

POLITICAL ACTION AND NEWS USE OF THE FRIDAYS FOR FUTURE MOVEMENT IN GERMANY

Factors impacting political action

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Dissertation

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Acknowledgement

My tired face is reflected in the dark window, interrupted by the flickering lights that illuminate the tunnel. The train speeds through the nocturnal landscape somewhere between Göttingen and Hanover and I stare out into the darkness and the reflection of my face in the window. I let my mind wander and think about the last few years: the insights, the experiences, the discoveries and the people who were there, with whom I sat on the train or who welcomed me at my destination.

I scroll through the photo album on my smartphone and look at the pictures of people who have accompanied me on this journey from the very beginning. My head lifts and the black behind the train window fills with memories. I think back to the first sections of the journey, the bus through the forest, the small-town library and the school on the hillside. The house with the large windows and the forest in sight. I can see the faces of the people who raised and accompanied me in this house in the black of the carriage window. I owe this journey to them.

The lights outside the window form a pattern, the city slides in front of my eyes. The train stops at a station and I take another gummy bear from the bag lying on the folding table in front of me. The sugar melts on my tongue and my thoughts wander to the first term paper I passed with the good will of the lecturer, to the fellow students I met and who still accompany me on one trip or another today. All the way to the countless conversations with my supervisors, co-authors and all the other people who inspired my thinking and encouraged me to write this thesis.

The conductor makes his way through the carriage and I think about the support I have received. From different people in different ways. They have all played their part in me and this thesis. They have encouraged me, smoothed my path, supported me with advice and knowledge or simply given me a hug. They have shared my thoughts, sweated in the sauna, played video games for hours, cried or

Danksagung

In der dunklen Scheibe spiegelt sich mein müdes Gesicht unterbrochen von den flackernden Lichtern, welche den Tunnel ausleuchten. Der Zug brettet durch die nächtliche Landschaft irgendwo zwischen Göttingen und Hannover und ich starre hinaus in das Dunkel und in die Reflexion meines Gesichts in der Scheibe. Ich lasse die Gedanken schweifen und denke an die letzten Jahre: an die Erkenntnisse, die Erfahrungen, die Entdeckungen und die Menschen, die dabei waren, mit denen ich gemeinsam im Zug saß oder die mich am Ziel in Empfang genommen haben.

Ich scrolle durch das Fotoalbum auf meinem Smartphone und betrachte die Abbilder von Menschen, die mich von Anfang an auf dieser Reise begleitet haben. Mein Kopf hebt sich und das Schwarz hinter dem Fenster des Zuges füllt sich mit Erinnerungen. Ich denke zurück an die ersten Teilstrecken, den Bus durch den Wald, die kleine Stadtbibliothek und die Schule am Hang. Das Haus mit den großen Fenstern und dem Wald in Sichtweite. Im Schwarz der Waggonscheibe sehe ich die Gesichter der Menschen, die mich in diesem Haus aufgezogen und begleitet haben. Ihnen verdanke ich diese Reise.

Die Lichter vor dem Fenster formen sich zu einem Muster, die Stadt schiebt sich vor meine Augen. Der Zug hält an einem Bahnhof und ich nehme mir noch ein Gummibärchen aus der Tüte, die vor mir auf dem Klapp Tisch liegt. Der Zucker zergeht auf meiner Zunge und meine Gedanken schweifen zu der ersten mit gutem Willen des Dozenten bestandenen Hausarbeit, zu den Kommiliton:innen, die ich kennen gelernt habe und die mich bis heute auf die eine oder andere Reise begleiten. Bis hin zu den unzähligen Gesprächen mit meinen Supervisoren, Ko-Autor:innen und all den anderen Menschen, die mein Denken angeregt und die mich ermutigt haben, diese Thesis zu schreiben.

Der Schaffner bahnt sich seinen Weg durch den Waggon und ich denke an die Unterstützung, die ich erfahren habe. Von unterschiedlichen Menschen auf unter-

simply put a beer on the table in the pub. They have all helped me and I am very grateful to them for that.

There's no beer in front of me right now, just the bright orange bottle of water that will disappear back into the black rucksack the next time I change trains. I imagine all the people I am so grateful to sitting on the blue seat of the ICE instead of the backpack. I hope they know how important they all were and are to me as companions on this journey. I hope these people are aware that this text is also thanks to them.

I see my face in the windshield as the random playback of one of my travel playlist "Riders on the storm" starts to play. The intro to the song sounds through my headphones. I think of the things and people that have always accompanied me on my travels: the headphones, the backpack, but above all the dedicated people in the background. These people were almost always with me but are not in any of the pictures in my photo album. I am also grateful to these people at the supermarket checkout, in the canteen, the administration and all the staff on the train for their support.

Being on the move can be exhausting, invigorating and enriching. The pictures on the smartphone screen show the places I visited, in an academic setting or for family, friends and partners. They show the small café in a park in Cádiz, the cliffs of Ireland, the valley basin of Jena, the rocks of Saxon Switzerland, a misty quay wall in Aarhus, snow-covered fields, the skyline of Frankfurt or a summit cross in the Alps. At all these stations, parents and siblings, colleagues, friends and partners got on the train with me and accompanied me on my and therefore our journey together. They have guided me through the rain, cheered me on as I sprinted to the train, made me laugh or encouraged me.

This journey is now about to change trains. The train slows down and the platform of the station moves in front of the window. It's time to board a new train or spend some time at the station. One way or another, this journey will be lined with insights, knowledge, people and experiences. The doors of the ICE open with

schiedlichste Art und Weise. Sie alle haben ihren Anteil an mir und auch dieser Thesis. Sie haben mich bestärkt, mir den Weg geebnet, mich durch Rat und Wissen unterstützt oder einfach in den Arm genommen. Sie haben mit mir Gedanken gewälzt, in der Sauna geschwitzt, stundenlang gezockt, geweint oder einfach ein Bier auf den Tisch in der Kneipe gestellt. Sie alle haben mir geholfen und ich bin ihnen dafür sehr dankbar.

Gerade steht kein Bier vor mir, sondern nur die hell-orange Wasserflasche, die beim nächsten Umstieg wieder in dem schwarzen Rucksack verschwinden wird. Ich stelle mir vor, wie statt des Rucksacks auf dem blauen Sitz des ICE all die Menschen, denen ich so dankbar bin, Platz nehmen. Ich hoffe, sie wissen, wie wichtig sie alle für mich als Wegbegleitung auf dieser Reise waren und sind. Ich hoffe, diesen Menschen ist bewusst, dass dieser Text auch ihnen zu verdanken ist.

Ich sehe mein Gesicht in der Scheibe als die Zufallswidrigkeit einer meiner Reiselists "Riders on the storm" zu spielen beginnt. Das Intro des Songs klingt durch meine Kopfhörer. Ich muss an die Dinge und Menschen denken, die mich auf meinen Reisen immer begleitet haben: die Kopfhörer, der Rucksack, aber vor allem die engagierten Menschen im Hintergrund. Diese Menschen waren nahezu immer dabei sind aber auf keinem der Bilder meines Fotoalbums zu sehen. Ich bin auch diesen Menschen an der Supermarktkasse, in der Mensa, der Verwaltung sowie dem ganzen Personal des Zuges dankbar für ihre Begleitung.

Unterwegs sein kann anstrengend, belebend, bereichernd und erschöpfend sein. Die Bilder auf dem Handy Bildschirm zeigen die Orte, die ich besucht habe, im akademischen Rahmen oder für Familie, Freunde und Partnerinnen. Sie zeigen das kleine Café in einem Park in Cádiz, die Klippen Irlands, den Talkessel von Jena, die Felsen der sächsischen Schweiz, eine neblige Kaimauer in Aarhus, verschneite Felder, die Skyline von Frankfurt oder ein Gipfelkreuz in den Alpen. An all diesen Stationen sind mit mir Eltern und Geschwister, Kolleg:innen, Freund:innen und Partnerinnen in den

that unmistakable beep and I set my feet on the station's flagstones, my black backpack on my back. I am grateful to have reached this station. I am grateful for the part of the journey that lies behind me, the people and the experiences I have had. My feet carry me down the white steps from the platform into the station in the direction of the next train.

Many thanks to all.

Zug gestiegen und haben mich auf meiner und damit unserer gemeinsamen Reise begleitet. Sie haben mich durch den Regen geführt, mich beim Sprint zum Zug angefeuert, mich zum Lachen gebracht oder mir Mut gemacht.

Auf dieser Reise steht nun bald ein Umstieg bevor. Der Zug verlangsamt seine Fahrt und die Plattform des Bahnhofs schiebt sich vor das Fenster. Es wird Zeit, einen neuen Zug zu besteigen oder etwas Zeit am Bahnhof zu verbringen. Auf die eine oder andere Weise wird dieser Weg von Erkenntnissen, Wissen, Menschen und Erfahrungen gesäumt sein. Die Türen des ICE öffnen sich mit diesem unverkennbaren Piep-Ton und ich setze meine Füße auf die Platten des Bahnhofs, den schwarzen Rucksack auf dem Rücken. Ich bin dankbar, diesen Bahnhof erreicht zu haben. Ich bin dankbar für die Teilstrecke, die hinter mir liegt, die Menschen und die Erfahrungen, die ich machen durfte. Meine Füße tragen mich die weißen Treppen von der Plattform hinunter in den Bahnhof in die Richtung des nächsten Zuges.

Vielen Dank an Alle.

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List of abbreviations

e.g.	exempli gratia / for example
i.e.	id est / that is
ca.	circa
FFF	Fridays for Future
ESM	Experience sampling method
DIY	Do it yourself

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1 Introduction and context

When we think of political action, we often directly think of protest. We think of crowds of people who push themselves through the streets with flags, signs, and slogans, of activists climbing tree houses in the Hambacher Forest¹ at breath-taking heights. However, this picture of political action is far from complete and only covers a fraction of the actual political action. The range of possible actions and activities is correspondingly large and is currently expanding with the spread of the Internet. Political action and social protest take place in both offline and online environments in the most diverse forms (Jungherr et al., 2020). One of the best examples of this development is the climate movement. The mobilization of millions of young people around the world under the banner of Fridays For Future (FFF) is a historic turn in climate activism (Wahlström et al., 2019). Never before have so many young people taken to the streets to call for more climate action through the symbolic disobedience of a school strike, demonstrations, or other protest actions. On March 15, 2019, some 1.4 million protesters around the world attended the youth strike for action on climate change (Barclay, 2019). The Swedish teenager Greta Thunberg founded the climate strike as a form of protest by younger generations for more and stricter measures against climate change. The strikes, which were mainly supported by younger people and students, initially lasted for more than a year. Under the hashtag *#fridaysforfuture*, young people demonstrated against the current climate crisis every Friday. The strike continued into 2021, with more and more young demonstrators taking to the streets to inform governments, parties and politicians about the climate crisis (Boulianne et al., 2020). Public attention has been considerable. No youth movement has ever experienced such a worldwide reception (Wahlström et al., 2019).

In Germany, the actions and demonstrations of the Fridays for Future movement were accompanied by a great media response and also met with the approval of some political actors (Wahlström et al., 2019). The German branch of the movement has found a young female personality in Luisa Neubauer, who acts as a media figurehead. The public image of active Fridays for Future activists is strongly oriented towards her. In terms of age, gender, and education, the supporters of the Fridays for Future movement largely correspond to this image in Germany (De Moor et al., 2020; Wahlström et al., 2019). The supporters of the Fridays for Future movement tend to be young, female, and well educated (De Moor et al., 2020). In the wake of the COVID-19 pandemic and the restrictions imposed on gatherings, Fridays for Future's visibility-raising activities have been curtailed. The movement has undergone some changes since its existence, which are also expressed in the form of the chosen protest. For example, by providing support for more radical groups that engage in riskier forms of protest,

¹ The Hambach Forest was occupied by climate activists to protest against the destruction of the forest for coal mining, it is located in Germany near Cologne.

such as the forest occupations in the Hambacher or Dannenröder forests. Where activists fought against the clearing of the forest areas. Overall, the Fridays for Future movement in Germany is an interesting example of political activism and political action in various forms, ranging from digital actions to the involvement of forest occupations and civil disobedience.

A large proportion of Fridays for Future supporters are part of a younger generation that has grown up with digital and social media and for whom they are an integral part of their everyday lives. The emergence of social media has had a clear impact on the phenomenon of political action (Papacharissi, 2015) such as the establishment of more digital forms of participation that reflect the relevance of digital and social media in the lives of younger generations. This has led to a shift in the repertoire of political action (Theocharis & van Deth, 2015). As a protest movement, Fridays for Future is also anticipating the changes in the media landscape and the new possibilities for organization and participation that this brings, such as groups or channels on Messenger apps, Instagram content, or the publication of their own Fridays for Future app. Political information such as background knowledge on climate change, current politically relevant developments, and calls for concrete actions are generated, disseminated, and liked both by the group and by individuals (De Moor et al., 2020; Kümpel et al., 2015). In this way, the political cause becomes more visible in the digital environment and, through spill-over effects, also in the more traditional media environment (Hölig, 2018), and a *group identity* and sense of community are strengthened within the circle of supporters (Alberici & Milesi, 2016), as well as mobilized for joint actions (Boulianne, 2009; Boulianne et al., 2020; Boulianne & Theocharis, 2020).

Against this background, the reception of media, especially political information, plays an important role in the functioning of protest movements as well as for democracies as a whole (Carpini & Keeter, 1996; Mitchelstein & Boczkowski, 2010). They enable the supporters of Fridays for Future to find out about current social and political events. In this way, the reception of media content affects the formation of opinions and attitudes on political issues such as climate change.

When it comes to obtaining political information, smartphones and social media applications play a particularly relevant role for younger generations, which include the supporters of Fridays for Future (Hasebrink et al., 2021; Hölig et al., 2020). The smartphone differs from more traditional media devices in its constant availability, the short but frequent usage sequences, and the large number of possible functions and applications that can be used on the device (Humphreys et al., 2018; Karnowski, 2020). Accordingly, the study of mobile information use is a relevant but at the same time complex undertaking, which, in particular due to the many possible usage situations and forms, needs to be placed in a broader context in order to be able to draw the correct conclusions (Toth, 2021).

1.1 The contribution of this work

This thesis aims to contribute on the one hand to a theoretical and empirical research interest, which aims at the question of the modes of use of supporters of Fridays for Future, and on the other hand to a more methodologically oriented question, which rather aims at the forms of measurement and analysis of automated mobile tracking data.

1.1.1 Theoretical and empirical contribution

The use of media, especially political information, is closely linked to the functioning of democratic societies on a societal level and political engagement on an individual level (Mitchelstein & Boczkowski, 2010). The relevance of information use, such as reading newspapers, following the news broadcast, and reading political updates on social media, for political opinion formation and for willingness to get involved politically is often assumed (Carpini & Keeter, 1996). For politically active individuals, it can be assumed that a basic level of political information is a prerequisite for political engagement. Studies show that there is a connection between *political interest* (Holt et al., 2013; Strömbäck et al., 2018), news consumption, and willingness to become politically involved (Ksiazek et al., 2010). Accordingly, there is a relationship between media and information behavior and political participation.

Research shows the relevance of media and information use, but the form and context of media and information use behavior are still a blank slate, especially with regard to political participation. The question is “what” media and information behavior looks like and whether there is a pattern in terms of forms of political participation. Particularly against the backdrop of newer forms of political participation that draw heavily on the possibilities, functions, and usage habits of social media platforms (Theocharis & van Deth, 2015), a connection between the type of usage and political participation seems obvious.

However, in this case, too, there is the question of whether the existence of the possibilities for using social media determines political participation with the help of these platforms or whether it is behavior within and in the context of these platforms. **Accordingly, a central empirical question of this work is the extent to which the nature and form of information and media usage behavior has an influence on the forms of political participation.** In other words, the question is to what extent the manner of use in the form of routines, habitualized behaviors and their context have an influence on the forms and nature of political participation. In this thesis, I would like to contribute to answering this question by looking at usage behavior and trying to identify patterns in relation to the forms of participation used.

Young supporters of Fridays for Future are suitable for (partly) answering this question because they are politically engaged, interested in politics, and more likely to consume political

information. Accordingly, this is a group that is both politically active and highly likely to consume political information. Consequently, I assume that the existence and frequency of use of political information are relatively stable and provide a better view—more independent of frequency—of usage patterns and behavior. The supporters of Fridays for Future, as part of a younger generation, are also highly likely to use mobile and digital media devices (Hasebrink et al., 2021; Hölig et al., 2020), which makes it easier to record their political information use.

Accordingly, this thesis aims to contribute to the elaboration of user behavior, its context (e.g. smartphone use in the course of the day), and its possible relationship to forms of political participation for supporters of Fridays for Future.

1.1.2 Methodological contribution

With the advent of mobile usage and the high relevance of mobile media as a source of political information, there is an increasing need for adequate measurements of mobile usage behavior. More established methods for data collection, such as surveys, lack – for some research questions – the needed accuracy and depth (Parry et al., 2021). Tracking as a form of data collection offers a possible solution, but tracking—especially mobile automated tracking—lacks established measurement forms, quality criteria, and best practice examples. **Against this background, this thesis answers the central methodological question of the extent to which automated mobile tracking data can be collected, operationalized and analyzed and what limits the methods have.** This thesis aims to partially fill the above gap and provide a best practice example for mobile automated tracking, operationalization, and analysis of automated tracking data.

A challenge when working with (mobile) automated tracking data is the operationalization of the preparation of the measurement without losing too much of the collected information. Most of the known studies in communication science aggregate the data collected by automated tracking to total usage times without preparing the context of usage (e.g.: Stier, Kirkizh, et al., 2020; Vogler et al., 2023). The usage context includes, among other things, the app used before or after, the social or geographical environment or the usage time during the day. This context is at least partially present in most automated tracking data and can be captured through appropriate operationalization, such as in usage sessions (Peng & Zhu, 2020), and structured into analyzable and interruptible units of meaning. This thesis shows the implementation and possibilities of operationalizing mobile media use in the form of sessions as a way to handle large amounts of data and keep relevant contextual information.

In addition to the operationalization of usage behavior, the identification of politically relevant parts of mobile usage poses a challenge. Identifying political information in media consumption is fundamentally a complex task, but it is made more difficult by the special characteristics of mobile media use already mentioned, in particular the large number of applications and their

short usage durations. The development of measurement instruments for politically relevant content is an important component of empirical research with mobile devices, as it is often the content that is of interest in communication science. Accordingly, this thesis presents two ways of measuring political exposure. The first measuring instrument relies on a combination of self-report and automated tracking data, while the second measuring instrument relies on the use of screen recording as a further automated tracking method.

Due to the different applications of automated tracking and its connection with other data collection methods, this thesis shows and discusses the strengths of automated tracking as a data collection method. At the same time, the practical application reveals limitations and blind spots in the method. Among other things, it is about the possibilities and limitations of measuring and interpreting human, digitally captured behavior as it is done through automated tracking. The thesis reflects on the recording and evaluation of behavioral patterns across individuals as well as the limits of this, especially in the case of deeply individual actions that arise in a specific context of a personal lifeworld and that are difficult or impossible to interpret from the outside without the necessary contextual knowledge. Accordingly, these are questions about the limits of interpretability, although measurement of behavior is possible.

In this way, this thesis contributes to the further development and testing of the methodological toolbox of communication science through the application, operationalization, and reflection of mobile automated tracking.

1.2 Structure of this work

This thesis aims to investigate the (mobile) media usage behavior of supporters of the climate protest movement Fridays for Future and shed light on the relationship between political information and media usage behavior and the chosen forms of political participation.

To this end, Chapters 1.3 and 1.4 provide an introduction to the German political and media system, in which the functioning of representative democracy, federalism, the media system, and political culture in Germany are presented as relevant background knowledge. Following this, Chapter 1.5 provides a historical outline of the climate movement in Germany in general and the emergence of Fridays for Future in particular.

In the theoretical framework of the thesis, the relevance of political information for a democratic society is first highlighted in chapter 2, before the interlocking of (non)political media and climate protest is pointed out and the change in protest and activism is briefly described in chapter 2.2. This is followed by a review of the current state of theory and research on citizens' exposure to and interaction with political information in Chapter 2.4, which discusses the current status of the use of political information (2.4.1), mobile information use (2.4.2), information repertoires (2.4.3) and engagement with political content (2.4.4). In the next section of the

theoretical background (chapter 2.5), we look at the complex interplay between political information and participation. Here, we look first at direct relationships (2.5.1), then at indirect relationships (2.5.2). The latter include the role of social networks (2.5.2.1), digital platforms (2.5.2.2), the relevance of political talk (2.5.2.3) and psychological factors (2.5.2.4). The following chapter 2.5.3 then presents the influence of the factors presented for the climate protest. In chapter 2.3, different forms of political participation are shown.

In the following section of the thesis, an interim status is drawn, which summarizes the relevance of political information and the complicated borderline (chapter 3), describes the current state of knowledge on political information, and reflects the complex entanglement of political information and participation, pointing out the respective research gaps and formulating the research questions.

This is followed by the presentation of the chosen research design and methodological approaches in Chapter 4. In this chapter, the overall research design and the advantages of a case study (4.1), mobile automated tracking (4.3), online surveys (4.4) and screen recording (4.5) are discussed. The data collection for both mobile tracking (4.7.1) and screen recording (4.7.2) is discussed. The online survey and the selected measurement methods are described in Chapter 4.8. This is followed by an explanation of the most important steps of the data preparation (chapter 4.9), which includes the mobile sessions (4.9.3), app categories (4.9.2) and further steps. In the next chapter, 4.10, the operationalization and the analysis strategy per research question will be presented. This includes the measurement and analysis of usage patterns (4.10.1), information repertoires (4.10.2), *mobile political exposure* (4.10.3), the relationship between information usage behavior and participation (4.10.4).

Subsequently, the results of the work are presented. First, the usage patterns are discussed in Chapter 5.1. This is followed by a presentation of the identified information repertoires in Chapter 5.2, before *mobile political exposure* (5.3) and the relationship between political information behavior and participation are discussed in Chapter 5.4.

In the discussion part of the thesis, the obtained results are placed in a broader context, which happens in Chapter 6.1 for mobile usage patterns. In chapter 6.2, the information repertoires are placed in a broader context. In chapter 6.3, *mobile political exposure* is addressed, followed by a discussion of the relationship between political information use and participation. The last part of the thesis is the theoretical and methodological limitations (6.5) of the thesis, as well as the outlook in chapter 7.

1.3 The democratic system in Germany

Protest, as well as any form of political participation, does not take place in a vacuum but is embedded in a political system with all its different components and logics. When we look at

the political participation of supporters of Fridays for Future in this thesis, we should also familiarize ourselves with the context in which the different forms of participation are exercised.

The Fridays for Future protests are an example of the fact that in Germany's democratic society, citizens are not only the addressees of politics but can also actively participate in shaping it by being allowed to express their political opinions without hindrance and by being able to defend themselves against government measures both civically, politically, and legally (Grotz & Schroeder, 2021). Accordingly, citizens are involved in the formation of political will, and their articulated interests are taken into account by politics. However, the way in which the interests and concerns of individuals and groups are considered is complex and not always easy to understand (Grotz & Schroeder, 2021). One possibility is free elections in which all citizens can participate equally and in which they can choose between several different candidates and parties. These general and competitive elections are a central criterion for democratic systems such as Germany (Dahl, 1971).

In addition to free elections, the principle of separation of powers exists in Germany to ensure that elected representatives do not exploit their position of power. For this purpose, there is an institutionalized separation of powers, which includes the legislature (among others, the Bundestag, Bundesrat), the judiciary (the federal and state courts) and the executive (among others, the federal government and the state governments). These control each other and thus uphold the principle of separation of powers.

When describing the functioning of the democratic system in Germany, the term governmental system is usually used (Croissant, 2010). This encompasses those structures that are involved in the formation of political will and decision-making (Grotz & Schroeder, 2021). In Germany, the system includes, among others, the federal and state governments as well as the parliament and the federal president, which exercise executive and legislative functions and thus represent the center of decision-making. This center is flanked by the various courts, as well as the administrations and the relevant institutions, organizations, associations, political parties, and media at the federal and state levels (Grotz & Schroeder, 2021).

Political parties form the organizational core of German representative democracy. The parties serve as mediators between citizens and political and public offices by seeking entry into parliament and government, where they represent the interests of citizens and deliver on promises made during election campaigns (Grotz & Schroeder, 2023). In this way, they occupy a mediating position between society and the center of political decision-making. Despite or precisely because of this important function, parties in Germany are facing complex challenges. On the one hand, the membership of political parties is declining, and the fragmentation and polarization of the party landscape are increasing (Fletcher & Jenkins, 2019), making it more difficult to form governments (Grotz & Schroeder, 2023).

The party landscape in Germany has been in flux for some years now, as established parties have come under pressure from new parties. The party system in Germany consists of the conservative parties of the CSU and CDU, which work together at the federal level and see themselves as the people's party. On the other hand, there is the social democratic SPD, which also sees itself as a party of the people and traditionally sees itself more as close to trade unions and employees. In addition, there is the economically liberal, conservative FDP, which is a rather small party that repeatedly fails to clear the 5% hurdle in individual state elections. Furthermore, the party Bündnis 90/ Die Grünen (Alliance 90/Green Party) exists, which is primarily involved in environmental and climate policy issues and emerged from the anti-nuclear movement. On the left of the political spectrum, there is still the Die Linke (Left Party), which sees itself as an emancipatory opposition party. In contrast, the AfD is gaining voters as a right-wing conservative, populist, and, in some cases, extreme right-wing party. Structurally, the parties in Germany are based on the state party associations. They stand for election at both the state and federal levels and, depending on the party, form governing coalitions in state parliaments. At the federal level, the major parties form federal associations. This principle is also found at the European level, where the major German parties are each united in a political party.

For citizens in Germany, elections represent the direct and central form of participation in the political process by making an electoral choice to fill political offices, choosing from a variety of content and personnel options (Grotz & Schroeder, 2021). Elections for the various parliaments (federal and state level) result in government majorities in which several parties form a governing coalition. A central prerequisite for this is the right to vote, which gives German citizens the opportunity to actively participate in elections and to be nominated for them. Furthermore, German electoral law follows the four principles of (1) universal voting, (2) equal voting, (3) secret ballot, and (4) direct election (Grotz et al., 2017). In Germany, all voters have two votes that can be cast independently of each other. The first vote is used to elect a candidate in the electoral district, while the second vote is used to elect a state party list (Grotz et al., 2017). As already mentioned, in Germany, both the Bundestag and the federal state parliaments, as well as the European parliament, are elected by the citizens.

Germany is a federal state. The federal tradition in Germany is already historically established and can be traced back to the existence of the Holy Roman Empire, which already consisted of a collection of different territories. Accordingly, Germany has not historically developed a political-administrative center that would have forced the establishment of a centrally organized unitary state, as in France, for example (Grotz & Schroeder, 2021).

When the Federal Republic of Germany was founded, this tradition was taken up again (Boldt, 2003) and constitutionally safeguarded. The federal structure provides for a division of tasks

between the federal government and the states, in which the federal government is responsible for the majority of legislation and the states are responsible for the greater share of law enforcement. In addition to these extensive administrative responsibilities, the Länder have the opportunity to help shape national legislation within the Bundesrat (Grotz & Schroeder, 2023).

This form of cooperative federalism has both positive and negative effects on the functioning of the democratic system in Germany (Benz, 2009). One positive aspect is the high degree of proximity to citizens, which can reflect and address different regional interests. Furthermore, the orientation toward uniform federal standards enables a high level of individual equality of opportunity. One problem, however, is that the strong interdependence and the numerous political actors involved make it difficult to understand the political decision-making process. The large number of party and state interests in this process also often leads to political compromises based on the lowest common denominator and to the blocking of national reform projects by the federal states (Grotz & Schroeder, 2021).

1.4 The German media system

The media play an important role in Germany's democratic society. They serve as a source of information for citizens, act as an intermediary between citizens and politics, and influence the formation of political opinion. Furthermore, they are often understood as the public control authority of politics and are therefore also referred to as the "fourth estate" (Bergsdorf, 1980). In order to fulfill the above-mentioned functions, the media system in Germany is relatively diverse and is characterized by a broad and independent spectrum of opinion (Ribeiro et al., 2018). Ensuring this independent and broad spectrum of opinion within the German media system became more complex with the emergence of digital platforms and social media.

The mediating and informing functions of the German media system are guaranteed by the state within a regulatory framework. First, as a guardian of competition, the state safeguards freedom of expression and regulates the media market, although it does not influence broadcasting. However, the Federal Republic of Germany does not rely solely on the free market but has established a qualitative and informative broadcaster in the form of public broadcasting. Here, however, there is a theoretical danger that the independence of public broadcasting could be threatened by political influences. Accordingly, the German state moves in a field of tension between competition control and quality assurance (Grotz & Schroeder, 2023).

These statutory regulatory measures are flanked by various forms of media self-regulation. Self-control relates both to journalistic professional ethics and to ensuring free reporting (Eberwein, 2020; Eberwein et al., 2011). To this end, various institutions exist in Germany: the so-called German Advertising Council, the Voluntary Self-Regulation of Television, and the Voluntary Self-Regulation of Multimedia Service Providers (Stapf, 2005, p. 26). There is also

the German Press Council, which monitors compliance with voluntarily imposed standards in the print sector. For this purpose, there is the so-called Press Code, whose violation can be reported to the Press Council (Baum et al., 2005).

In Germany, the media landscape is highly differentiated in terms of content and organization. In the print media sector, Germany is the largest newspaper market in Europe (Schnücker, 2010, p. 61). The print sector is privately organized and is characterized by its size and the breadth of its offerings (Hölig et al., 2020; Schnücker, 2010, p. 61). The high number of more than 300 daily newspapers is largely covered by regional and local subscription newspapers (Keller & Eggert, 2023). In addition, there are significantly fewer national daily newspapers (including BILD, Süddeutsche Zeitung, Frankfurter Allgemeine Zeitung, and die tageszeitung), 17 weekly newspapers (including Die Zeit), and three Sunday newspapers (Keller & Eggert, 2023).

Despite its size, the German media landscape, and the press landscape in particular, is undergoing massive upheaval, which has been driven in part by the establishment of digital and social media offerings (Chadwick, 2017). One effect is greater organizational concentration in order to be able to offer a stronger cross-media presence and product range. Whereby multi-media, cross-regional content, and foreign news are sourced from global news agencies (Grotz & Schroeder, 2021). Furthermore, the number of consumers of print media is declining. Here, the proportion of regular newspaper use is decreasing (Keller & Eggert, 2023). This leads to economic challenges for publishers since advertising revenues and sales figures are falling. Which leads to closures and mergers of regional newspapers, price increases and reductions in the number of employees, and a low diversity of offerings (Seufert & Wilhelm, 2013).

In contrast to the print media, broadcasting in Germany was organized exclusively under public broadcasting for many years (Grotz & Schroeder, 2021). These include the nine state broadcasting corporations, which are united in the ARD (Association of Public Broadcasting Corporations in the Federal Republic of Germany), the Second German Television (ZDF), the Deutschlandradio, and the Deutsche Welle. Private broadcasting was not permitted until 1984, resulting in a dual system. In order to prevent market concentration and opinion power, the so-called Commission for Determining Concentration in the Media Sector (KEK) exists (Grotz & Schroeder, 2021). Against this background, radio and television broadcasting in the Federal Republic is characterized by a high degree of diversity, both at the local and national level. This diversity of offerings includes, among others, the private channels (including Sat1, Pro7, RTL and Vox), which are largely owned by the media conglomerates Bertelsmann AG, Axel Springer Verlag, and the ProSiebenSat1 Group. In addition, there is public broadcasting on ZDF, ARD, Phönix and the third channel.

In addition to the aforementioned media offerings, digital platforms and social media represent an important source of information whose relevance has been steadily increasing within the last few years. Depending on the perspective, this development can have political and contextual effects that promote emancipation and democracy (Jungherr et al., 2020; Lorenz-Spreen et al., 2022), in that groups that were previously unseen in society can organize themselves more easily and have more opportunities for visibility. At the same time, this also brings undesirable effects and challenges, including more emotional, moralistic, and group identity-based dissemination of information (W. Brady et al., 2020; Brady et al., 2017; Toepfl & Piwoni, 2015), up to and including alternative news (Sandberg & Ihlebæk, 2019) and fake news (Rampersad & Althiyabi, 2020) and hate speech (Kaspar et al., 2017). Nevertheless, there are intersections between digital and more traditional media offerings, which include online news sites of established print media (e.g. DER SPIEGEL) as well as a digital presence of public broadcasters on various digital platforms (bpb, 2021). Social media are not only used by citizens, but politicians are also increasingly using digital and more direct communication channels as an efficient and resource-efficient way of sharing their own presentations and information directly with citizens (Stier et al., 2018).

The establishment of digital media formats in Germany has led to an intensification of media competition, which has resulted in a hybrid media system of coexistence between analog and digital media formats (Chadwick, 2017). In this hybrid nature of the media system, the opposing logics of politics and the media are reinforced. Two lines of tension in particular can be identified here (Meyer, 2002). The first is “political process time” versus “media production time”, which highlights the different temporal parameters of politics (slower, mediating) and media (immediate and fast) (Meyer, 2002). Second, the tension between factuality and attention, which describes, somewhat casually, the tendency of the media to report catchy, sensational, and exciting topics (Grotz & Schroeder, 2021).

This development has led to scholarly discussion of the shift away from a party democracy to a so-called media democracy (Müller, 1999). What is indisputable is the shift from analog to digital communication behavior, which poses new challenges for the relationship between citizens, politics, and the media (Jarren & Donges, 2011). Statements expressed on digital platforms such as Twitter (now X), Instagram, or Facebook can impact democratic discourse, including mass media coverage (Hölig, 2018), political actors (Jungherr et al., 2020), as well as individuals (Alberici & Milesi, 2013). Amplified topics and statements are often emotional (Berger & Milkman, 2012), morally laden (W. Brady et al., 2020), and contain references to *group identity* (Toepfl & Piwoni, 2015). This is eroding the gatekeeper function of traditionally established media providers (Neuberger, 2009).

Overall, following Chadwick's line of argument, Germany's media system can be described as a hybrid media system in which established media are coming under increasing pressure from digital platforms and social media but still have a relevant role in reporting and the opinion-formation process.

1.5 Climate change movement & Fridays for Future in Germany

In order to understand the context of the emergence of Fridays for Future in Germany, we need to look at the climate movement. I follow the argumentation of Kössler (2013), who concludes that we can speak of a climate movement in Germany since politically intervening and networked collective actors with a common collective identity carry out symbolic interactions over a longer period of time (Raschke, 1985 as cited in Kössler, 2013). In this regard, the climate movement in Germany is not alone but joins a number of other movements, which include the peace, queer feminist, or anti-nuclear movements, among others.

In Germany, the climate movement can be traced back to the turning away of various groups from the mainstream climate policy, consisting of established NGOs and parties, because they no longer saw themselves represented. Activists from the anti-globalization, anti-nuclear, and peace movements, as well as anti-fascist groups, took up the issue as the climate debate progressed, bringing with them both a more radical practice and a more distinctive theoretical background (Kössler, 2013). In this environment, autonomists, members of the 1968 movement, and young ecologically motivated people came together. In the course of this, the commitment to climate protection and other ecological issues was backed by a system-critical worldview (Kössler, 2013). In implementing the goal of climate justice, the German climate movement often appears to be against something rather than for something (Kössler, 2013).

In addition to the theoretical background, the German climate movement also adopted practice-oriented concepts, such as the climate camp. The concept of the climate camp was transferred to Germany by activists from England and serves as a grassroots gathering that served both as an exchange and learning space for alternative ideas and approaches to a more climate-friendly vision of society and as a practice-oriented starting point for political actions and strategies (Bedall et al., 2011).

The German climate movement's distance from the Bündnis90/Die Grünen party intensified with the first conservative-green state government in Hamburg in 2008, which broke an election promise by approving a coal-fired power plant (Kössler, 2013). This intensified activists' impression that the party should be considered a political opponent. Parallel to this debate, the first nationwide climate camp took place in Moorburg near Hamburg, the site of the newly approved coal-fired power plant (Kössler, 2013).

Kössler (2013) describes the preparatory meeting in Copenhagen in 2009 as the birth of the international climate movement. Here, activists from different countries met, among them a strong group of German activists. In the course of the meeting, actors of the emancipatory left forced a conflict about the content and forms of participation of the movement. This process was also an important process of discovery and differentiation for the German climate movement, in which the legitimacy of “inside” activism in negotiations, in the form of lobbying, as opposed to “outside” activism, which includes various forms of protest and demonstrations, was addressed and the relationships between the two approaches were discussed (Kössler, 2013). This process produced three factors relevant for the future, which included a fundamental change in the field of climate protest-oriented NGOs, the spread of climate camps, and the strengthening of globalization-critical voices in the climate discourse (Bedall, 2014).

Following the UN climate summit in Copenhagen, the German climate movement turned to local struggles. In the years that followed, several climate camps were organized and held in the Rheinland, Lausitz, and Hambacher Forst, among other places (Kössler, 2013). During this time period, two directions of the climate justice movement formed. The first is understood as a socio-ecological direction, which focused primarily on model projects in urban space with the goal of promoting alternative climate justice ideas and approaches outside of its own milieu (Sander, 2016, 2017). The second direction advocates the rapid and massive reduction of greenhouse gases. In Germany, this part of the movement focused on the lignite industry (Sander, 2017). Against this background, the organization Alliance Ende Gelände was founded in 2015, which organizes large-scale annual actions mainly in German lignite mining areas, especially the Rheinland and Lausitz. In these actions, Ende Gelände mobilized several thousand people to blockade coal excavators, single-track railroads, such as the Hambachbahn tracks in 2018, or other coal-related infrastructure.

This was the ground on which the impulse of the then 15-year-old Greta Thunberg fell, who first attracted the attention of Swedish media and later other countries, including Germany, in her three-week “school strike for the climate” that began on August 20 (Sommer et al., 2019; Wahlström et al., 2019). Greta Thunberg became a media star relatively quickly and was subsequently invited to the Climate Summit in Katowice in December 2018 (Sommer et al., 2019). The idea of the climate or school strike was adapted relatively quickly by others. In Germany, the first demonstrations took place in Freiburg, Göttingen, Berlin, Kiel, and Flensburg in December 2018 (Sommer et al., 2019).

An internationally networked organizing body made it possible to establish the global climate strike, which took place for the first time on March 15, 2019, and in which more than 1.7 million people worldwide are said to have participated, according to the organizers (Sommer et al., 2019). In Germany, more than 220 protests were announced that day, in which about 300,000

people participated. Thus, the global climate strike was the largest appearance of the movement until then (Sommer et al., 2019).

A few months later, Fridays for Future mobilized for the first international strike in Aachen, Germany, on June 21, 2019, under the slogan “Climate Justice without Borders - United for a Future”. The location has a high symbolic significance due to its proximity to the border as well as being the site of lignite mining. Civil resistance was also announced for the international strike, which was not carried out by Fridays for Future but by Ende Gelände. Fridays for Future expressed solidarity with Ende Gelände but did not directly call for participation in civil resistance. It is likely that there is overlap between the supporters of the two groups (Sommer et al., 2019).

In the wake of the Corona pandemic, protests leveled off. Fridays for Future tried to generate attention through other forms of action, such as the laying of 10,000 posters on the green space in front of the Bundestag on April 24, 2020 and streaming the action. Decentralized protests and vigils with smaller groups took place as part of the Global Strike on September 25, 2020. Before the 2021 federal election, large-scale protests took place in 470 communities, which enabled FFF to place the climate issue as a relevant topic in the election campaign.

In the following year, Fridays for Future again mobilized for a global climate strike, in which more than 280,000 people participated in 270 cities in Germany. The focus was on ecological and social issues as well as solidarity with the protests against lignite mining and the demolition of the village of Lützerath. This line was continued in 2023 with the simultaneous warning strikes of the service union ver.di in public transport and the global climate strike, in which, according to the organizers, more than 220,000 people participated.

Overall, Fridays for Future builds on the partly more radical ideas and forms of action of the climate justice movement in Germany but sees itself as a broader and more accessible group.

2 Political information and participation

In our everyday lives, we need a range of information to make conscious or unconscious decisions about the direction of our day, week, or life. This applies to everyday life as well as to politics. However, the majority of politically and socially relevant information is not directly accessible to us, the individual citizens. Citizens are therefore dependent on a mediating instance, which in modern information societies is both the mass media and the digital media. In Germany, news and media outlets represent an important key point in the transmission of political information. The reception of media, especially political information such as news, plays an important role in the functioning of democracies (Carpini & Keeter, 1996; Mitchelstein & Boczkowski, 2010). It enables citizens to obtain information about current social and political events. In this way, the reception of media content impacts the formation of opinions and attitudes toward political issues. They are key instances of political mediation and mediate and influence political communication accordingly (Sarcinelli, 2011, pp. 64-66). Political information is therefore the basis for political participation, which is often conveyed through the media and thus indirectly influences the political behavior of citizens.

Accordingly, the exchange of information is an important function for the functioning of democratic societies, in which the concept of the informed citizen plays a central role. The informed citizen is a basic assumption of most theories of democracy. Citizens should know which political issues are relevant and recognize the different positions of parties and candidates on them (Wolling & Emmer, 2014). Furthermore, citizens should form their own opinions on this basis against the background of their own values, norms, and interests, which are reflected in their political participation (Wolling & Emmer, 2014). The ideal of the well-informed citizen goes back to Alfred Schütz (1946), who distinguishes between “experts”, who have distinct knowledge in limited areas, and the “man in the street”², who relies on working knowledge that is not comprehensive or complete but sufficient to cope with his everyday life. The “well-informed citizen” is between these two types (Schütz, 1946). Citizens need information about current developments, background knowledge, and information about political actors in order to make the best possible decisions in the electoral process or to express themselves politically and engage in other forms of political participation outside of elections. The basis for this is the functioning transmission of political information.

We refer to the aforementioned functioning transmission of political information as political communication. The central aspect of information transfer, or communication, is the transmission of meaning between living beings (Maletzke, 1963, p. 13). Communication basically refers to the exchange of information, more precisely to all transmission and exchange processes of

² At this point, I would like to suggest the term “average citizen” as a gender and class-neutral form of “man of the streets”.

meaning content (Geise, 2017), which in our case can be information, opinions, or assessments of political events. The transmission of these meanings can take place through speech as well as through non-verbal and visual elements (Reinemann, 2014). Specifically, I can express my opinion about a politician through a verbal exclamation, my facial expressions and gestures, or through a digital meme. Regardless of this, a mediating instance is needed. This instance is called a medium and can be specified technologically (as in mass media or digital communication) or personified (interpersonal communication). Accordingly, my expression of opinion about a politician can take the form of a post on Instagram, for example, or a personal conversation in the pub. The communication process mediated by the medium can be interactive or one-way (Geise, 2017), which means: either someone answers or they don't. Following Lasswell (1948), it essentially comprises six components: (1) the communicator, in our example, me; (2) the content of the communication, my opinion of the politician; (3) the medium, my voice; (4) the receiver, the person sitting opposite me; (5) the effect of the communication, his or her answer; (6) and the conditions of the communication situation, the loud, drunken environment in the pub.

To stay with this example, not everything that is discussed in the pub this evening is political and is therefore not relevant for political behavior. According to Denton and Woodward, political communication occurs when (1) the communicative act is carried out by politicians and other political actors to achieve specific goals; (2) it is communication directed to political actors by non-politicians such as voters, columnists and bloggers; and (3) communication about these actors and their actions takes place in news reports, editorials and other forms of media debate about politics (McNair, 2011, p. 4).

What is striking here is that my talk about the politician in the pub would not fall under any of these defined points³. However, interpersonal political conversations between citizens, political actors, and journalists are seen as highly relevant to the political process and the flow of information within society (e.g. McNair, 2011). The reason for this lies in the difficulty or impossibility of recording and analyzing this form of political communication (McNair, 2011, p. 4). Fortunately, there is no microphone to record the drunken expression of my opinion about the politician. However, the use of novel methodological approaches in this thesis allows for at least a partial recording of this interpersonal political communication when it is done via a mobile device. With this in mind, this thesis adds the item (4) interpersonal communication about political actors and their activities mediated by mobile devices to the definition of political communication. According to this, my conversation in the pub would still not be recordable, but the WhatsApp chat with my friend would be.

³ I am aware that I am not the first to criticize Lasswell's formula and I would like to take this opportunity to refer to the diverse literature available, such as the essay by Sapienza, Iyer, & Veenstra (2018)

However, besides talking to the pub, citizens have a variety of ways to get information about political events and actors. In the context of political communication, the transmission of information is described as an information function (Geise, 2017). This can take place in different ways. The different forms range from face-to-face communication, such as in the pub, to various forms of mass communication (print newspapers, TV, radio) and digital communication (social networks, messenger apps). Here, the term mass communication describes a one-way, indirect, and technically mediated form of public communication directed at a large, dispersed audience that is separated in space and time (Maletzke, 1963, p. 28). The people communicating are spatially separated from each other; they usually do not know each other personally, and there is usually no opportunity for direct feedback (Geise, 2017). In contrast, digital communication usually offers the possibility of feedback in the form of media-mediated interaction (e.g. through comments, postings, ratings, likes). This leads to a softening of the formerly rigid separation of mass media and interpersonal communication (Geise, 2017). This has some implications, which are discussed in more detail in the following chapter.

Another relevant function of the political function is the so-called articulatory function, which describes the placement of the transmitted information in the context, which is often accompanied by a “constitutive process that produces and reproduces common socio-cultural patterns” (Craig, 1999, p. 144). In concrete terms, this means that the information content is supplemented by the communication of, for example, opinions on the facts conveyed. We remember my conversation in the pub, where I conveyed not only a pure piece of information but also a classification of it.

Accordingly, the informed citizen is an essential component of democracy, which depends on the exchange of information and is necessary for the functioning of democratic societies. Consequently, political communication is an essential requirement for the transmission of information and meaning between individuals within democratic societies, which can take place through various media, including mass media, digital media, and interpersonal communication. While interpersonal communication is difficult to capture and analyze, the spread of mobile devices enables the use of new methodological approaches to at least partially capture this type of communication. Regardless of the medium, citizens need to have access to information about political events and actors in order to make informed decisions in the electoral process or to participate in political actions.

2.1 Blurred boundaries of (non-)political media & climate protest

The technological changes of the last decades have greatly altered the media landscape and increased the possibilities for the reception of media and political information (Chadwick, 2017), which also affects society as a whole and increases the relevance of media-mediated

political information, as the transformation affects the information and articulation functions of political communication. A series of different and partly interrelated developments, such as the emergence of the internet and digital media, the spread of the smartphone, and the fragmentation of the media market, impact individuals, political protest groups, and actors, as well as society and the media system as a whole (e.g. Chadwick, 2017; Jungherr et al., 2020). The changes listed have in common that they lead to a stronger integration of media in society and the lives of individuals. Media and media-mediated communication have become an integral part of most people's everyday lives and experiences around the world (Hepp, 2020).

In today's digital world, media-mediated communication and media consumption are taking up an increasingly large share of everyday life. This leads to an increase in the relevance of media, as digitalization makes it easier to record usage behavior. Citizens and users leave behind trace data that can be used by researchers to measure and analyze their behavior (Breiter & Hepp, 2018). This data makes it possible to make previously hidden behavior visible and, for example, to record user behavior or the use of certain media. At the same time, political information can also be captured. With improved measurability, the relevance of media-mediated political information for political behavior is becoming increasingly important.

However, the increase in relevance is not only due to improved measurement of citizens' behavior but also to the increased possibilities of accessing and interacting with political information, which has been brought about by technological change.

This transformation of the media system has led to the emergence of a hybrid media system in which traditional mass media and newer digital media interact and compete with each other (Chadwick, 2017; Klinger & Svensson, 2015). This leads to an erosion of the old power system in which the selection and production of information is dominated by social elites such as members of the media system, members of the political system, and civil society actors (Chadwick, 2017; Klinger & Svensson, 2015). The emergence of digital media has led to the strengthening of other actors, as they can benefit from the network media logic and a many-to-many communication environment, as well as the lower costs of producing and disseminating information. This "hybrid" nature of the new media system and the accompanying partial democratization of information provide the context for political protest groups – such as Fridays for Future – and lead to the emergence of new (digital) social and discursive elites as well as the participation of non-elites. Established media actors, such as traditional newspaper outlets, continue to occupy a dominant and powerful position (Klinger & Svensson, 2015), but are increasingly impacted by and compete with these newly empowered actors (Jungherr et al., 2020).

The aforementioned transformation processes are reflected in an increase in the complexity of the transmission and classification of political information, which conveys an idea of the increased relevance of media and the use of these for the political behavior of individuals.

Interacting with political information via digital media platforms has become an integral part of consuming online political information for many people (Kümpel et al., 2015; Vermeer & Trilling, 2020). This leads in particular to changing media consumption among (younger) people (Hasebrink et al., 2021; Kümpel, 2021). An influence on the conscious or unconscious exposure to political information has, among others, individual (political) likes or dislikes (Merten, 2021; Stroud, 2010), but also algorithmic systems (Thorson et al., 2021) as well as the social network of peers (Turcotte et al., 2015). In particular, the last two points are followed by the so-called news finds me perception, which reflects the impression of citizens that an active search for news is not necessary because it is brought to them by the mentioned peers or algorithmic recommendation systems (Gil de Zúñiga et al., 2017).

In addition to the possibilities of access and user behaviors regarding political information, media transformation processes have also led to an expansion of options for political expression. Citizens can express their opinions through postings on social media (Springer et al., 2015) and comment columns on news sites (Engelmann et al., 2019). These comments contain political information and classification that goes beyond the actual journalistic news source (Zerrer & Engelmann, 2022). The classification of political information is often done by means of identity (Toepfl & Piwoni, 2015), morality (W. Brady et al., 2020), and emotional expressions (Ziegele et al., 2020). A more detailed description of the effects of the change in the media and information landscape on political participation is provided in chapters 2.2 and 2.5.

In summary, the transformation of the media landscape through the rise of digital media, the proliferation of smartphones, and the fragmentation of the media market has led to greater integration of the media into society and the lives of individuals. This has increased the relevance of media-mediated political information due to its better measurability and the increased possibilities of accessing and interacting with political information. The complexity of transmitting and classifying political information has grown, with changing media consumption influencing how political information is handled. The expansion of interactions about political issues enables the classification of political information based on identity-related, morally laden, and emotional media-mediated expressions on digital platforms. Overall, changes in the media and information landscape have important implications for political participation and society.

2.2 Changing (climate) activism

The emergence of a hybrid media system and the associated changes in the media landscape have led to different media-related habits and practices, which have resulted in significant

changes in the everyday lives of most people. These changes have been accompanied by the emergence of new forms of political participation (Jungherr et al., 2020; Theocharis, 2015). There are several ways in which people choose to engage in political action. These ways, scope, and structures of political participation change over time, and younger generations of activists develop different ways and forms of protest (van Deth, 2014). The aim of their activities is still to “influence more or less directly the selection of government personnel and/or the actions they take” (Verba & Nie, 1972, p. 2, cited by Theocharis et al., 2021). The more established forms of participation, such as attending a demonstration or voting in an election, are complemented by a wide range of “individualized, creative, expressive and everyday forms of engagement with social and political issues” (Theocharis et al., 2021).

A substantial part of these newer forms of political engagement rely on digital and mediated communicative practices (Theocharis, 2015). Specifically, the public digital discourse of climate-relevant content on social media platforms such as Twitter (now X) is a relevant form of visible expression of opinion (Meyer et al., 2023). Online participation is the overarching term for these forms of digital political participation, which include different forms of engaging with political topics such as signing an online-petition (Earl & Kimport, 2011), contacting a political action on social media, as well as posting mobilizing content on social media or texting it to peers on messenger apps (Gil de Zúñiga et al., 2021; Lilleker & Koc-Michalska, 2017). Accordingly, the aforementioned changes in the media landscape are also reflected in forms of political participation, which leads to increasingly blurring boundaries between media usage, forms of political participation, as well as organization (Bennett, 2012) and everyday media usage practices. The concept of Digitally Networked Participation (DNP) describes the fundamental changes in the participation landscape shaped by the characteristics of the hybrid media system (Theocharis, 2015), which is defined as “a networked media-based personalized action that is carried out by individual citizens with the intent to display their own mobilization and activate their social networks in order to raise awareness about, or exert social and political pressures for the solution of, a social or political problem” (Theocharis, 2015, p. 6).

A second occurring development that affects different forms of political engagement is a stronger focus on individualized forms of participation (Bennett, 2012) such as so-called lifestyle politics, which describes “the politicization of everyday life choices, including ethically, morally or politically inspired decisions about, for example, consumption, transportation or modes of living” (De Moor, 2017, p. 181). Accordingly, the decision to eat vegetarian or vegan, to travel by train instead of flying, or to boycott certain climate- or environmental-damaging products can be considered a form of political and individual engagement.

Several studies indicate an intertwined relationship between these “newer” forms of political participation and the consumption of political information. Findings show direct relationships

between the reception of political informative content and political engagement, as well as more indirect relations between these, which are discussed in more detail in Chapter 2.5.2.

As a climate justice protest movement, Fridays for Future is also anticipating the changes in the media landscape and the new possibilities for organization and participation that this brings. The protest group is trying to develop and implement further forms of protest, both in the analogue world, for example by establishing so-called school strikes (Boulianne et al., 2020), and by testing and implementing digital formats, such as groups or channels on messenger apps, Instagram content, or the publication of their own Fridays for Future app. Digital protest formats, such as the targeted (digital) sharing and dissemination of information, petitions, or calls for demonstrations on social media by supporters of Fridays for Future, as well as the intertwining of online and offline protests, make full use of the existing media landscape and the DNP's concept. The dovetailing of digital mobilization, the analogue protest, and the subsequent coverage of this in social media and journalistic news reporting is correspondingly close (Brünker et al., 2019; von Zabern & Tulloch, 2021). At this point, the relevance of journalistic reporting for the visibility of the protest becomes clear, as does the close relationship between user-generated (mobilizing) content, journalistic reporting, and the reception of this political informative content (von Zabern & Tulloch, 2021). Accordingly, the consumption of political informative content, which can be either user-generated or journalistically generated, is an important prerequisite for political participation.

2.3 Different modes of participation

Against this background, there are different ways of participating politically in a democratic system. The way in which a person becomes involved can vary and take on different forms. According to van Deth (2014), the range of possibilities can be divided into different dimensions: political participation within the system, political participation beyond the political system, and community participation as well as so-called individual participation (Andersen et al., 2021; Theocharis et al., 2021; van Deth, 2014).

Political participation within the system refers to the minimalist definition of political participation, which includes “amateurish, voluntary activities located in the sphere of government/state/politics” (van Deth, 2014, p. 356). This dimension includes voting, running for political office, and membership in a party. Accordingly, activities that are based on coercion or legal grounds, as well as activities that are carried out by professionals or that are not part of the political context, are excluded here.

The concept of political participation targeting the political system is based on Deth (2014), which is similar to institutionalised participation (McLeod et al., 1999) or elite-directed participation (Inglehart, 2018). Political participation targeting the political system refers to

actions that directly target the political system and include signing petitions, participating and recruiting for demonstrations or other forms of protest, and contacting political decision-makers (Andersen et al., 2021). Most of the activities listed existed before digitalization. Digitalization lowers the threshold for some forms of participation and thus facilitates access to political participation, e.g., some activities can be carried out via online platforms (Theocharis, 2015). For example, petitions can be signed and submitted digitally. Similarly, there is no need to send analogue letters to politicians, who can now be contacted via email or social platforms. Overall, digitalization has lowered the threshold of political participation for competent users of digital media.

However, as social beings, citizens are not only part of a political sphere but also of the local community in which they live. The way of life as well as the quality of life are determined by how they are shaped and embedded in the social environment. The way in which local affairs, such as the sports club, the church, the charitable organisation of which a person is a member, or the school that the children attend, are regulated affects the way in which this person lives. Decisions like these, however, are often not made by political representatives but by the people involved themselves (Andersen et al., 2021). By participating in such negotiation processes, people can shape their own living environment and experience the effects of their own actions more directly and quickly than in the democratic system. From the perspective of democratic theory, involvement at the local level and in the immediate living environment can prepare people for activities within or aimed at the political system. This means that political participation at the local level, for example, through volunteering at a sports club or supporting non-profit local action (Zukin et al., 2006), can be a breeding ground for participatory democracy. Participation in a local community implies more than just interacting with the local political system (Verba et al., 1995). Participation in such activities is beneficial to the health of both the community and society as a whole since it increases social capital (Putnam, 2000). This form of engagement, according to Shah et al. (2005), “plays a central role in the health and functioning of democratic societies by channelling collective action toward community building” (p. 533).

The so-called “individualized collective action” (Micheletti, 2003) differs from the aforementioned forms of participation by the individualistic character of different forms of engagement in this category. Forms of individual political action are not located in institutionalized politics and formal organizations such as parties or trade unions but unfold in the politicization of everyday life, such as the boycotting of certain products in everyday life (Theocharis et al., 2021). According to Theocharis et al. (2021), individual participation also includes the concepts of digital network participation (DNP) and lifestyle politics. Both DNP and lifestyle politics show clear similarities in terms of the strong individual character of political actions for individual participation, but have different focuses in that DNP concentrates on

actions related to social media and lifestyle politics includes more activities such as shopping & boycotting, mobility, and energy use (Theocharis et al., 2021). This focus on the individual actions of individuals can be understood as part of the general trend of individualization. For example, Beck (2005) and Giddens (2008) argued that with the advance of globalization and the increased emergence of (environmental) crises, perceptions about the government's ability to act to address such crises have diminished, shifting citizens' political activism toward individual and DIY approaches (do it yourself) to problem solving (Theocharis et al., 2021).

This development can also be observed in parts of the actions of supporters of Fridays for Future. With regard to the participation dimension within the system, the literature shows that the proportion of party memberships among the participants of Fridays for Future demonstrations was low (De Moor et al., 2020). This could be explained, at least in part, by the fact that the respondents did not have a particularly high level of trust in political parties (De Moor et al., 2020). The low level of organization of protest participants within political parties is also reflected in the low membership numbers in other environmental organizations and associations (De Moor et al., 2020). The results of the survey of German participants in Fridays for Future supporters support the assumption that engagement is shifting away from traditional and institutional forms of participation towards more individual political action. The lack of or mediocre trust in political parties is also reflected in forms of participation targeting the political system, where respondents indicated that they very rarely contacted a politician, while other forms of participation were reported often (De Moor et al., 2020). This shift in political engagement away from traditional political institutions is also reflected in the strong engagement within the direct community of participants in the demonstration (De Moor et al., 2020). The high relevance of individual political participation among the supporters of Fridays for Future is particularly evident in individual political engagement, such as reducing energy consumption, changing one's diet, reducing consumption, and (re-)using second-hand goods (De Moor et al., 2020). In summary, based on the literature, it can be assumed that the assumed change in political participation towards more individual actions can also be found among supporters of the Fridays for Future protests.

2.4 Exposure to and interaction of citizens with political information

In Western democracies, citizens have a variety of ways to interact with political information in different forms, either (un)intentionally or through *personal curation*. The spectrum ranges from the probably best researched traditional news, which is disseminated via radio, TV, print, and online newspapers, as well as digital news formats, to user-generated content on digital platforms such as Twitter (now X) or Instagram, where most authors usually do not have a journalistic background, to the personal conversations already mentioned, whether face-to-face or mediated by (digital) media. The following chapter provides an overview of the use of different

forms of political information, their usage practices, and how they are dealt with on a more general level and specific to protest groups, as well as Fridays for Future.

The already-discussed change in the media landscape has reinforced the already-existing assumption that basically all media formats can contain information and are thus able to satisfy the users' need for information (Gehrau 2001: 130ff cited in Hasebrink & Dörmeyer, 2010). In many digital formats on different platforms, it is difficult to make a clear distinction between politically informative and entertaining content. This blurring of the boundary, which has always been blurred, through mobile and digital media with feeds of different small-scale posts whose content ranges from informative to entertaining, is the context of this work.

We are primarily interested in media usage behavior. Thus, the question of the conscious and intentional or unconscious and incidental reception of political information is correspondingly relevant. We assume that these motivations are reflected in the observable media usage behavior, for example, in the conscious and observable search on a search engine for a statement by a politician (Merten, 2021). In contrast, we can just as easily imagine the unintentional sticking to a social media post about a political issue. In the following, we look at the (1) intentional, (2) incidental, and (3) and personally curated reception of political information in relation to supporters of the Fridays for Future movement.

(1) First, let's get an idea of why people intentionally use information in the first place. I already addressed the need for information in a democratic society, but this rather general idea needs more clarification in regard to protest groups such as Fridays for Future. Hasebrink and Dörmeyer (2010) investigated the question of why people seek information and, based on the information-seeking and use-and-gratifications approach (Ruggiero, 2000), identified different overarching information needs. The information-seeking approach argues that people develop a need for information, especially when the available knowledge is not sufficient to achieve a goal. More information is needed to close a knowledge gap. Whereupon the person consciously goes in search of information (Case & Given, 2016). Following this approach, information needs can be categorized according to a specific subject or topic (Hasebrink & Dörmeyer, 2010).

The first category includes undirected information needs, which are the need for constant monitoring of one's environment for opportunities and risks (Hasebrink & Dörmeyer, 2010). This is particularly true for individuals and groups of actors in a society who may experience political disadvantages as a result of missing out on opportunities. In the specific context of Fridays for Future, there is a need to observe the political developments in the social system in which changes are to be achieved, both at the individual and group level.

The second category are thematic interests, which describe an active, conscious, and time-stable orientation towards specific topical knowledge (Hasebrink & Dörmeyer, 2010). People

differ greatly in their interests, which is also reflected in a strong thematic differentiation of the various media devices, channels, and formats (Hasebrink & Domeyer, 2010). In terms of Fridays for Future supporters, we can distinguish between group-related thematic interests that individuals need to connect with and participate in the group, and individual and personal areas of interest that are not related to Fridays for Future membership. Group-related information interests, in the case of Fridays for Future, would include information behavior with regard to climate change, measures against it, general political developments, and discussions about the topics mentioned.

According to Hasebrink and Domeyer (2010), the third category is group-related information needs, which include the exchange of information and experiences in the group as well as the agreement on common interests, goals, and *moral beliefs* in order to build a *group identity* and trust (Hasebrink & Domeyer, 2010). In the case of supporters of Fridays for the Future, this would include information needs such as sharing common experiences (e.g. participating in a climate strike), the need to form a common understanding of goals and values, and other forms of communication that lead to the formation of *group identity*, *agency*, and *moral beliefs*. Against the background of digital platforms, these communication processes can also take place digitally on social media or messenger applications (Alberici & Milesi, 2016). It is important again to emphasize the distinction from the category of thematic interests, which refer to the topic and not to group-related communication processes.

The last category describes concrete problem-solving needs for information, as they are mentioned in the information-seeking approach (Hasebrink & Domeyer, 2010). These result from specific situations, for the solution of which certain information is required (Hasebrink & Domeyer, 2010). The type of information needed heavily depends on the specific situation. In terms of Fridays for Future supporters, there is a wide range of possible problems and corresponding information needs, ranging from location-based issues ("Where is the meeting point for a demonstration?"), to more thematic problems ("I need an information on the impact of climate change on biodiversity."). The possibilities of media and information behavior resulting from this need for information are correspondingly diverse.

Hasebrink and Domeyer (2010) introduced this categorization as an analytical framework, which is not a deterministic approach for clearly distinguishing research objects but rather an analytical tool for analyzing them under a common lens.

(2) Second, there is the possibility that a person is incidentally coming across some political content, which is more likely in a social media environment (Merten, 2021; Oeldorf-Hirsch, 2018; Oeldorf-Hirsch & Srinivasan, 2021). Social media and video platforms such as Instagram and TikTok increase the likelihood that a user will be exposed to a post containing political information by casually scrolling through their feed, expecting to see pictures and videos of

kittens. There are several practices that influence the composition of the content displayed in the feed. On the one hand, the digital social network of friends and followers has an influence on the content displayed by showing the posts or shares of these contacts in the recipient's feed (Kaiser et al., 2021). This practice is also known as *social curation* (Villi et al., 2012). In contrast, the practice of *algorithmic curation* describes the influence of automated processes on the composition of a recipient's social media feed (e.g. Zuiderveen Borgesius et al., 2016) by automatically tailoring the content to the automatically attributed preferences of the user. Furthermore, strategic curators, such as political actors or companies, influence the composition of the news feed on social media platforms (Merten, 2021). Accordingly, a number of curation practices exist in relation to consuming political information on digital platforms. The phenomenon of the *news find me perception* is related to these curation practices, as this reflects the attitude of people to receive relevant information by themselves due to the curation practices mentioned, and accordingly, an active curation of politically relevant information is no longer necessary (Gil de Zúñiga et al., 2017).

The incidental reception of news can be interpreted from two perspectives. First, the social media platforms in question are “low-choice media environments” (Bode, 2017) in which the content is mainly brought to the user through social contacts and *algorithmic curation*. Following this perspective, the incidental reception of political content can be seen as a way to close the gap between heavy and low news users and thus also to strengthen the political knowledge and participation of the low news users (Fletcher & Nielsen, 2018; Merten, 2021). The second perspective argues for social media as a high choice environment, which reestablishes and strengthens existing gaps between low and high news users due to the higher relevance for individual interests, content preferences, and practices of information consumption (Möller et al., 2019; Prior, 2007; Thorson et al., 2021). Accordingly, both the inequality-enhancing and mitigating effects of unintentional news consumption are theoretically conceivable. For us, however, only the theoretical assumption about the existence of unintentional exposure to political content is of interest here, which could result in observable usage patterns of Fridays for Future supporters.

(3) Third, besides the two poles of the spectrum of conscious and incidental political information consumption, there is the concept of *personal curation* (Thorson & Wells, 2016).

“Users play a decisive role in customizing their information repertoires on social media. Users can subscribe to news organizations or hide user accounts, topics, and pages in their news feed and thereby have a certain kind of leverage in determining its composition” (Merten, 2021, p. 1019).

In this way, users can curate the content on their own feed and at least partially influence its composition. Curation by deliberately selecting followed or blocked accounts and content reflects selective and partially purposeful behavior (Thorson & Wells, 2016). For example, supporters of Fridays for Future may consciously choose to follow accounts that share content about political action or climate change. This *personal curation*, along with algorithmic and *social curation*, is a relevant component in the mechanisms that determine the composition of social media feeds and their share of political information (Merten, 2021). A slightly different perspective on the composition of received content and political information is taken by the concept of *selective exposure*, which is based on the tendency of people to prefer information that confirms their already prevailing attitudes, views, and opinions rather than exposing themselves to contradictory information (Knobloch-Westerwick & Meng, 2011). According to the argumentation of the concept, this would mean that supporters of Fridays for Future mainly receive political information that confirms their own political standpoint with regard to measures against climate change. Empirical evidence contradicts this interpretation of the *selective exposure* concept, as it shows that recipients increase exposure to online information sources that agree with their own views without sacrificing contact with other opinions (Garrett, 2009). Trilling and Schoenbach (2015a) were able to show that there are differences in the content of the information sources received, but that these can hardly be attributed to people's preferences. Nevertheless, the findings indicate that recipients make a certain selection of information sources.

The conscious and incidental exposure to political information as well as the personal curation of this information represent important background knowledge for this work. It can be assumed that these behaviors are reflected in the manner of observable usage behavior (Thorson & Wells, 2016). Even if it is not possible to infer the underlying motivations and reasons directly from the bare observation, they do provide a helpful and relevant theoretical framework for analysis. These underlying motivations are the starting point for different information usage practices as well as the reception of different media and information sources.

2.4.1 The status quo of the reception of political information

A large and frequently studied part of information sources relates to news, which represents a specific form of political information. News is professionally curated information that is disseminated through the media.

News interest and frequency of news use are at a high level. In 2020, 94% of online adults will use the news several times a week, and 71% Germans will report that they are very or extremely interested in the news (Hölig et al., 2020). Among 18-year-olds, 50% are very interested in news, and among 25-year-olds, 66% are very interested in news, with the

proportion of interested people in both groups increasing compared to previous years (Hölig et al., 2020).

Classic television is by far the most widespread source of news for the German population (70%) (Hölig et al., 2020). Receiving political information via radio or print newspapers and magazines also still takes up a large share in terms of news sources (Hölig et al., 2020). However, a closer look at the user groups reveals a high proportion of older users in particular, while younger generations use these traditional news sources (TV, radio and print) the least compared to all other age groups (Hölig et al., 2020). However, studies indicate a trend towards more digital offerings. While proportionally more people use the Internet as a resource for information about world affairs, the number of those who watch news on linear television is declining. The Reuters Digital News Report shows the shift in the media landscape towards a hybrid structure (Hölig et al., 2020).

What is striking is the increase in the reach of social media as a news source. In 2020, 37% of respondents will use social media platforms as a source of news. In the 18-24 age group, 56% use social media as a resource for news in 2020, and for 3%, social media will be the main source of news (Hölig et al., 2020). Furthermore, the triumph of the smartphone as an end device for using the Internet in general and for retrieving online news in particular is becoming apparent. 58% of the adult respondents to the Reuters Digital News Report use their smartphones to read, watch, or listen to news on the Internet (Hölig et al., 2020). One in two used a laptop or PC to access news content. When it comes to using digital news offerings, the smartphone will represent the most common device in Germany in 2020 (Hölig et al., 2020). Access to news services is mostly via direct access to the website or the app. However, for younger generations (18 to 24 years old), social media is the main way to become aware of and access news content (Hölig et al., 2020). Here, WhatsApp, YouTube, and Facebook are the most widespread among adult internet users in Germany, as are the social media platforms on which proportionately the most users come into contact with news content (Hölig et al., 2020). In 2020, 22% of respondents to the Reuters Digital News Report regularly watched news on Facebook, 16% on WhatsApp, and 14% on YouTube (Hölig et al., 2020).

In addition to the information sources listed, (media-mediated) personal conversations are still one of the most important sources of information (Allensbach, 2022). Here, respondents state that personal contacts are the second most common source of information (Allensbach, 2022). However, the methodological recording of this second most frequent source of information is difficult and only partially possible or justifiable in terms of research ethics. Despite the difficulties of data collection, research suggests that interpersonal communication is highly relevant for obtaining information about political actors and events (Zhang et al., 2010), which

has a positive influence on political behavior (Mondak, 1995). A more detailed examination of the effects of political talk is presented in Section 2.5.2.3.

The very high relevance of personal contacts as a source of information is also reflected in the survey of participants in Fridays for Future demonstrations (De Moor et al., 2021; Wahlström et al., 2019). For younger participants in particular, direct social contact is an important source of information about political actions such as demonstrations (De Moor et al., 2021; Wahlström et al., 2019). The proportion remains high for older participants, who at the same time receive information through other sources of information, such as the radio, TV, online, and print newspapers (De Moor et al., 2021; Wahlström et al., 2019). Digital media formats, especially social media platforms, are the second most important source of information on Fridays for Future political actions for younger and older participants (De Moor et al., 2021; Wahlström et al., 2019).

In summary, news consumption among German adults is high, with traditional television being the most common news source. However, there is a trend toward more digital services, with social media platforms becoming increasingly popular as news sources, especially among younger age groups. The smartphone is one of the most common devices for accessing news content, with face-to-face conversations also an important source of information but more difficult to measure and study.

First, however, we look at the media and information usage of recipients in order to obtain as comprehensive a picture as possible of how information is received.

2.4.2 Types of news users and their exposure, practices and sources of political information

Technological change and the emergence of social media platforms and other forms of digital media offerings have significantly expanded the range of media and information available (Geers, 2020). This has led to increased choice, encompassing both traditional media and digital information formats, as well as institutionalised and non-institutionalised offerings. This development necessitates a broader and more comprehensive consideration of the use of information and media offerings, and information and media repertoires provide a suitable analytical framework (Edgerly, Vraga, et al., 2018; Strömbäck et al., 2018; Taneja et al., 2012). Information and media repertoires refer to the combined use of different media for information consumption in a hybrid and diverse media environment (Chadwick, 2017; Hasebrink & Domeyer, 2012; Hasebrink & Hepp, 2017; Hasebrink & Popp, 2006). With digital media forms, such as online and social media, people turn to the social platform or online media format first and then look for content that meets their needs (Kim et al., 2016).

The repertoire approach goes back to the television research of Heeter (1985), who was interested in the composition of the TV channels watched by users. The concept was further developed by Uwe Hasebrink and Jutta Popp, which now includes the entirety of all media regularly used by users (Hasebrink & Popp, 2006). The accompanying shift of the research focus to the overall results from a combination of media exposure led to the development of the media repertoire approach. Here, media repertoires are understood as relatively stable patterns of use across media, which are characterized by (1) user-centeredness, (2) comprehensiveness, and (3) relationality (Hasebrink & Popp, 2006). (1) User-centeredness describes the aforementioned shift of focus towards the behavior of the individual user and away from the audience of a medium. (2) In which all media used by a person are included. (3) Whereby the relationship of the individual media within the usage pattern plays an important role. For the conception of media repertoires, the frequency as well as the duration of use, preferences or attitudes towards media, and their integration into everyday routines play a role and can be included as indicators in the creation of media repertoires (Hasebrink & Popp, 2006).

Studies representative of society as a whole identified different groups of information users based on their media and news consumption on a range of different media platforms, including social media platforms and online and offline formats. Schmidt et al. (2019) have examined the role of intermediary media offerings, such as social media and digital platforms, in shaping media repertoires. Strömbäck et al. (2018) identified five different news repertoires: minimalists, public news consumers, local news consumers, social media news consumers, and popular online news consumers. Their findings are largely consistent with those of Bos et al. (2016), who identified four types of news users: minimalists, public news consumers, popular news consumers, and news omnivores. Some of the user groups seem to be relatively stable; for example, Lee and Yang (2014) also identified three user types: news avoiders, emerging news consumers (who prefer digital media) and traditional news consumers. This is also true of the study by Leonhard et al. (2020), who identified six different types of mobile news users: light users, casual users, focused casual users, focused frequent users, entertainment-oriented frequent users, and habitual frequent users.

To what extent these repertoires are also among supporters of protest groups, in our case Fridays for Future, is questionable. Two phenomena come into play among the supporters of Fridays for Future. First, the supporters are usually much younger than the majority of the population (De Moor et al., 2020; Wahlström et al., 2019), which means they have grown up with other media formats (Edgerly, Thorson, et al., 2018). Secondly, politically active people usually use media in a different way than the rest of the population (Boulianne & Theocharis, 2020; Weeks et al., 2017). Let's first focus on the media usage behavior of younger generations.

The information repertoires mentioned above also apply, at least in part, to younger generations. A Dutch study among adolescents identified six types of news users: online news users, news junkies, traditionalists, readers of free newspapers, TV users, and dabblers (comparable to minimalists) (Van Cauwenberge et al., 2011). Unfortunately, the study did not take into account digital media platforms and social networks. In the more recent study by Edgerly, Thorson, et al. (2018), digital media formats and social platforms are incorporated, which translates into four types of young news users: news avoiders, curated news only, traditional news only, and news omnivores.

These user groups are at least partly reflected in the results of the German UseTheNews study, which is a representative study of the news usage of young people in Germany. The study takes into account the existing news interest, the information-oriented media use, the degree of informedness, and the relevance to the formation of opinion. On this basis, the groups of journalistic, low, comprehensive, and non-journalistic information-oriented groups are formed (Hasebrink et al., 2021). The group of journalistically information-oriented people is characterized by a great interest in news, sees itself as well informed, and mainly uses journalistic sources to inform itself and form an opinion. They access content via TV, radio, social media, and newspapers (Hasebrink et al., 2021). The group of the low-information-oriented is distinguished by a low interest in news and the low relevance of being informed, which goes hand in hand with a self-assessment of not being informed. This group mainly uses social media, radio, and TV (Hasebrink et al., 2021). In contrast, the comprehensively information-oriented show a high level of interest in news, which is also reflected in a self-image of the high relevance of information. This group uses both journalistic and non-journalistic sources, both of which are regarded as equally important for forming their own opinions. The group sees itself as well-informed and obtains its information mostly from social media, radio, TV, podcasts, and news aggregators (Hasebrink et al., 2021). The group of non-journalistically information-oriented people differs from this, as they show little interest in news but still consider being informed to be important. This is expressed by the fact that this group is skeptical about journalistic content and therefore does not use it but instead obtains information from non-journalistic content. They often obtain their information from social media, podcasts, radio, and news aggregators (Hasebrink et al., 2021). In principle, according to the study, all age groups have a great interest in entertainment, music, film, and culture. It is striking that for all groups, the social environment, consisting of family, friends, and acquaintances, is highly relevant for the formation of opinions (Hasebrink et al., 2021).

In summary, the literature distinguishes between several types of (young) news users. The most stable groups seem to be news avoiders (or news minimalists) and news omnivores (Bos et al., 2016; Edgerly, Vraga, et al., 2018; Geers, 2020; Ksiazek et al., 2010; Strömbäck et al., 2018; Trilling & Schoenbach, 2015b). News avoiders are characterised by low overall news

consumption, while news omnivores are on the other side of the scale and show high overall news consumption (Geers, 2020). The media environment, with its wide bandwidth, also makes it possible to avoid politically informative offers and to use media purely for entertainment purposes or for interaction with other people (Geers, 2020). According to Bos et al. (2016), minimalists are on average less politically interested and consume information to get an overview. The minimalists also make up the largest proportion of information users (Bos et al., 2016; Edgerly, Vraga, et al., 2018). Bos et al. (2016) interpreted minimalists as representatives of a so-called quasi-monitoring citizen, which is modelled on the concept of the monitorial citizen (Schudson, 1999). This describes politically interested citizens who consume news only sporadically.

In addition to the frequency of information use, a distinction can also be made between the types of use. Here, a categorization can be drawn between users who tend to focus on traditional and offline news offerings and more digitally oriented information users (Lee & Yang, 2014; Strömbäck et al., 2018). Another group can be described as users who use both digital and traditional media (Wolfsfeld et al., 2016). Edgerly and colleagues (2018) argue for two distinct possibilities for young people's offline and online news consumption. The first line of argument focuses on socialisation in the digital age, resulting in an information repertoire that is characterised by the use of digital media, social platforms, and non-traditional news sources (Mitchell et al., 2015). The second argument highlights socialisation by parents or older generations (Vaala & Bleakley, 2015), which leads to their repertoire being similar to that of previous generations and comprising mainly traditional, offline news sources. Against this background, I assume that the information repertoires are aligned between these two extremes.

Against this background, the importance of digital and especially mobile media use becomes clear. Mobile news consumption has grown steadily in recent years and has become an integral part of everyday life for many people (Görlund, 2020; Westlund, 2020). This is especially true for younger people, for whom digital and mobile media are the most important sources of news (Newman et al., 2021). Mobile news consumption is characterized by a large number of shorter usage sessions (a few minutes) in which people receive short updates on current developments and news (Westlund, 2015, 2020). In addition, a smaller group of people seem to use the smartphone for longer, continuous sessions (Westlund, 2020). In general, mobile news consumption differs significantly from the use of other media due to the shorter and more frequent sessions on average (Peng & Zhu, 2020; Westlund, 2020). The use of mobile devices to consume digital information is changing the way people receive, engage with, and learn from the content. People see social media as an imperfect but convenient way to consume news (Oeldorf-Hirsch & Srinivasan, 2021). The personalization of news content is seen as ambivalent, with both advantages and disadvantages (Oeldorf-Hirsch & Srinivasan,

2021). In particular, news consumption through social media creates a feeling of being informed, which, however, does not result in a deeper engagement with the content (Oeldorf-Hirsch & Srinivasan, 2021). Active and publicly visible engagement with news content, through commenting, sharing, or liking, is not undertaken at all or hesitantly, and instead a rather passive observing position is taken (Dvir-Gvirsman, 2020; Oeldorf-Hirsch & Srinivasan, 2021). To what extent the mobile consumption of political information can be translated into an increase in political knowledge or participation is still a little unclear. On the one hand, studies show an increase in political knowledge when consuming news on mobile devices as well as (partial) mobilization effects for electoral participation (Ohme, 2020). On the other hand, other studies find no connection between the use of news apps and political knowledge and participation in referendums (Vogler et al., 2023). The findings speak for a complex phenomenon for which the received content should also be taken into consideration for a closer examination.

Looking at content and preferences for content provides a more comprehensive picture of younger people's information repertoires. The choice of media platform depends on structural factors, such as habits and routines (Geers, 2020). Once a platform has been chosen, various factors play a role in what news a user is exposed to; here, individual likes or dislikes (Stroud, 2010) but also algorithmic systems (Thorson et al., 2021) as well as the social environment (Turcotte et al., 2015) have an influence on what content the user is exposed to. Some studies have argued that information consumption depends more on content preference than on the platform providing it (Kim et al., 2016; Van Rees & Van Eijck, 2003).

When looking at the information repertoire according to content preferences, a very different picture emerges. Some information areas seem to be very platform-specific, while for other information areas, no connection with the platform could be found at all (Hasebrink & Popp, 2006). Platform-specific information seems to be especially important regarding hard-news as well as entertaining information content. For so-called hard news, such as politics, economics, and social issues, people seem to have preferences for more traditional media (Hasebrink & Popp, 2006; Van Rees & Van Eijck, 2003). In the case of young online news users, there is a stronger preference for entertaining news content about showbiz and celebrities (Geers, 2020).

In this thesis, I want to look at the relationship between the way political information is used and forms of political participation. Accordingly, the focus of the thesis is less on "whether" and more on "how" political information is used. I consider supporters of Fridays for Future as a group that is politically active and therefore different from the average population. Politically active people often use news differently than the rest of the population (Boulianne & Theocharis, 2020; Weeks et al., 2017). Studies show that the reception of political information increases in particular with a higher level of education (Eveland & Scheufele, 2000) and a higher social status (Kalogeropoulos & Nielsen, 2018). The influence of these characteristics

is also reflected in terms of political participation, where the level of education (Eveland & Scheufele, 2000), level of income, overall higher social status (Dalton, 2017) and use of political information also have an impact (Chan, 2017). Furthermore, people with a social media information repertoire in particular are more likely to get involved in politics (Dinnar & Nossek, 2019; Strömbäck et al., 2018), which could be true in view of the high relevance of social media as a source of information for Fridays for Future supporters. Accordingly, it can be assumed that the supporters of Fridays for Future are people with a higher level of education and social status and that their information usage behavior differs from that of the average population. Based on this, we can assume that the supporters of Fridays for Future have a higher level of information consumption than the average population. This allows us to take a not-ccomplete but at least partially more isolated look at usage patterns without too much variation in the amount of usage.

In summary, the emergence of social media platforms and digital media has led to an expansion of media offerings, necessitating a more comprehensive view of media use. Information and media repertoires provide a suitable analytical framework. Several types of (young) news users have been identified, with the most stable groups being news avoiders (or minimalists) and news omnivores. Younger generations tend to use social media and digital platforms more. On average, politically active individuals, such as supporters of Fridays for Future, exhibit different media usage behavior than the rest of the population, which can be attributed to higher education, social status, and *political interest*.

2.4.3 Interaction and engagement with (political) information

Digital media, in particular, not only enable the pure reception of information content but also offer the possibility of disseminating the content through various functions. Interaction with news via social media platforms and messenger apps has become an integral part of online political information distribution and consumption (Kümpel et al., 2015; Vermeer & Trilling, 2020).

In itself, engagement with political information via social media is a marginal phenomenon, but it is disproportionately perceived by users who are already interested in politics (Kümpel, 2020). These politically interested and often politically involved individuals represent a specific subgroup of the population. These users have different motivations and characteristics that cause them to engage with political information.

At this point, I would like to focus on a specific and highly relevant group of politically interested and involved people. Opinion leaders are actors, including both individuals and organizations, who influence the opinions, attitudes, behaviors, and actions of others through interpersonal and/or media-mediated communication, behaviors, and actions (Geise, 2017, p. 14). The phenomenon of opinion leaders is not limited to a specific subject area, but in the course of this

thesis, political opinion leaders are of particular interest to us. These political opinion leaders are people with a high level of interest and commitment to politics, which goes hand in hand with a strong identification with one or more political positions, above-average political engagement, and a high degree of (mediatized) exchange of political opinions and information. Accordingly, opinion leaders consume a high level of (digital) political information (Schäfer & Taddicken, 2015) and show a high level of interest and knowledge about politics (Boulianne, 2016; Jung & Kim, 2016). They are not just passive recipients of political information but are heavily involved in exchanging political information and opinions with their peers (Weeks et al., 2017) and actively participate in political actions (online and offline) (Boulianne, 2016; Kavanaugh et al., 2006; Weeks et al., 2017). High involvement (Ziegele et al., 2018) is associated with high engagement and emotionally and morally charged statements on social media (Brady et al., 2017). In addition, opinion leaders with a high level of engagement are able to influence the flow of information on social media more strongly (Xu et al., 2014). These politically active opinion leaders are to a large extent characterized by extreme political attitudes such as partisanship for political parties (Hirndorf, 2020), higher media bias and hostility (Tsang & Rojas, 2020) and skepticism (Yamamoto et al., 2018). Against this background, opinion leaders represent a specific sub-group of politically interested and active individuals.

The news items that show a high level of engagement tend to share common characteristics that may be related to traditional concepts of newsworthiness (Trilling et al., 2017). Factors that positively impact news engagement include soft news (Newman et al., 2016), content that is deemed interesting (Bakshy et al., 2011), emotional (Berger & Milkman, 2012), morally laden (W. J. Brady et al., 2020) or is of high informational value (Rudat et al., 2014).

There are different motivations and features that motivate users to engage with political information. Extant research has emphasized two ways in which users come into contact with political information: the first is actively searching for it, and the second is unintentionally coming across it through social interaction or algorithmic recommendation systems (Fletcher & Nielsen, 2018; Oeldorf-Hirsch, 2018; Thorson et al., 2021; Thorson & Wells, 2016). In recent years, this view has become more nuanced, particularly with regard to the incidental nature of incidental exposure (Merten, 2021). Using intentional or incidental exposure to political information, the influence of digital platforms on citizens' use practices with respect to news or other forms of political information is well illustrated. Both active seeking and incidental exposure are linked to engagement with political information (Oeldorf-Hirsch, 2018). There are relevant predictors for engagement with political information. (1) News-related factors such as usage of social media for news, usage of different social media platforms, high interest in hard and soft news (Kalogeropoulos et al., 2017), and news preferences (Romero et al., 2011; Weeks & Holbert, 2013). (2) Political factors such as homophily and tie strength (Bakshy et al., 2012), (perceived) opinion leadership (Wu et al., 2011), and *political interest* (Reiter & Matthes, 2021;

Schulze, 2020). (3) as well as technical features (Collier et al., 2021). In relation to sharing news as a form of engagement with political information, one of the main drivers is information sharing (Holton et al., 2014) and seeking status by drawing peers' or others' attention (Boyd et al., 2010; Lee & Ma, 2012). The sharing of political information expresses (public) interest in it and is accompanied by the risk of negative reactions from others (Altay et al., 2020). In this context, the concept of *opinion certainty* is an important factor that has a relevant influence on whether a person expresses their opinion in a (digital) group (Matthes et al., 2010). Accordingly, the degree of self-perceived certainty of opinion in relation to the topic has a major influence on whether a person speaks out (semi-) publicly. On a societal level, the sharing of political information is closely linked to information diffusion and opinion formation (Park & Kaye, 2018).

Given that politically interested and active people in particular are politically engaged and at the same time interact disproportionately with political information, it can be assumed that political informative content in particular is produced via this subgroup, which in turn is interacted with to a greater extent, and that there is thus a bias on two levels. For example, media coverage depicts statements, images, and behaviors of participants in the Fridays for Future demonstrations who, because of their higher education, better social status, and *political interest* (De Moor et al., 2021; Wahlström et al., 2019), do not represent the population as a whole. These journalistic or user-generated representations are in turn received by politically interested, better educated, and socially better-off people, who interact more with them (liking, commenting, sharing). As a result, these posts appear more relevant, which can lead to a feedback effect. This is because political actions such as demonstrations or climate strikes are picked up by the media landscape, which in turn generates a higher echo in the social networks and comment columns of newspapers, which serve as relevance indicators for journalists (Domingo, 2011; Hölig, 2018).

Overall, we can see that the reception behavior of people with regard to political information has become significantly more complex and fragmented with the establishment of digital content. The increase in access pathways to political information is reflected in very different individual information behavior, which in turn, depending on the type of usage behavior, can have reciprocal effects on the information offered via sharing, posting, and so on. These complex behaviors take place to a large extent in mobile usage patterns on the smartphone.

2.4.4 The special case of mobile information exposure

We have already established that smartphone use accounts for a large share of media use among younger generations, which include the supporters of Fridays for Future (Hasebrink et al., 2021; Hölig et al., 2020). The way smartphones are used differs from many other forms of

media use primarily in its mobile, sequential, and erratic nature, the shortness of usage periods, and the large number of possible functions and applications available on the smartphone (Humphreys et al., 2018; Karnowski, 2020). Due to the aforementioned short periods of use, the context of use is relevant information in order to better classify the information behavior on the smartphone. This is particularly true in that the smartphone is an everyday companion for many people, which is used in a wide variety of daily activities. Accordingly, it is important to record the context of use, which enables a better understanding and provides a broader perspective.

Due to the large number of functions and the wide range of possible uses of the smartphone, there are a whole series of possible contexts that should be taken into consideration. For example, scrolling through Instagram on the way to work or listening to music while standing on the treadmill in the gym in the evening. There are several contextual dimensions to consider, which can be summarized under the overarching distinction between contextual pattern discovery and temporal pattern discovery (Tong et al., 2022). Contextual patterns include the sensor context, the usage context, and the social context (Tong et al., 2022). The three dimensions aim to investigate the relationship between app use and its context. In other words, the contextual pattern describes the situation on the treadmill in the gym. The sensor context, which is information that can be technically captured by the smartphone's sensors, includes geographical location, time, battery status, movement status, network connection, and so on (Tong et al., 2022). In contrast, the usage context describes the upstream and downstream use of other applications on the smartphone, for example, the apps opened before and after (Tong et al., 2022). To stay with our example, opening the fitness tracker to start recording the workout and switching to the running playlist on Spotify. The social context differs from the other two dimensions, especially in the consideration of the social environment in which the application is used, e.g., with friends, colleagues, on the way to and from work, etc. (Humphreys et al., 2013; Tong et al., 2022).

The second overarching dimension is called temporal pattern discovery, which aims at the investigation of specific usage patterns over time, such as how app usage changes during the day (Tong et al., 2022). If we think back to the example, this would be the combination of the mobile application used and the time of day. Specifically, the use of the fitness tracker and Spotify in the evening. There are two broad approaches to this; the first involves looking at usage times over the course of the day to identify recurring patterns (Tong et al., 2022), which is in our example the daily run on the treadmill in the evening with the associated pattern of app use. The other aims to categorize previously formed sessions, which describe a period of uninterrupted smartphone use (Peng & Zhu, 2020), into certain more general types of smartphone use (Tong et al., 2022). In this case, the focus is not on the point in time during

the course of the day but within a specific usage sequence, i.e. when we always open the fitness tracker before Spotify.

Media use in general, as well as smartphone use in particular, is an unfolding process over time (Peng & Zhu, 2020). In such a sequential process, earlier and possibly already completed behaviors frame the current usage (Peng & Zhu, 2020). The recipient moves to another behavioral step when he or she feels the need to do so and considers the previous behavior to be completed and compatible with the next behavior (Avnet & Sellier, 2011). This could be, for example, commenting on a video after it has first been sent by a friend via WhatsApp and then viewed by the recipient. Accordingly, this would be a cross-platform usage sequence that combines different platforms and behaviors over time. This illustrates the interlocking of behaviors and the emergence of sequential patterns of smartphone use.

The media repertoire approach (Watson-Manheim & Bélanger, 2007) assumes that recipients develop a personalized repertoire of individual behaviors when using media. Furthermore, these individual behaviors are not disconnected from each other but can be arranged into discrete behaviors in a sequential, uninterrupted series of behaviors that aim to satisfy the user's needs. These uninterrupted and sequential behaviors can be conceptualized as mobile sessions in mobile smartphone use (Zhu et al., 2018), which is at least partly a continuation of the approach propagated by the aforementioned usage context.

Said mobile sessions may show different characteristics and patterns. On the one hand, sessions may (1) include different sequential behaviors with complementary or redundant functions (Stephens et al., 2008), or they may (2) include a single behavior that a user adheres to in a given period of time. Accordingly, the duration of the behavior can vary greatly within a session.

For the understanding of sequential processes, duration, repertoire size, sequence, and order are relevant reference variables (Peng & Zhu, 2020). Duration of use is the most obvious feature of media use, and here we can consider both the total duration of smartphone use, the duration of individual mobile sessions, and the duration of individual behaviors within these sessions (Peng & Zhu, 2020). The size of the repertoire describes the number of discrete behaviors that are used (Peng & Zhu, 2020), such as opening an app, using the keyboard, or watching a video. The number of behaviors used can vary greatly both between individuals and within individuals at different times (e.g. days). The order and transition between individual behaviors in mobile sessions describe the beginning, development, and end of mobile sessions (Peng & Zhu, 2020). Here, initiating behaviors are of particular importance because they provide the direct context (Peng & Zhu, 2020). The transition between behaviors can, in turn, indicate the compatibility or complementarity between behaviors. Peng and Zhu (2020) argue

that, based on other research on the combinatorial use of multiple media, there are two different types of transitions in mobile media use. One is the assortative, which describes the transition between the same type of behavior, and the other is the disassortative, which describes the change from one behavior (e.g. social media use) to another (e.g. search).

In summary, various contextual dimensions can be identified for mobile media use, which can be differentiated into the two superordinate dimensions of contextual and temporal pattern discovery. The second dimension seems to be the most promising, especially for the communication research question of this thesis. Accordingly, I will consider mobile media use in terms of mobile sessions, which are a sequential and temporally unfolding process of individual behaviors characterized by duration of use, repertoire size, and order of behaviors.

Several studies show the relevance of contextual and temporal patterns for mobile usage. In terms of contextual patterns, particularly for the sensor context, Karen and Barry (2008) show the close intertwining of the satisfaction of information needs that are informative, geographical, and personal in nature. These have strong dependencies on time and location (Do et al., 2011; Karen & Barry, 2008). This is also in line with the findings of Rahmati and Zhong (2013), who describe teenagers' smartphone use as mobile, locally dependent, and closely intertwined with social contexts. In particular, the local context of smartphone use is reflected in several studies; for example, students are more attentive to app notifications in universities, libraries, streets, and residential areas (Mehrotra et al., 2017). Web and multimedia apps are increasingly used while waiting or driving (Böhmer et al., 2011; Do et al., 2011). Interestingly, the type of street seems to be related to smartphone behavior, e.g., more dating apps are used in pedestrian areas (Graells-Garrido et al., 2018). Furthermore, the context also seems to be relevant for the search behavior on the smartphone, as gender, time, place, search activity, relation, and importance of the task have an influence here (Dan & Shaobo, 2018). Accordingly, the function of a location seems to influence app use at that location (Ren et al., 2019; Xia & Li, 2019). With regard to the usage context, Rahmati and Zhong (2013) showed the dependence of app usage on previous usage. These usage patterns appear to be relatively stable over time for one to three months (Rahmati & Zhong, 2013), although they change over longer periods (Fan et al., 2021). The study of app applications that frequently occur together or in sequence reveals several common app combinations, such as e-commerce and payment apps (Huang et al., 2017; Liu et al., 2018) and camera and album applications (Tseng & Hsu, 2014). The use of different app patterns is also shaped by the social context, which, according to Ferreira et al. (2014) is differentiated into alone, with friends, with strangers, and others. Interestingly, the influence of the type of social context on app use seems to vary, with friends, for example, having a higher influence than family members (Kloumann et al., 2015; Taylor et al., 2011).

In addition to contextual patterns, some studies also address temporal patterns. The timing of the individual's day also seems to be related to different usage patterns, with news apps being most popular in the morning and games apps being more popular in the evening (Böhmer et al., 2011). A typical pattern of app use over the course of the day is the so-called diurnal pattern, which describes an increase in the intensity of app use during the day and a flattening out at night (Tong et al., 2022). However, such relatively stable patterns can be distorted or influenced by (major) events such as New Year's Day, the UEFA European Championship, or COVID-19 (Li et al., 2021; Van Canneyt et al., 2017). Furthermore, these medium-term stable patterns change in the long term. Here, Dohyun et al. (2019) found that (1) individual app usage patterns change over time, (2) users use a smaller set of apps over time, and (3) a core set of apps is used stably over time, while other apps, such as games, have shorter lifetimes. Some studies explicitly examined mobile sessions (e.g. Peng & Zhu, 2020). For example, Silva et al. (2018) showed that maps and media apps have longer usage times. Furthermore, the average mobile session seems to last less than one minute (Böhmer et al., 2011), although the total daily usage time is more than three hours (Howarth, 2023). Additionally, several types of mobile users could be identified on the basis of mobile sessions: checker, waiter, and responsive (Cao et al., 2018; Jones et al., 2015). The checkers have relatively short but very frequent mobile sessions. The waiter, meanwhile, is characterized by long and evenly distributed sessions over longer periods of time, while the responsive show both variants (Cao et al., 2018; Jones et al., 2015). The high diversity of users is also reflected in the number of interactions with the smartphone (Hossein et al., 2010; Vassili et al., 2016).

Few studies exist that go beyond describing mobile usage patterns and use them as predictors of future behavior. An example of the successful implementation of this approach is provided by Raihana et al. (2015), who use app usage patterns as a predictor of perceived stress levels at work. Kulshrestha et al. (2021) also use browsing behavior patterns as a predictor of human mobility on the web. Vogler et al. (2023) set a stronger political focus in their work by relating mobile news usage to knowledge about and participation in a political referendum, but without determining specific usage patterns. This background shows the promising link between mobile usage patterns and human behavior. This thesis attempts to contribute to closing the research gap by combining the two previously mentioned approaches of mobile sessions, political information use, and the participation of young climate activists.

2.5 The complex interplay of political information and participation

Since mass media, digital media, and interpersonal communication are the main sources of political information “that citizens need for their political engagement, it should be clear that media use and political participation are closely linked” (Wolling & Emmer, 2014, p. 451). However, the way and the mechanisms of the relationship are not always clear and form a

complex picture. The effect of the reception of political information on political participation is possible as both a direct and indirect relationship. Accordingly, we first consider findings about direct relationships that do not involve a mediator.

2.5.1 Direct relationships between political information and participation

To what extent does the consumption of political information, whether mediated through mass or digital media, lead to political participation? Political participation can include traditional forms such as voting, signing a petition, or taking part in a demonstration, as well as newer digital forms (Theocharis, 2015; Theocharis & Van Deth, 2018). When looking at the findings on the influence of traditional mass media, such as TV, radio, or print newspapers, on the political behavior of citizens, a complex and ambiguous picture emerges.

With regard to one of the most frequently used sources of information, the television, Gentzkow (2006) found a negative correlation between higher usage time and political engagement. This finding also seems to apply to younger user groups, in whom increased TV use during the phase of political socialization led to lower political participation (Quintelier, 2015). However, results suggest that the type of TV used is crucial. A number of studies found that the reception of public broadcasting (Sørensen, 2016), late-night TV shows (Hoffman & Thomson, 2009; Hoffman & Young, 2011), local news (Hoffman & Thomson, 2009), and satire (Hoffman & Young, 2011) are positively related to political engagement. Satire and late-night TV in particular seem to have a stronger positive effect on younger citizens (Landreville et al., 2010). The relevance of media content in terms of positive effects on citizens' political activities also seems to apply to radio use. Studies suggest that radio consumption, particularly political talk programs, can promote political participation and interest (Bello & Wilkinson, 2017; Hofstetter, 1998). Accordingly, the degree of political information density in the corresponding media format seems to be of great importance. This could also explain the positive influence of print newspaper use on political knowledge and interest (Boulianne, 2011; Pattie & Johnston, 2003), although here, as with TV use, a clearly directed influence on political behavior varies across different contexts.

This complex constellation continues with the advent of the internet. With technological progress and the spread of the internet, two theses have been put forward regarding the influence of the then-new technologies on the political participation of citizens. The first hypothesis assumes that digital media have an activating function that can encourage passive groups, such as the poor or younger generations, in society to participate in politics. The underlying argument is based on the reduction of costs for political information and the facilitation of coordination and organization so that people who were previously uninterested in politics begin to en-

engage with politics (e.g. Delli Carpini, 2000; Krueger, 2002). Furthermore, it is argued that citizens may also come across political information on social media more or less by accident (discussed in more detail in sections 4.1 and 4.2; Gil de Zúñiga et al., 2014).

The second hypothesis takes the opposite direction, assuming that digital media are more likely to help people who are already politically active and to expand their participation repertoire (Bimber, 2001; Bimber & Copeland, 2013; Xenos & Moy, 2007). Accordingly, supporters of the second hypothesis argue that digital media help those who are already politically interested, and usually socially better situated, to expand their political influence by making it easier to participate. Empirical findings by Boulianne (2009) support this theory: in a meta-analysis, it was shown that Internet use does not lead to the activation of the politically passive and that the Internet is more likely to be used by those who are already politically interested for political participation and to obtain politically relevant information (Boulianne, 2009). Boulianne also shows a link between digital media use and “newer” forms of digital participation, but the specific causal relationship remains unclear (Boulianne, 2016). Of particular interest to this thesis is that digital media activate political engagement among younger people, like most supporters of Fridays for Future (Boulianne et al., 2020; Boulianne & Theocharis, 2020). This could be due to the fact that the formation of political socialization is not yet complete among younger people, and digital media have a positive effect on this (Jungherr et al., 2020).

Nevertheless, the findings are not clear and are partly contradictory. The available panel studies show inconsistent results (Dimitrova et al., 2014; Holt et al., 2013; Theocharis & Quintelier, 2016), while one of the rare experiments found a negative effect of Facebook use on political participation (Theocharis & Lowe, 2016).

In summary, the relationship between media consumption and political information and action is complex and ambiguous, with both traditional mass media and digital media having both positive and negative effects. Studies suggest that certain types of media consumption, such as public broadcasting, late-night TV shows, and political talk shows, can promote political engagement. With respect to digital media, findings suggest that people who are already politically active tend to benefit more and expand their participation repertoire. A special case seems to be younger citizens, whose political socialization phase can be increasingly influenced by (digital) media.

2.5.2 Indirect relationship between political information and participation

Political information cannot influence political participation in a direct way but also indirectly through the intermediary of a mediator. To draw the obligatory sport reference once in this work, you can imagine it roughly as the successful passing game, including the goal kick, of a soccer team. The ball comes onto the field and is passed by different players, one of whom symbolizes political information, to another player through skillful passing, until finally one

player dares to take the shot on goal. Similarly, the indirect and complex influence of political information (a player) on participation (the goal). The player who reflects political information has an important role and position on the field, and he/she plays a part in making the final goal possible. However, he/she is not the only player, and the game of soccer itself is a complex and dynamic one. With this picture in mind, I will try to identify the individual relevant players and their positions in the following chapter in order to obtain a clearer picture.

2.5.2.1 The role of social networks

Interpersonal contacts, whether mediated by the media or in person, are among the most relevant sources of information. A look at the literature suggests that interpersonal networks, such as family, friends, or work colleagues, can have a positive effect on political participation. This is particularly true with regard to the use of political information, for political talk in general and on digital platforms, and for diverse networks (Hsieh & Li, 2014; Quintelier et al., 2012; Valenzuela et al., 2012; Zhang & Seltzer, 2010).

Here, digital platforms and especially social media, such as Facebook or Instagram, play a relevant role. In their study, Hsieh and Li (2014) show that people who discuss political issues online with their friends are more likely to engage with political actors and to articulate their opinions in digital public spaces. The use of digital media formats as well as the use of different information sources for political information are often linked to political interpersonal networks (Hsieh & Li, 2014; Zhang & Seltzer, 2010). Establishing a single and clear causal direction is difficult and would not do justice to the complex interplay of the different factors.

The extent to which interpersonal networks exert a stronger or weaker influence on citizens' political behavior depends in large part on the characteristics of these networks. For example, strong relationships with political parties are associated with higher trust in the government (Zhang & Seltzer, 2010). In the case of digitally mediated communication by citizens about politics, the frequency of discussions, the number of arguments mentioned, and the size of the online network all play a role in the digital participation of citizens, even if this influence is declared to be rather weak (Valenzuela et al., 2012). The type of discussion also has an influence, with discussions about politics among like-minded people being positively associated with the form of digital participation, while the opposite is true for discussions with people who are not like-minded (Chan et al., 2018; Valenzuela et al., 2012).

The diversity of the interpersonal network also exerts an influence on political participation, especially for younger people (Quintelier et al., 2012). The study by Quintelier et al. (2012), suggests a reciprocal and lagged effect, as a politically diverse social network leads to higher political participation, which in turn has a positive effect on the composition of the network by promoting social encounters.

For political protest movements in particular, such as Fridays for Future, it can be deduced that interpersonal networks have a positive influence on political participation through various factors such as (digital) discussion of political or climate protection-relevant issues, broad use of information by activists, and communication within activist groups. In this context, digital platforms, especially social media, play a crucial role as they facilitate the implementation of the above-mentioned points. The type of discussion, the frequency of political discussions, e.g., about political developments or other climate protection-relevant issues, the size of the Fridays for Future network, and the diversity of opinions all play an important role. Overall, interpersonal networks have high significance for political participation, especially in the digital age.

2.5.2.2 The role of platforms and their affordances

In the previous chapters, it has already become clear that digital platforms are a relevant factor influencing participatory behavior. As in our example of the soccer game, it is difficult to quantify tangible shares in the outcome, but it is clear that the player is on the pitch and takes part in the game. Accordingly, the role of digital platforms has already been (partly) discussed in other chapters, so to avoid repetition, only the most important points will be addressed in the next section.

Digital platforms play a particularly important role in the exposure of political information. Here, a distinction is made between intended and incidental exposure by the user (Merten, 2021), which has already been discussed in more detail in chapter 2.4. This exposure to political information, either intentional or unintentional, affects the level of knowledge about political events and knowledge about climate change (Anderson, 2017; Boukes, 2019), the sense of belonging to (political) groups or communities (Jungherr et al., 2020, p. 110), and conversations about political issues (Cho et al., 2009), which in turn are related to political participation (Chan, 2017; Cho et al., 2009).

Whether exposure to political information on social media is fundamentally related to an increase in recipients' knowledge is unclear. The mere use of social media, especially Facebook, suggests a negative impact on users' knowledge (Boukes, 2019; Shehata & Strömbäck, 2018; van Erkel & van Aelst, 2021) while other findings on use in general, Twitter use in particular (Boukes, 2019), and climate change (Anderson, 2017) suggest an increase in knowledge when using social media. This reflects the relevance of specific media formats and content already mentioned. Bode (2017) argues that effects are not uniformly expressed in every social group. Differences in usage behavior could be an explanation for the seemingly contradictory findings, as purely passive exposure to political content, as opposed to actively seeking it, shows no effect on knowledge levels (Gil de Zúñiga et al., 2017).

In addition to providing pure information and knowledge, digital platforms also enable stronger embedding within communities or political groups, such as Fridays for Future or other activist

groups, and the stronger networking strengthens affiliation and *group identity* (Jungherr et al., 2020, p. 110). However, this process does not take place in isolation but in the context of other simultaneous processes. The formation of *group identity* is based on a common information foundation, which includes not only information but also a classification of this information in a broader political and social framework; e.g., knowledge about climate change is linked to the assessment that society should take stronger measures against it. Here, digital platforms support the process of creating such a knowledge base and its classification through their functions and the possibility to post, share, and otherwise interact with content and other people. Accordingly, several processes, such as the creation of *group identity* and knowledge increase, are interlinked here, both of which are supported by the functionality of digital platforms. The interlocking of these processes could then later translate into an increased willingness to support this community through political participation (Boulianne, 2015; Gil de Zúñiga et al., 2012). Accordingly, digital platforms are very relevant for Fridays for Future and their political engagement, as they allow both intentional and unintentional exposure to information about protests or climate change in general, help with the transfer of knowledge about climate change, and assist in building a stronger sense of belonging to the movement among supporters. In practice, these two separately listed points will often be found in parallel and together in social media posts since information is often packaged in formulations that place the information provided in the broader political context and often contain direct or indirect references to one's own group (Toepfl & Piwoni, 2015; Zerrer & Engelmann, 2022). Accordingly, it should be noted that the mere use of digital platforms is not necessarily conducive to participation in Fridays for Future activities, but that the aspects mentioned should be present.

2.5.2.3 The importance of thinking and talking about political information

Receiving information about political developments, protests, proposed legislation, and other social developments is not only received silently but often leads to conversations with other citizens, colleagues, friends, and family (Mcclurg, 2003). Thinking and talking about political issues leads to a better understanding and consolidates both the knowledge and the classification of the information received (Cho et al., 2009), which can take place digitally as well as face-to-face.

Sharing political information in (semi)public digital spaces, such as Telegram groups or Twitter, as well as forwarding messages in private conversations, is a precursor and entry point to (media-mediated) interpersonal exchange on political issues. This is the phenomenon of reasoning, which is divided into the two dimensions of mental elaboration and collective consideration (Cho et al., 2009). The intrapersonal dimension of mental elaboration refers to the individual processing of the information in this context, while the second dimension of collective consideration refers to both the interpersonal exchange and the resulting

interpersonal process (Cho et al., 2009). But the process of reasoning is not always fully rational. Instead, thinking could be irrational, emotionally heated, or founded on inaccurate or prejudiced premises (Cho et al., 2009). Consequently, Cho et al. (2009) argue for the concept of thinking not in terms of the rationality of thinking but in terms of its depth.

In this broad sense, reasoning can take many different forms, including reflection on media content (Eveland, 2001), conversational anticipation (Eveland et al., 2005), and integration and understanding (Cho et al., 2009). Cho et al. (2009) see interpersonal discourse as an essential aspect of the argumentation process alongside intrapersonal mental processes. Personal conversation, both face-to-face and media-mediated, gives people the opportunity to sort out their thoughts and express them in the context of reality (Eveland, 2004). Furthermore, a political discussion with other people enables them to get to know their knowledge and points of view and to participate in group thinking (Cho et al., 2009).

Political discourse, as suggested by Southwell (2014), is intentional and meaningful behavior since it entails evaluating, elaborating, and clarifying information. Empirical research has shown that interpersonal discussion increases factual knowledge (Cho et al., 2009), as well as the quality of opinion, measured by consistency of opinion or reasoned argumentation (Kim et al., 1999). Furthermore, social ties play a relevant role in both receiving and classifying political information. For example, people on average assign a higher degree of credibility to information they receive from people with whom they have close social ties than from people they do not know (Turcotte et al., 2015).

Interestingly, this phenomenon applies not only to personally known and close people but also to celebrities and social elites, who are trusted with the information they share on social media (Sterrett et al., 2019). The information shared in this or other ways is received by others and possibly discussed online or face-to-face, with an indirect relationship between social media and mobile media use and political participation via interpersonal political discussion (Chan et al., 2017). These findings are in line with the results of the study by Vaccari and Valeriani (2018), who were able to show that political conversations on social networks and mobile instant messaging platforms have a positive relationship with institutional and extra-institutional political participation. Here, a possible motivating factor for individuals to participate in political conversations is a hostile media perception and suspected media influence (Barnidge & Rojas, 2014).

Accordingly, political participation will be influenced by online discussions mediated by the media. Particularly in the context of protest groups, it is assumed that media-mediated discussion between members of political groups contributes to the development of their politicized identity and thus exerts an indirect influence on political action (Alberici & Milesi, 2016). A relevant component here appears to be like-minded peer discussion, which is positively related

to online participation. This correlation is reversed when discussing with non-like-minded peers (Valenzuela et al., 2012). Accordingly, the discussion group is relevant for the impact of discussions (Valenzuela et al., 2012).

These findings show that engagement in political conversations depends on the social environment. For younger people in particular, people close to them, such as family and peer groups, are important discussion partners for friendly conversations, arguments, and the exploration of opinions and (political) identities (Ekström, 2016). These types of conversations seem to be more likely to be face-to-face or in closed messenger groups, as younger people in particular are more reluctant to express their opinions on social media, as the fear of threatening reactions is an important aspect of their disengagement (Ekström, 2016). It was shown that the discussion of political news and topics in closed Messenger app groups among people who know each other can have a positive effect on emotions and knowledge about the topics discussed (Vermeer et al., 2021). However, the strength of social ties is a relevant indicator for the discussion and sharing of political topics and news within closed social media and messenger app groups, as the group members assess whether the discussion or sharing of political topics is appropriate based on the social ties and the associated norms and aims of the group (Swart et al., 2019).

This speaks for the reinforcing function of reasoning processes in the impact of political information. In the case of Fridays for Future, this means that political information, e.g., about government climate protection measures, that an activist or supporter discusses with other people is better processed and classified and can therefore have a greater impact than if this information had not been discussed. Accordingly, discussions both within the protest groups and with external parties are a relevant component that strengthens both the understanding of the information itself and its placement in the political context. It is likely that this placement in the political context is also accompanied by a strengthening of *group identity*, since the person discussing the issue takes a stand and at the same time distinguishes himself from an outgroup (Ekström, 2016). Overall, the discussion of political issues is an important influencing factor for participatory action.

2.5.2.4 The impact of political information on psychological factors

In the previous chapters, the relevance of psychological factors for the participation of citizens has already been more or less directly touched upon. The fact that reading, hearing, or seeing political information has an influence on political participation has already been described, but the exact path from receiving political information to actual political action, e.g., participation in a climate strike, has not yet been examined in detail. Accordingly, we would now like to focus more on the psychological factors and mechanisms in order to gain a better understanding of the processes that take place within the individual.

Citizens who are highly involved in politics become more aware of the problems facing their community, country, or the world in general (Guo, 2007). This heightened awareness can lead citizens to become more involved in social life, thereby shaping society (e.g. Ekman & Amnå, 2012). This positive effect can also turn negative if citizens become disillusioned and withdraw from their involvement.

However, whether and how a citizen becomes politically involved in their community or elsewhere also depends on their personality traits (Mondak et al., 2010). For example, extroverts tend to participate in more group-related activities, such as public rallies and protests (Mondak et al., 2010). In addition, more open-minded people are more inclined to participate in political discussions, while people with a strong need for connection are more attracted to ideologies that offer simple answers to complex social issues (Hodson et al., 2009). It is also interesting to note that people with higher levels of empathy are more inclined to support social justice issues (Graham et al., 2009; Pagano & Huo, 2007), while for people with a strong sense of duty and responsibility to be "good citizen", voting is a chore (Blais et al., 2019; Quintelier & Van Deth, 2014). Overall, personality traits may be a determining factor in how people approach and engage in political participation.

Personality traits, however, are very stable characteristics that hardly change over time. Accordingly, it is relatively unlikely that receiving political information, digital media, or other media consumption will change them significantly. Following this line of reasoning, we can assume that this form of psychological factor is unlikely to be a mediator of an indirect media effect. However, we have already touched on other psychological factors that can be considered mediators of a media effect. Specifically, these are the *group identity*, *emotions*, and *agency* already mentioned.

The consumption of media and political information has an impact on *group identity*. The concept of *group identity* was partially addressed indirectly in both the impact of interpersonal networks, digital platforms, and political conversations on participation. *Group identity* describes the individual's affiliation to a group, which "reflect[s] the basis for the development of social (or group) identities" (van Zomeren, 2013, p. 380). Based on the perspective of *social identity theory* (Tajfel, 1978), people see themselves as individuals or as members of a group depending on the situation and individual factors (Ellemers et al., 2002). They can switch between an individual or collective identity and different identity levels (e.g., political group, community, nation) (Van Zomeren, 2016). This political motivation influences the group-related interpretation and emotional experiences of individuals' environments and, thus, their motivations to act collectively (Van Zomeren, 2016). Findings show the relationship between media usage and identity. The literature review by Priante et al. (2018) reveals the relationship between computer-mediated communication and social identity (Priante et al., 2018). Harlow

and Benbrook (2019) showed that Twitter posts by black celebrities contained identity-building formulations posted in the context of the Black Lives Matter protests. The results of two experimental studies suggest that exposure to positive media depictions of the ingroup can lead to a better evaluation of one's group and the self (McKinley et al., 2014). It is noteworthy that exposure to positive media depictions does not impact the evaluation of the outgroup about the ingroup (McKinley et al., 2014). The findings of Zhang & Haller (2013) are in line with these results regarding the impact of media representation on the ingroup (Zhang & Haller, 2013). Perceived positive media representation of the ingroup resulted in the confirmation of their ingroup identity (Zhang & Haller, 2013). On the other hand, the lack of representation of the ingroup in media can undermine ingroup identity, as Leavitt et al. (2015) argue in their article (Leavitt et al., 2015). Not only the presentation of one's group in the media, but also the use of the language of the in- or outgroup has an effect on identity (Clément et al., 2005).

In addition to *group identity*, *emotions* are a common human characteristic that is also reflected in political action. *Emotion* can be understood as a "dynamic psychological mechanism that guides the efforts of individuals to cope with their environment" (van Zomeren, 2013, p. 381). *Emotions* can influence political participation (Van Zomeren, 2016). Empirical results highlight the impacts of negative *emotions*, such as anger and rage, on the likelihood of becoming politically active in a group (e.g., Shi et al., 2015). The emotionality of supporters on the issue of climate change shows a high proportion of worry, frustration, and anger (De Moor et al., 2020). The effect of media on *emotions* can occur in different areas where the reception of media can always cause emotionality (Wirth & Schramm, 2005). Wirth & Schramm (2005) present a wide range of media effects in relation to *emotions*. In the context of right-wing populist communication, the results of a transnational content analysis and survey show a negative correlation between populist content and negative *emotions* (Wirz et al., 2018). A higher reception of populist content increased negative *emotions* (Wirz et al., 2018). When considering the possible effects in relation to positive *emotions*, the reception of constructive news content shows a positive impact on *emotions* (Hermans & Prins, 2020).

In addition to belonging to a group and the feelings associated with it, the belief that one can influence the political system through one's own or collective actions is a central concept in terms of participation. The so-called *agency* derives from Bandura's (1999) concept of *self-efficacy* and defines the belief in being able to achieve a "certain goal through a certain (collective) action" (Van Zomeren, 2016, p. 93). It consists of two dimensions: *group efficacy* and *personal outcome expectancy*. *Group efficacy* describes the belief that a group can achieve a particular goal through specific collective action (Bandura, Freeman, & Lightsey, 1999). Van Zomeren assumes that a strong identification with a group also leads to a stronger belief in the efficacy of political participation and group goals (van Zomeren, Leach, & Spears, 2010). *Personal outcome expectancy* reflects the belief that a specific action will lead to a

specific outcome (Bandura et al., 1999). The findings of media effects on *self-* and *group-
efficacy* can be separated into two main arguments. The first argument shows the impact of general social media usage on efficacy (Hoffmann & Lutz, 2020; McNallie et al., 2020) and the impact of media content on information efficacy in the context of political participation (Jennings et al., 2020). The second argument focuses on the impact of specific media frames on *self-* and *group-
efficacy* regarding political participation (Haenschen & Tedesco, 2020; Smith et al., 2020). The findings by Haenschen & Tedesco (2020) show that the framing of a political movement (in this case the American youth-led movement for gun violence prevention) as unsuccessful undermines the external and collective efficacy of the recipient. Another aspect of news frames regarding political participation was tested by Smith, Williamson, & Bigman (2020). In their study, they focused on the impact of discrimination news frames and activism intentions. The results show that news frames directly impact the self-reported level of activism intentions (Smith et al., 2020).

For Fridays for Future, this means that media and exposure to political information have an impact on the willingness of supporters to engage politically in joint actions. Here, both contributions generated by activists can have an impact, as can contributions from journalists or user-generated content from other people outside the protest movement. The effects produced can have an impact on perceptions of *identity*, *emotions*, or beliefs in political *self-
efficacy*, though this can vary greatly depending on the content and context.

2.5.3 Relationship between digital & mobile media and climate protest

In the previous chapters, we have looked at the impact of political information on political participation, under which a whole range of different actions and behaviors fall (see chapter 2.3). For example, signing petitions, contacting politicians, or posting on social media sites is a political action that is also carried out by supporters of the Fridays for Future movement. However, a relevant, if not the most relevant, part of the effectiveness and perception of Fridays for Future are demonstrations or so-called “school strikes” (De Moor et al., 2020; Wahlström et al., 2019). Public protest is an important form of political participation for the climate movement, which is also facilitated by digital media and the flow of political information.

Digital media and other digital tools help activists orchestrate people's collective behavior. Specifically, mobilizing supporters, either for political action and protest or organizational tasks, is easier, faster, and cheaper. This relatively simple functionality increases not only the reach but also the effectiveness of political actions, as it is easier and faster to respond to new developments, both offline and online.

According to scientific findings, citizens participate in political actions when they have a common goal and motivations, have the necessary resources to participate (e.g., time), and are

recruited for them. Accordingly, digital media can help protest groups turn already well-meaning supporters into active participants while also trying to convince those who are not yet well-meaning of their cause.

In terms of climate protests, this means that Fridays for Future activists use their digital media repertoire to highlight the visibility of the issue of climate change and the necessary measures against climate change (Boulianne et al., 2020). At the same time, it attempts to increase the motivation for participation in political actions of potential participants by producing a shared identity image. The communication of identity imaginaries is often accompanied by an emotional connotation of the issue of climate change and of one's own and opposing political actors (Martiskainen et al., 2020; Toepfl & Piwoni, 2015). In doing so, activists also appeal to moral convictions and the belief that something can be changed through collective political action. In this way, a social problem—in this case, climate change—is made visible, the need for political action is outlined, and a possible solution strategy—political protest combined with action against climate change—is demonstrated (Han & Ahn, 2020).

In this way, digital media enable Fridays for Future activists to reach out to others and invite them to participate (Enjolras et al., 2013). Furthermore, they can increase the visibility of climate change issues by engaging ordinary citizens with their messages and raising awareness of existing injustices and grievances (Lee et al., 2017). This leads to a weakening of political and social elites as digital media continuously challenge their version of events (Gurri, 2018 as cited in Jungherr et al., 2020).

In summary, digital media are an important coordination tool for Fridays for Future activists, through which they disseminate information about protests. In addition, digital media serve as a mobilization and recruitment tool, as Fridays for Future is thus able to challenge the government's and elite's narrative and thus convince people to participate in the movement as well as in protest actions.

3 Synopsis of the theoretical context and research gaps

Access to political information in a democratic society, such as Germany, is highly relevant for all citizens (Mitchelstein & Boczkowski, 2010). However, politically active individuals in particular, such as the supporters of Fridays for Future, have a greater need for information to enable them to exercise their political engagement. Consequently, political communication is essential for the transmission of information and meaning between individuals in democratic societies. This transmission can occur through various media, including mass media, digital media, and interpersonal communication (Sarcinelli, 2011). Recording and analyzing this media transmission is sometimes complex. This is particularly true for interpersonal communication, which is at least partially made more methodologically ascertainable for scholars by the proliferation of mobile devices. Regardless of the medium, Fridays for Future supporters need to have access to information about political events and actors in order to make informed decisions in elections or to participate in political action.

Added to this is the growing influence of digital and mobile media, which is becoming increasingly relevant due to the changing media landscape and the spread of smartphones (Chadwick, 2017; Jungherr et al., 2020). Along with this, the fragmentation of media offerings has increased the complexity of possible sources of information. Overall, a stronger integration of the media into society and the lives of individuals can be observed (Hepp, 2020). This has increased the relevance of media-mediated political information, as it is easier to measure and there are more opportunities to access and interact with political information. The complexity of the transmission and classification of political information has increased, as it can be written and received by a variety of different actors (including: normal users, journalists, politicians, activists) and can be disseminated via a variety of different channels, each with their own functions (messenger, social media, video platforms, etc.) (Kümpel et al., 2015). Overall, the changes in the media and information landscape have had a significant impact on political participation and society.

As a protest movement for climate justice, Fridays for Future also anticipates the changes in the German media landscape and the associated new possibilities for internal organization and forms of political participation. A large number of the grassroots movements belong to a younger generation who have grown up with digital, social, and mobile media and see it as a normal part of their everyday experience (Hasebrink et al., 2021). It is therefore natural for the protest group to incorporate media and technical possibilities into their repertoire. This includes internal communication channels, such as news feeds on messenger apps, as well as more public formats on platforms such as Instagram or Twitter. This is not limited to the creation of a pure information channel for organizational purposes but also serves to mobilize supporters and increase the visibility of the issue and the movement in public discourse (Sommer et al.,

2019; Theocharis & van Deth, 2015). This creates a close link between online and offline activities.

Accordingly, digital mobilization, analogue protests, and the subsequent reporting on them in social media and journalistic coverage are closely intertwined (Brünker et al., 2019; von Zabern & Tulloch, 2021). At this point, the relevance of journalistic reporting for the visibility of the protest becomes just as clear as the close connection between user-generated (mobilizing) content, journalistic reporting, and the reception of this political information content (von Zabern & Tulloch, 2021). The consumption of political information content, which can be both user-generated and journalistically generated, is therefore an important prerequisite for political participation.

The points listed are to be regarded as an important context for the present work and should enable the reader to classify the results and analyze them more easily.

3.1 Summary: Usage patterns of political information

The available literature clearly shows that, on the one hand, the existence of digital media has an influence on political protest and other forms of participation (Jungherr et al., 2020). In particular, the emergence of these digital media has created new spaces of opportunity and, at the same time, softened and challenged the existing gatekeeper structures of the old media system (Klinger & Svensson, 2015). Accordingly, it is clear that the existence of digital media is an important tool, especially for political groups outside the political mainstream (Lorenz-Spreen et al., 2022), which gives these groups greater visibility, improved internal and external networking, easier and faster dissemination of content, and the creation of a *group identity* (Alberici & Milesi, 2016; Jungherr et al., 2020).

In addition to the mere presence of digital media, the literature highlights the frequency of use of political information in particular as a relevant predictor (Boulianne, 2015; Boulianne & Theocharis, 2020). The frequency of media use is relevant both for direct effects on political participation and for indirect effects through relevant variables such as political interest, *group identity*, and *political efficacy* (Andersen et al., 2021; Boulianne, 2020; Holt et al., 2013). These studies focus purely on the frequency of use and do not include the context of use or the type and nature of the content used.

However, some studies show that context and usage behavior are relevant with regard to the effects of media consumption. The basic idea here is not that more media consumption has more impact, but that the quality and type of use are important factors in determining whether the media consumed has an effect. In their study, Hoffman and Young (2011) found that the reception of political satire programs in particular, in contrast to pure entertainment formats, has an influence on how well people are informed about political developments. This result,

which may seem relatively banal at first glance, is extremely relevant on closer inspection, as an argument is made here for a differentiated and content-oriented analysis, which runs counter to the overly general summation of usage frequencies. This argument is supported by the results relating to the high relevance of follow-up communication and political talks that follow the reception of political content. Studies show that content that is discussed and contextualized with peers after reception is better remembered and can therefore have a greater impact (Cho et al., 2009). This behavior of receiving and discussing politically relevant content is increasingly shifting to media-mediated environments due to the spread of digital media and, in particular, the advent of smartphones. Here, political information is shared and discussed in (private) chat groups such as WhatsApp or Telegram (Gil de Zúñiga et al., 2021; Vermeer et al., 2021), which increases the potential impact of this content.

The studies presented show the relevance of user behavior in relation to the impact of the media consumed. Anter and Kümpel (2023) show that in a digital media environment, opening apps, such as Instagram in this case, is an “automated behavior that happens without thinking or specific intentions in mind” (p. 13). Despite this behavioral pattern, Anter and Kümpel (2023) argue that large parts of the use serve to fulfill information needs, such as group-related, topic-related, undirected, and problem-related. Other studies identify (mobile) usage patterns and attempt to work out relevant behaviors. A whole series of studies show that there are various recurring patterns of mobile smartphone use (Deng et al., 2018; Peng & Zhu, 2020; Tong et al., 2020; Tong et al., 2022). On the one hand, usage behavior can be examined over the course of the day (Böhmer et al., 2011; Tong et al., 2022), as well as the usage context in relation to previous applications or the use of the smartphone in social or spatial contexts (Cao et al., 2018). These studies show the possibilities of technical recording and evaluation of human trace data on the smartphone, which, however, are usually carried out without social or communication science aspects.

The embedding of these analytical possibilities in a broader communication science question is promising. Following Peng and Zhu (2020), the methodological possibilities can be transferred to research on media and information repertoires. The studies that focus on app and information use on the smartphone, mostly from the field of computer science, do not link their detailed and interesting analysis of smartphone use with social or political behavior, such as political participation. Accordingly, these studies are often descriptive without a stronger theoretical foundation. Some studies that examine media and information usage behavior usually use either survey data based on self-reporting or qualitative interviews, both of which can offer interesting contextual added value but are often too imprecise for querying detailed usage patterns, e.g., on a smartphone.

This thesis aims to contribute to closing this research gap by focusing on mobile usage patterns, including the usage context on the smartphone, for politically active individuals. In order to be able to consider this usage behavior with as little interference as possible from other relevant dimensions, such as frequency of use, a sample is selected for which it can be assumed that both political information use and participation are given and can therefore be regarded as relatively constant. In this case, supporters for Fridays for Future. If usage patterns are relevant, the probability of finding them is highest in a politically active and informed group. The following research question is formulated accordingly.

RQ 1: How can different forms of mobile political information used by supporters of Fridays for Future be identified and characterized?

3.2 Summary: Exposure to political information & information repertoires

In the literature, a distinction is made between different types of (young) news users, with the groups of news avoiders and news omnivores in particular being the most common and stable in a whole series of studies (Bos et al., 2016; Edgerly, Thorson, et al., 2018; Geers, 2020; Ksiazek et al., 2010; Strömbäck et al., 2018; Trilling & Schoenbach, 2015b). News avoiders are characterized by low overall news consumption, while news omnivores are on the other side of the scale and have high overall news consumption (Geers, 2020). Accordingly, the frequency of political news consumption plays a major role in the formation of repertoire types. Against this background, the recording of specific behaviors is less clearly reflected in the formation of repertoires.

The emergence of social media platforms and digital media has led to an expansion of media offerings, which requires a more comprehensive view of media use. Information and media repertoires provide a suitable analytical framework for this. Younger generations tend to use social media and digital platforms more. It is striking that there are few existing studies that relate to the information repertoires of younger generations and their changed media usage behavior. The study by Geers (2020) also identifies known patterns of news avoiders and news omnivores among younger people. However, it does not go into more detail about specific usage behaviors or the use of the smartphone as a source of information. The study by Anter and Kümpel (2023) takes a much broader approach, with a stronger focus on the context of use. In this study, Anter and Kümpel (2023) show “that Instagram [use] is an integral part of young adults' information repertoires, although information is [rarely] actively sought” (p. 1.). Accordingly, the characteristics of the platform influence information behavior (Anter & Kümpel, 2023). Accordingly, the study provides insights into the use of Instagram, which is an important but not the only relevant digital medium. This thesis aims to build on this work by using a cross-

platform approach to draw a broader picture of information usage behavior and practices on young people's smartphones.

Politically active individuals, such as Fridays for Future supporters, on average exhibit different media usage behavior than the rest of the population, which can be attributed to higher education, social status, and *political interest*. Accordingly, this study focuses more strongly on a subgroup of the population that is politically active, relatively young, and thus has a different media usage behavior and consumes news and political information relatively frequently. This enables a stronger consideration of usage behavior within information repertoires, as the frequency of media use in a relatively homogeneous group is not so important. Looking at Fridays for Future supporters makes it easier to identify differences in the form of political participation behavior in relation to different forms of media use behavior, as the general frequency of information use does not vary as much.

In summary, this thesis aims to fill the research gap in relation to the information usage behavior of politically active individuals, including smartphone usage, using more accurate methods of data collection. I formulate the following research question accordingly:

RQ 2: How can different types of information repertoires of supporters of Fridays for Future be identified and characterized?

3.3 Summary: Mobile political exposure & talk

Overall, it can be said that people's reception behavior with regard to political information has become significantly more complex and fragmented with the establishment of digital content. The increase in access channels to political information is reflected in very different individual information behavior, which in turn can have interactions with the information offered through sharing, posting, etc.

This reveals the rather methodological problem that politically relevant use should be analytically identifiable from politically irrelevant use in order to be able to make a reliable statement. A number of tracking studies proceed with the help of a comparison of web addresses by matching the tracked URLs against a list of previously defined politically relevant web addresses (news sites, party accounts on social media, etc.) and classifying these as politically relevant information use (Stier et al., 2018; Stier, Breuer, et al., 2020; Stier, Kirkizh, et al., 2020). This approach has two blind spots. On the one hand, it is unclear whether politically relevant information was really received on a news site or whether the person was merely playing chess on Zeit-Online. Some studies address this disadvantage with a detailed analysis of the URLs. The second blind spot relates to the use of smartphones and the applications used on them, whereby the content received within an app often represents a black box. This in-app use, i.e., specifically the Instagram feed or similar, is often the most interesting aspect.

This thesis aims to contribute to a partial solution to this problem. By testing two methodological approaches that provide insights into this black box and thus represent a way to shed light on the politically relevant use of mobile information.

In this context, a more empirical component is added, namely the question of digitally mediated political talk. Upstream thinking and actual talking about political issues lead to a better understanding of political information by consolidating it and placing it in a broader context (Cho et al., 2009). This process can take place both digitally and face-to-face. The exchange of political information in (semi-)public digital spaces such as Telegram groups or Twitter, as well as the forwarding of messages in private conversations, is a precursor and entry point for (media-mediated) interpersonal exchange on political issues.

Existing studies record political conversations mainly through interviews and self-reporting, which is particularly inadequate and inaccurate in a mobile and digital media environment (Parry et al., 2021). Furthermore, there are no studies that I know of that look at the proportion of political conversation on Fridays for Future supporters in a digital media environment. Although studies in other political contexts describe the high relevance of messaging apps and other digital exchanges for political communication (Gil de Zúñiga et al., 2021; Vermeer et al., 2021).

Accordingly, this thesis would like to contribute to closing this research gap by describing a methodological contribution to capturing the politically relevant part of information use as well as linking behavioral patterns, which include digitally mediated political conversations. Accordingly, I raise the following research question:

RQ 3: How do the share and the manner of mobile political exposure and talk differ within the information repertoires of supporters of Fridays for Future?

3.4 Summary: The complex interplay of political information and participation

There is a complex relationship between the consumption of politically relevant information and political engagement, with both traditional mass media and digital platforms and associated usage behavior playing a role. The results suggest a multi-layered effect in which certain types of media, including public broadcasting, late-night TV shows, and political talk shows, can promote political engagement (Hoffman & Young, 2011). Similarly, digital media appears to increase political engagement among individuals who are already politically active (Bimber, 2001; Bimber & Copeland, 2013; Xenos & Moy, 2007), while younger citizens may experience significant influence from digital media during their political socialization phase (Jungherr et al., 2020).

Digital platforms, particularly social media, are of great importance to Fridays for Future as they provide access to information, share knowledge about climate change, and foster a sense of belonging among supporters (Jungherr et al., 2020, p. 110). Media posts, whether they come from activists, journalists, or users outside the movement, influence supporters' willingness to engage in political action. The impact varies depending on content and context and affects *identity*, *emotions*, and belief in political *self-efficacy* (Alberici & Milesi, 2016; Asker & Dinas, 2019; Smith et al., 2020). In summary, digital media is an important tool for coordinating and disseminating information about the Fridays for Future protests, as well as for mobilization and recruitment. The movement challenges the dominant narratives and encourages people to participate in the protests.

The literature particularly emphasizes the frequency of use of political information as a relevant predictor (Boulianne, 2015; Boulianne & Theocharis, 2020). The frequency of media use has direct effects on the probability of becoming politically active as well as indirect effects via relevant variables such as *political interest*, *group identity*, and *political efficacy* (Boulianne, 2015; Boulianne & Theocharis, 2020).

However, some studies show that context and usage behavior are relevant with regard to the influence of political information consumption. At the same time, the connection between usage behavior and context in relation to political participation is under-researched. Some studies contribute to closing this research gap. Among others, Dvir-Gvirsman (2020) shows that different information repertoires can be identified on the basis of usage behavior, which shows differences in the level of political participation. However, these differences can be attributed to the frequency of use, as the repertoire with the highest news usage was also the most politically active (Dvir-Gvirsman, 2020). The findings of Wolfsfeld et al. (2016) are also interesting, as they were able to show that the use of political information via social media has the greatest explanatory and significant impact on digital political participation compared to the use of information via traditional media. Accordingly, the type of information used appears to have an influence on the form of political participation. This suggests a close connection between forms of Digital Networked Participation such as sharing a political post on Instagram (Theocharis & van Deth, 2015) and some forms of use of political information. This finding is also supported by Strömbäck et al. (2018), who were able to show that social media news users in particular are more likely to engage in both offline and online political participation.

However, these findings are based on self-reported survey data, which is inaccurate in the current complex media reality (Parry et al., 2021). It is difficult for respondents to remember the occurrence of politically relevant content in their social media feed and to state this correctly in a survey. Accordingly, it can be assumed that survey data for recording digital media use leads to biases (Pak et al., 2022; Parry et al., 2021). Due to the relatively rough recording of

political information use by means of questionnaires, these studies paint a relatively abstract picture of user behavior with regard to different forms of political participation. Here, the link between digital mobile usage behavior and digital forms of political participation, such as sharing or reposting political content in social media or messenger applications, remains relatively unexplored. Furthermore, most studies do not directly include the smartphone as a relevant device for accessing political information in the data collection and are therefore not able to capture the corresponding usage contexts.

This thesis aims to contribute to closing the aforementioned research gap by using automated tracking as a more precise method of data collection, which enables a more detailed recording of user behavior. This is accompanied by a more detailed examination of specific usage patterns and forms of political participation. In order to shed more light on the question of the extent to which the context of use and the behavior in the reception of political information are related to the forms of political engagement. Accordingly, the last research question is formulated as follows:

RQ 4: How do the forms of political participation differ between the information repertoires of supporters of Fridays for Future?

4 Research design and methods

The connection between the use of political information and various forms of political engagement among people who are already politically active has not yet been sufficiently investigated empirically, as the previous chapter shows. This applies in particular with regard to the collection and evaluation of data in a complex, partially mobile media environment. This thesis aims to contribute to the research by answering the following research questions:

RQ 1: How can different forms of mobile political information used by supporters of Fridays for Future be identified and characterized?

RQ 2: How can different types of information repertoires of supporters of Fridays for Future be identified and characterized?

RQ 3: How do the share and the manner of mobile political exposure and talk differ within the information repertoires of supporters of Fridays for Future?

RQ 4: How do the forms of political participation differ between the information repertoires of supporters of Fridays for Future?

To answer this question, supporters of the Fridays for Future movement in Germany were automatically tracked in their smartphone use over a period of four months and surveyed at regular intervals, four times in total, using an online survey. The data obtained made it possible to identify distinct usage patterns, which are also reflected in the composition of information repertoires. These information repertoires show differences in terms of the proportion of political information use and the forms of political participation. In this way, I am able to draw conclusions about the interplay of political information, user behavior, and participation.

This thesis examines the relationship between political information use and political participation. A combination of methods will be used to investigate these research phenomena. A mixed-methods design allows for a comprehensive capture and examination of the phenomenon through online surveys to capture political participation as well as offline information usage, automated mobile tracking of usage behavior, and mobile screen recordings paired with image recognition algorithms to capture parts of the received content.

In this way, the different methodological approaches complement each other by closing the respective gaps in the data material that is necessary to answer the research question (Flick, 2011). Through the online survey as a reactive data collection instrument, it is possible to capture political participation as well as other characteristics on an individual level (Möhring, 2010). To capture digital information usage behaviors, more accurate and reliable automated tracking is used as a non-reactive data instrument, which allows a more precise mapping of usage behaviors, especially in digital contexts (Parry et al., 2021). In this case, automated

tracking allows us to capture applications used on smartphones. The findings from screen recording can serve as an indicator for relevant usage sessions. Using a keyword approach, when one or more previously defined terms appear, such as *protest* or *climate*, these terms are saved in a log file together with the timestamp. In this way, it is later possible to combine the data records from the app tracking and the screen recording and thus merge the collected information for a more precise interpretation. This allows us to obtain a data set that contains information such as the following: *Participant X used the keyboard on Instagram on Tuesday at 10:32 a.m. and used the previously defined keyword “climate”*.

This method combination of an online survey and automated tracking offers the advantage of increasing the validity and reliability of the results. This is especially possible due to the possibility of triangulation, i.e., the verification of findings from different perspectives or data sources (Flick, 2011). Especially against the background of the nature of tracking data, triangulation is an important tool to draw the correct conclusions from automated tracking data that are sometimes very small-scale and lacking in context (Stier, Breuer, et al., 2020).

The combination of methods used also poses some challenges for the present work. On the one hand, the use of automated tracking in particular, and especially in combination with surveys, raises ethical questions. These mainly concern questions of data protection, the consent of the participants, as well as the pseudonymization and anonymization of the collected data. On the other hand, there is the risk that the comparability or interpretation of the data from the different sources is not or only partially possible, which would cause the quality of the data to suffer greatly (Stier, Breuer, et al., 2020). To minimize this risk, a planned and thoughtful research design is necessary. Furthermore, there are supposedly trivial challenges, which are often of a technical nature, such as the secure storage of data and the processing of large data sources, as they occur in particular in automated tracking, as well as ensuring the reproducibility of one's own procedure, especially against the background of the sometimes-complex data preparation and cleaning steps in automated tracking and content data (Sen et al., 2021).

In addition to the advantages and disadvantages of combining methods at the level of research design, the individual methodological approaches have their own strengths and weaknesses, which are briefly described below.

4.1 Case study

The case study approach enables the investigation of a phenomenon based on the intensive examination of a case, in this instance the political information behavior of the supporters of Fridays for Future, in order to be able to derive indicators, findings, and statements from these that are at least (in part) transferable to the overall phenomenon. In this thesis, I follow the argumentation of Gerring (2004), who defines case studies as “an intensive study of a single

unit for the purpose of understanding a larger class of (similar) units” (p. 342). Here, Gerring (2004) understands a unit as a spatially limited phenomenon, in our case, Fridays for Future as a political movement that is examined at a single point in time or, like in this thesis, over a certain period of time.

Case studies differ from cross-unit studies in the way cases are defined, not in the analysis or method chosen to model causal relationships (Gerring, 2004). The research design of a case study constructs cases on the basis of a single unit and, at the same time, pays attention to conclusions that can be (partially) transferred to similar units outside the unit of investigation (Gerring, 2004).

To understand the definition of a case study, it helps to consider the term in relation to other terms in this field. In this conceptual field, there are a number of nested definitions, whereby the population consists of a sample and non-studied cases. This sample is made up of several units that are observed at certain points in time and form cases. This case consists of several variables based on either a single or a large number of observations. Gerring (2004) argument is that all of the above terms can only be defined with reference to a specific research question and research design; for example, a state or country can be a case, a unit, a population, or a case study, depending on which claim is being made (Gerring, 2004). Against this background, the definition of the level of analysis is of great importance. For example, if we go one analysis level deeper, the population and all nested terms will also shift. Accordingly, the population, unit, case, and observation are closely intertwined. Therefore, it is important to define the overarching question and the corresponding analysis level, which define the conceptual context (Gerring, 2004).

Gerring (2004) argues that a case study differs from other methods by the means of its “reliance on covariation demonstrated by a single unit and its attempt, at the same time, to illuminate features of a broader set of units” (p. 343). Accordingly, the number of cases (N) within a case study can vary greatly and enable both qualitative and quantitative data collection and evaluation methods (Gerring, 2004). Gerring (2004) distinguishes between three types of case studies based on their covariational structure. The first type refers to case studies that deal with a single event over time (Gerring, 2004). For example, a case study of the first type looks at the unit Fridays for the Future in regard to their political information use. The study would analyze Fridays for the Future in different phases of the movement, such as the formation, the establishment, and the decline, and work out any changes or constants. The points in time at which the unit is examined represent the cases (Gerring, 2004). In the second type of case study, there is no temporal variation (Gerring, 2004). If we stay with our example of Fridays for the Future, we would only look at it at a single point in time. Accordingly, the covariance patterns within this unit are of interest in this example. The cases here are all cases that are at a

lower level of analysis than the claim under investigation. In our example, the movement of Fridays for Future would be the highest unit of analysis, which is subdivided into the subordinate cases of local groups, working groups, individuals, or similar (Gerring, 2004). Case studies of the third type represent a combination of the first and second types, as they contain both temporal and intra-unit variation (Gerring, 2004).

This thesis is a case study of the third type, although the unit-internal elements of the study clearly predominate. It should be noted here that the data collection has a temporary dimension, as continuous data collection is carried out over the four-month period under investigation, while the analytical and research question-led analysis focuses more on unit-internal statements. These include working out different information usage patterns and information repertoires among the supporters of Fridays for Future.

Despite the sometimes-difficult delimitation of case studies as a concept, they exhibit a number of characteristic features. In particular, the use of case studies is worthwhile when (1) the conclusions are more descriptive in nature and are not designed to verify a causal relationship, (2) when a deeper and more detailed statement is preferred to a generalizable finding, (3) when the (internal) comparability of the cases studied is more important than the (external) representativeness of the cases, (4) if the gain in knowledge about causal mechanisms is more important than the insight into causal effects, (5) if the causal statement investigated is invariant rather than probabilistic, (6) if the objective of the research is more exploratory than confirmatory, (7) if the usable variance is only available for a single unit (Gerring, 2004).

Against this background, a case study design is suitable for the present thesis due to the descriptive character of the strongly exploratory investigation aimed at a deeper and more detailed analysis and the insights that can be derived from it. The aim here is not necessarily to gain universally generalizable findings, but to gain deeper insights into possible relationships and mechanisms in relation to political information use and its link to the chosen forms of political engagement.

4.2 State of the art of automated tracking and the methodological contribution of this work

The changes in the media landscape and the associated differentiation and greater digitalization of media consumption have led to an increase in communication studies with an automated tracking approach (e.g.: Guess et al., 2020; Stier et al., 2021; Wojcieszak, 2019; Wojcieszak et al., 2023). This development was strengthened above all by the argument that more established forms of data collection (including surveys and media diaries) are no longer unequivocally suitable for recording media use within the changed media landscape (e.g. Parry

et al., 2021). Following this argument, the number of studies with an automated tracking approach and communication science questions increased.

There are several studies in communication science and neighboring fields that are using mobile or desktop tracking as a data collection method. The two basic assumptions in these studies are usually that the consumption of media content, usually news, has an influence on an attitude or behavioral variable, such as the degree of polarization or a person's political participation, or that specific preferences lead to exposure (Stier et al., 2018; Stier, Breuer, et al., 2020; Stier, Kirkizh, et al., 2020). To answer these questions, media and information usage were first measured. Three common forms can be distinguished here.

The first form of data collection by means of tracking refers to the so-called proxy approach, which takes on the role of a digital middleman in the form of a browser plug-in and records the accessed URLs (Christner et al., 2021). It can be assumed that a large number of commercial tracking panel providers also use this approach. The approach provides the URL accessed, either as a full address or shortened to the domain level, as well as the time and, in most cases, the duration of access (Stier, Kirkizh, et al., 2020; Wojcieszak et al., 2023). In this way, conclusions can be drawn about the number, frequency, diversity, and duration of visits to specific websites, such as news (Wojcieszak et al., 2023), social media profiles of politicians (Stier et al., 2018) as well as other content, such as pornography (von Andrian-Werburg et al., 2023). Furthermore, this approach almost always requires a list of previously identified URLs that serve the research interest (e.g. news pages), which is compared with the tracked URLs in order to identify relevant information. Alternatively, it is possible to code the tracked URLs either manually or automatically, with the aim of identifying websites relevant to the research interest. In both cases, a comparison of the tracked URLs is necessary, which can lead to practical research challenges, particularly with regard to the so-called "long-tail" (high number of URLs with low access rates) of the data. If the tracked URLs are available in their entirety, it is also theoretically possible to capture their content through web scraping and examine it analytically (Kühnemann, 2021; Munzert & Nyhuis, 2019). However, the possible short lifespan and access barriers, such as paywalls, make scraping URLs difficult. Overall, the approach is, depending on the research question, well suited to capturing media and information usage on desktop devices. At the same time, it quickly reaches its limits in a more mobile media environment, as it is not possible to capture in-app content, such as posts on Instagram, and data collection is therefore limited to websites accessed in the browser.

This problem remains with the second form of collecting (mobile) automated tracking data. In this variant, the applications used on the smartphone are recorded using a mobile automated tracking app and made available to the researchers (Ferreira et al., 2015; Tong et al., 2022). Accordingly, data on the usage time of specific apps, such as Instagram, as well as the

smartphone in general is collected (Fan et al., 2021; Tong et al., 2020). In contrast to the URL-based approach, the usage times of apps in a mobile media environment can be recorded here, although their content remains a black box. This is a standard security feature of iOS/Android. While apps can receive lists of active applications from the operating system, they cannot “see” into other apps.

Illuminating this black box is an advantage of the third form of automated tracking, which is known as screen capturing or screen recording (Krieter, 2019, 2020; Krieter & Breiter, 2018). Here, an application is installed on the device to be tracked, usually a smartphone, which either takes screenshots or a video of the screen at regular intervals (Krieter, 2020; Reeves et al., 2021; Yee et al., 2023). Depending on the technical approach, these screenshots or videos are either transferred directly to a server of the research team for analysis, which is the most information-dense but also a very privacy-invasive variant, or the screen recordings are evaluated on the device of the study participant, and only the results of this evaluation are transferred and stored on a server of the research team, thus providing a small amount of information but also a much higher level of privacy protection (Krieter, 2020). In general, the screen-capturing approach is quite flexible and offers a wide range of possible options for implantation. Normally, events relevant to the research question are identified for the analysis of the screen recordings, which may include news pages, social media posts from specific accounts, as well as the (private) chat via messenger (Krieter, 2019, 2020; Krieter & Breiter, 2018). This flexible nature of the approach makes it an interesting but also challenging data collection method for communication scientists, which requires a high skillset to implement or (further) develop such screen-capturing applications as well as a good concept for the privacy protection of the study participants. These challenges are probably the reason why there are only a few studies using a screen-capturing approach.

At this point, I would like to briefly mention another possible approach to collecting digital trace data, known as data donations (Boeschoten et al., 2022; Ohme et al., 2021; Wu-Ouyang & Chan, 2023). This is the voluntary donation of data by participants who make their own data, usually from specific digital platforms, available for research purposes (Boeschoten et al., 2022). The possibility for users to request their own data from digital platforms is based on the legal provisions of Art. 20 of the GDPR. There are technical frameworks that support participants in uploading the data and processing it in a way that protects privacy (anonymization of the data) (Araujo et al., 2022). In this way, researchers gain retrospective access to various data, such as posts and interactions on social media, URLs accessed in the browser, URLs to watch YouTube videos, and so on. Data donations are similar to the screen-capturing approach in terms of their implementation challenges and protection of privacy. Additionally, data donations are generally not cross-platform in nature, which makes this data collection approach less suitable for some research questions.

There are two types of research designs in communication science research using automated tracking. One is the combination of a classic panel design with one or more survey waves in combination with automated tracking (Stier, Breuer, et al., 2020). This design enables both a detailed measurement of media and information use as well as conclusions regarding other variables recorded in the survey. Here, studies examine the influence of news usage on polarization (Sandra & Michael, 2023; Stier, Kirkizh, et al., 2020; Wojcieszak et al., 2023), as well as on political participation in the form of voting in an election (Stier et al., 2018) or signing a petition (Vogler et al., 2023). This form of research design makes it possible to address a variety of research questions by successfully combining the strengths of the applied data collection methods (tracking and survey). Tracking can play out its advantages in the accuracy of the survey of media use and thus usefully complement the attitude and behavior variables of the survey (Stier, Breuer, et al., 2020). The studies that implemented this research design worked together with panel providers, such as YouGov, ComScore, and bilendi, who were responsible for recruiting, supporting, and automated tracking the participants. This reduces the feasibility of the study and the workload for the research team, but leaves a dependency on the technical provider and (sometimes) difficult to understand data in relation to the automated tracking, as the functionality of the automated tracking tools used is usually a black box for the researchers.

The second type of research design with automated tracking are experimental designs in which the effects of different variables, such as the functionality of algorithmic suggestion recommendations or the influence of political content (Guess et al., 2019; Guess, 2021; Guess et al., 2020; Nyhan et al., 2023), are investigated under real conditions with the help of different groups. This form of design is particularly appealing due to the high degree of causality but is relatively cost-intensive or requires cooperation with a platform operator, as in the case of the Nyhan et al. (2023) study. The previously described problem of dependency on the panel provider or platform operator and the potentially difficult transparency of data generation also remain with this design. This problem can probably only be solved by carrying out such research projects independently.

With regard to the sequential consideration of automated tracking data in combination with an information-theoretical underpinning, only a few studies exist (Kulshrestha et al., 2021; Möller et al., 2019). Möller et al. (2019) examined the use of information and identified three different modes: the routine mode, the social media mode, and the search mode. For this purpose, the clickstream sequences were extracted from the data and analyzed (Möller et al., 2019). A similar approach was taken by Kulshrestha et al. (2021) in their work, in which they were able to show that people develop routines when browsing and that these repeated patterns enable the predictability of search behavior. This shows that the linking and successful operationalization

of usage patterns and sequences, which were recorded by means of automated tracking, can offer empirical added value.

The studies by Möller et al. (2019), Jürgens and Stark (2022) and Kulshrestha et al. (2021) show the depth and level of detail of automated tracking data and the analyses that are possible with this data basis if it is well prepared and operationalized. However, this level of detail is not exploited in most studies; instead, a pure aggregation of usage times takes place, which can also be sufficient depending on the research question but can also lead to the non-use of data that has actually been collected. One challenge of automated tracking research here is the insufficient or very shallow operationalization of automated tracking data, which does not do justice to the actual level of detail and the sequential nature of actual behavior. This is also due to the lack of a theoretical underpinning of human behavior on mobile platforms. This thesis aims to contribute here, particularly in the areas of data preparation, conceptualization, and operationalization.

Some studies also look at the use of information on mobile devices, such as smartphones. Some studies focus on specific forms of information usage, such as news usage by means of automated tracking (Vogler et al., 2023) or media diaries (Ohme, 2020), search behavior (Wu & Liang, 2022) and situational influences on usage behavior (Karnowski, 2020). Many of the studies use the Experience sampling method (ESM) or media diaries as a form of data collection based on self-reports, which have certain drawbacks in terms of the accuracy of measuring media and information use (Araujo et al., 2017; Naab et al., 2019; Prior, 2009). The study by Vogler et al. (2023) is an exception to this, as mobile automated tracking data was collected and analyzed using a specially developed VPN solution. However, it is unclear to what extent in-app content, e.g., through the web browser integrated into Instagram, was also recorded. This thesis aims to contribute to the methodological feasibility as well as the operationalization and evaluation of such automated tracking data in the course of the investigation of information use on mobile devices.

The identification of politically relevant information use in contrast to general media use is a conceptually and technically challenging matter. The studies that track URL calls use the coding of URLs by means of previously compiled lists or other manual or automated procedures. This procedure requires a clear conceptual idea of what relevant content is and in what form it can be found on the web. This can lead to difficult delimitations and definitions due to the multimodal and complex nature of the media environment. This logic, the determination of relevant shares downstream of tracking, is opposed by the Krieter (2019) screen recoding approach, which enables the identification of relevant content and thus shares of usage within automated tracking in a privacy-friendly way. This approach is not limited to URL-based content but enables the identification of relevant content regardless of the app used. Krieter (2019)

approach had not yet been applied in any communication science study before the data collection for this thesis was carried out. Krieter (2019) thoroughly tested their approach, but it had to be adapted for use with communication science questions within this study. Accordingly, this thesis contributes to the conceptual knowledge, feasibility, operationalization, and evaluation of screen recording in the course of communication science research questions.

Against this background, this thesis also makes a contribution with regard to the conceptual interweaving of different forms of data collection and their interaction in the evaluation of the data. Some of the well-known tracking studies use further data collection, such as surveys or ESM, in order to be able to process further questions. The degree to which these forms of data collection are interlinked is often not particularly high. The author is not yet aware of the interweaving of different methods of data collection within a measurement instrument. In my opinion, however, it is precisely this possibility that represents an exciting and profitable further development of both automated tracking and surveys. This thesis aims to contribute to the development of new measurement instruments based on a stronger interweaving of different forms of data collection.

4.3 Advantages of mobile automated tracking

Technological and media change is leading to the ongoing fragmentation of media diets (Hasebrink & Popp, 2006), which challenges the reliability of established data collection methods in communication studies (Parry et al., 2021). This development includes the emergence of new media formats, the increased relevance of social media platforms and messenger services, and the popularity of smartphones (Hasebrink et al., 2021), which emphasizes the need for a cross-platform method of data collection. Against this background, the observation of mobile and desktop media use on smartphones and computers is an exciting and promising approach that allows conclusions to be drawn about information and media diets and also provides (partial) information about media-mediated interpersonal communication.

In this thesis, I understand digital automated tracking data as the end product of “every procedure intentionally applied to trace the usage of digital media aiming to analyze the collected data for research purposes” (Wieland et al., 2018, p. 134). The data obtained through automated tracking is user-centric and, depending on the methods used, contains information about media usage behavior and content across multiple platforms (Christner et al., 2021; Wieland et al., 2018).

Mobile automated tracking offers several advantages as a data collection method for this study. First, it enables detailed and continuous recording of online media use. The increasing fragmentation of media and information use and its duration makes it difficult to measure them accurately by means of self-reports or through users' memories, on which established methods

such as surveys (Parry et al., 2021) and media diaries rely and are accordingly often inaccurate and incomplete (Araujo et al., 2017; Prior, 2009). Against this backdrop, the use of automated tracking on mobile and desktop devices is a promising approach that enables much more accurate measurement of digital information and media use (Stier, Breuer, et al., 2020).

Secondly, automated tracking offers the possibility of unobtrusively recording user behavior, and, in some cases, content across different platforms represents an appropriate form of data collection for the complex reality of the media environment in the context of this work. In this way, mobile automated tracking enables the study of behavior on the entire smartphone, not an isolated view of the use of individual platforms or apps.

Third, automated tracking enables the analysis of various dimensions of online media use, such as duration, frequency, sequence, and content of websites or applications visited (Christner et al., 2021). By measuring these dimensions and linking them with other variables, such as content received, socio-demographic variables, or political predispositions, a detailed and in-depth analysis of phenomena is possible.

Fourth, this approach of linking automated tracking data with other data sources can be particularly advantageous in relation to a panel design, as the temporal dimension of the study design enables further analyses. This is particularly useful because the isolated consideration of automated tracking data is usually only of limited use for communication sciences (Stier, 2020). Tracking data usually contains only imprecise or no information at all about the relevant characteristics or attitudes of the people studied (Stier, 2020). In the case of a panel design, the automated tracking data obtained can be linked to user demographic characteristics, attitudes, or behaviors to examine correlations or patterns (Stier, Breuer, et al., 2020).

However, there are a number of challenges associated with the use of desktop and mobile automated tracking. On the one hand, implementation requires a high level of technical expertise as well as financial and technical resources (Christner et al., 2021). It also requires a privacy-compliant implementation that protects the privacy of participants and keeps the data collected secure. In addition, tracking studies are highly dependent on user consent and cooperation, and recruitment in particular is a hurdle, as users are not always willing to share their online activities with researchers. In addition to the limitations mentioned above, it is not possible to use automated tracking data to infer the context of use and the motivations for it; this requires a combination with other methodological approaches (Stier, Breuer, et al., 2020).

4.4 Considerations for an online-survey

In addition to automated tracking, standardized surveys are another method in the research design. Surveys are primarily used to investigate attitudes and opinions (Diekmann, 2014, p. 434). A methodological advantage is the possibility of capturing the subjective experiences of

the respondents (Döring, 2016, p. 374). The survey procedure can be divided into three areas: the direct oral survey, the telephone interview, and the written survey (Diekmann, 2014, p. 437).

Compared to the direct oral interview and the telephone interview, the use of online surveys offers a number of advantages. (1) Conducting a written online survey is more resource-efficient. (2) Respondents can spend more time on each question, which can be particularly advantageous for more complex questions. (3) The occurrence of so-called interviewer effects is relatively unlikely or low. (4) Furthermore, the technical implementation of the online questionnaire offers the possibility to randomize the sequence of questions to avoid sequence effects (Diekmann, 2014, p. 514).

With regard to online surveys, the disadvantages of sampling are mentioned in particular (Diekmann, 2014). Specifically, the problems of under-coverage and non-response are listed. The former problem only arises to a limited extent in the context of the research question and objective of this thesis, as the target population in this project is internet users. Accordingly, an online survey is an appropriate means of reaching this population. In addition, it is a relatively realistic survey instrument, as the survey situation (e.g., at home on one's own computer or smartphone without other people present) is very similar to the situation of daily media use. However, there is a limitation in that asking about intentions to act does not allow conclusions to be drawn about actual actions. This is because only the respondents' willingness to act in the situational context can be assessed. Furthermore, the problem of non-response has to be accepted when choosing this survey method; there is only the possibility to increase the response rate by setting material incentives (Diekmann, 2014, p. 528). Another problem is the relatively long time required by some of the participants to complete the survey and the literacy required.

4.5 Advantages of screen-recordings

Advancements in technology and media lead to continual diversification in media consumption patterns (Hasebrink & Popp, 2006), posing challenges to established data collection techniques in communication studies (Parry et al., 2021). This development involves the rise of new media formats, the growing importance of social media platforms and the widespread adoption of smartphones (Hasebrink, Hölig, & Wunderlich, 2021), highlighting the necessity for a comprehensive approach to collecting data across various platforms. Consequently, enhancing the methodological toolkit in communication studies becomes crucial. Given this context, observing mobile media usage on smartphones enables insights into individuals' information consumption habits and also offers some understanding of mediated interpersonal communication.

Mobile phone screen recordings are an extremely useful source of data for this purpose because, by observing them, almost every interaction of the user on the smartphone can be tracked (Krieter, 2019, 2020; Krieter & Breiter, 2018; Reeves et al., 2021). Manual analysis of screen recordings is very time-consuming and resource-intensive and is accordingly only carried out for short periods of time. Newer approaches automate the analysis by generating log files based on screen recordings (Frisson et al., 2016; Krieter, 2019, 2020; Krieter & Breiter, 2018; Reeves et al., 2021). This allows not only general system events (e.g. the opening of an app such as Instagram; Böhmer et al., 2011; McMillan et al., 2015), but also detailed in-app events (e.g. sharing of content) to be captured by using methods from artificial intelligence, computer vision, and machine learning to analyze the screen recordings of mobile devices (Krieter, 2019, 2020; Krieter & Breiter, 2018; Reeves et al., 2021). Screen recordings can cover situations that cannot be captured with other logging approaches based on the implementation of log commands in apps.

The application of screen recording as a methodological approach is particularly suitable for the research questions in this thesis, as this can be implemented either on a topic level or by recording function-oriented keywords. The broad applicability of screen recordings is possible due to the free and flexible selection of the events to be tracked, whereby an event can consist of a previously defined visual pattern (e.g. a logo, the share button, or similar) or a keyword (e.g. climate, protest, Fridays for Future).

As already mentioned, depending on the focus of the research question: (1) either keywords can be tracked that relate to the use of smartphone- or specific in-app functions (e.g. sharing, forwarding, etc.); (2) content-related keywords target topic-specific vocabulary or references (for example, party names, names of politicians, etc.) or terms that provide information about the use of specific media content (e.g. the names of Instagram channels, newspapers, TV stations, etc.).

When using the screen recording approach to record content information, the tracking app can be combined with topic dictionaries, which were developed specifically for automated content analysis. In this way, a more comprehensive and interpretable data basis can be obtained. However, the privacy of the participants must be respected, and they should be informed extensively about the scope and content of the dictionaries. The use of dictionaries should not be used to undermine privacy measures. The second less privacy-invasive form of automated tracking of thematically relevant content is the automated tracking of topic-specific keywords. Individual terms or references can be tracked, or a certain number of particularly thematically distinctive terms can be determined in advance, e.g., through topic modelling (Maier et al., 2021), and entered as keywords in the screen recording app.

To enable better contextualization of the tracked events, the combination of several automated tracking apps is a good option. By combining the screen recoding approach with an app that records the start and end times of the smartphone apps used (Ferreira et al., 2015), it is possible to assign the tracked events to specific app applications. The data collected in this way thus allows conclusions to be drawn about what information about climate change was received, in what way the participants received the information (e.g. via Telegram channels) and how the participants dealt with it further (e.g. follow-up communication).

The disadvantage of using screen recordings as a data source is the permanent recording of the screen for later analysis and the associated risk to the user's privacy (Reeves et al., 2021; Tang et al., 2006; Vuong et al., 2017; Yee et al., 2023). The smartphone is an everyday companion for most people, and its recordings contain both personal and highly sensitive information. Studies have shown that the central storage of data with third parties (e.g. commercial providers of cloud services) is in conflict with the privacy requirements of users (Hong et al., 2003; Spiekermann & Cranor, 2009). Furthermore, centralized processing and analysis of screen recordings requires high computing resources (Frisson et al., 2016; Krieter & Breiter, 2018).

In summary, screen recordings are a very powerful form of data collection that provides relevant and detailed insights into smartphone usage behavior. At the same time, the implementation of screen recordings in a privacy-compliant manner is challenging, and the technical implementation and configuration of existing screen recording apps require appropriate skills.

4.6 Protection of data and privacy

The smartphone accompanies most people through their everyday lives and constantly collects data that is directly or indirectly related to the events of the day. This data is the reason why social and communication scientists are so interested in mobile automated tracking data. At the same time, tracking data can contain a whole range of very sensitive and private information (Krieter, 2020), which must be handled responsibly and consciously by the researcher. Protecting the privacy of study participants is of the utmost importance and begins long before the data that has already been collected is processed. A number of measures were implemented in this project to protect data and privacy.

(1) A data protection concept was developed as part of the project, which the participants and all interested parties were able to view online (appendix 2; see also below).

(2) The study participants' consent to participate in the study was obtained (appendix 2). They were informed in advance about the purpose, the components of the study, the duration, and the procedure. They were also informed about the type of data collected and were able to ask the research team questions. This information was publicly available on the project website. In

general, care was taken to ensure complete transparency and the inclusion of the study participants.

(3) The data required for the research project was stored on servers of the University of Bremen and the commissioned market research institute. The personal data (name and contact) of the study participants was stored separately from the research data on the university's secure servers. Access to the data was divided among members of the research team. The market research institute had access to the information required for the payment of the incentive, but the research team had no access to it.

(4) The tracking app essentially takes two approaches to strengthen the privacy of participants. Firstly, the screen videos, which can contain very sensitive data, are only stored temporarily and do not leave the device, as they are only evaluated locally on the smartphone. The evaluation of the videos follows a fixed catalog of predefined events that are to be recognized in the videos. This means that only what is relevant for the research purpose is recognized and saved. The log files created locally on the device are transmitted to the research team in a pseudonymized form via a secure connection. On the methodological side, the design presented here aims to combine a minimally invasive invasion of privacy with data collection that can be used for scientific purposes. Second, the participants have the option of stopping the tracking throughout the entire study period by revoking the authorizations for the Keywordlogger & AWARE app on their Android smartphones. In this way, control over the data remains with the participants (Ferreira et al., 2015).

(5) A pseudonymized data management system was used for this thesis (Nissim et al., 2018). Here, the commissioned market research institute must be distinguished from the scientific team with regard to data management. At the start of the study, the market research institute takes over the allocation of “keys” to the study participants. The “keys” are not passed on to the research team. Accordingly, the research team has no way of assigning the data anonymized by means of “keys” to specific participants. At the end of the data collection, the “keys” are deleted by the market research institute; from this point on, it is no longer possible to assign the data.

The aforementioned measures serve to protect the research data and the privacy of the study participants involved. However, further smaller steps are necessary with regard to the protection of privacy, which are discussed in more detail in the section on the processing of the collected research data.

4.7 Mobile Data Collection

In order to get a better idea of the information use of young, politically active supporters of Fridays for Future, this study was conducted. The aim was to obtain as accurate a picture as

possible of information behavior in relation to political participation. For this purpose, a total of 40 participants were recruited, whose smartphone use was recorded over the period from February 14, 2022 to May 6, 2023, and who were surveyed a total of four times with regard to political participation and other information use. Of the total number of participants recruited, 32 individuals participated in all four survey waves. Mobile automated tracking data is also available for 25 participants in this group.

Recruitment of participants was conducted by the author and a student assistant⁴. In principle, all individuals who self-identified as supporters of Fridays for Future in Germany could participate in the study. In addition, the participants should be between 16 and 25 years old, since the information use of younger people was of particular interest in terms of topic and this user group has a strong affinity for the smartphone as an information source (Hölig et al., 2020), which helps with automated tracking as a data collection method. All participants were asked for voluntary and informed consent. For persons under the age of 18, the consent of their legal guardians was obtained. In addition, there were a few technical requirements regarding the functionality of mobile automated tracking, which were a criterion for recruitment: 1) an Android smartphone had to be used, 2) preferably with a display resolution of 1920x1080 or 2340x1080 pixels. The second criterion was removed during the recruitment process, as a new version of the tracking app became available.

Recruitment for the study was carried out passively through posts on Instagram and actively through targeted e-mails and Instagram messages to all Fridays for Future local groups registered on the Fridays for Future Germany website, as well as other climate policy groups (see appendix 2), asking them to pass on information about the study to their members. Furthermore, an offer was made to present the study at meetings of the local groups, which was taken up several times.

Given the relatively burdensome research design for participants and the potentially invasive data collection through automated tracking, some measures were taken to make participation in the study more attractive. Information was provided to participants through a project website and an Instagram project account, and an incentive for participation was paid (monthly plus a completion bonus). In addition to the extensive provision of information, all participants signed a consent form.

With the signing of the consent form, the participants received the download link for the tracking apps as well as instructions for the installation and the assignment of the necessary authorizations on the smartphone. During this onboarding process and throughout the study, technical

⁴ Many thanks to Anna Fischer for her tireless support and creative ideas in the implementation of the recruitment.

support was available to participants via WhatsApp chat or email. Once the onboarding process was completed, the first survey of participants was conducted on February 8, 2022.

4.7.1 Mobile automated tracking

Smartphones, with all their sensors, have become a constant companion in our everyday lives (Görland, 2020). Accordingly, the smartphone records a whole range of information by means of the sensors (Ferreira et al., 2015), mostly intended for technical purposes, but these can also be used for social science questions (e.g. Ohme, 2020; Wei, 2020). This wealth of information was also used in this study, although the apps that are used and the general time spent using the smartphone are of particular interest for the question addressed in this paper: the type of information used.

The open-source AWARE framework was used to capture this information (Ferreira et al., 2015). AWARE provides application developers, researchers, and smartphone users with the ability to capture, derive, log, and share contextual information regarding smartphone usage with the help of sensors. AWARE can collect hardware-, software-, and human-based data from smartphones (Ferreira et al., 2015).

As already mentioned, the apps used and the general use of the smartphone are relevant for this research project. Accordingly, only the sensors “applications” and “screen” were used for data collection, and other sensors of the AWARE client were deactivated. The data collected is transferred from the participants' smartphones to a server at the university and stored in a MySQL database.

The application sensor logs the use of applications and notifications on the smartphone. This record shows which application is active in the foreground. This means that this application is present on the screen (i.e. the applications with which the user is currently interacting) and the new timestamp is logged when the application is changed. The recording of processes and applications in the background is no longer possible with newer Android versions (5.x+) (AWARE).

The screen sensor records the status of the screen, e.g., on and off, lock and unlock. In this way, it is possible to obtain information about the frequency of interactions with the smartphone and their duration (AWARE).

The AWARE framework has been approved by the Institutional Review Board (IRB) of a European university and in the US for several research projects. AWARE protects user privacy by encrypting data and obfuscating by one-way hashing logged personal identifiers such as phone numbers. Increased security is achieved through application permissions, certificates, user authentication and the use of secure network connections to access and transfer logged data between the client and the database (Ferreira et al., 2015).

The collected data from the “application” and “screen” sensors is stored in the database and used for further pre-processing. The data is processed in several steps: 1) A blacklist is used to identify potentially privacy-sensitive applications and mark them with the “blacklisted app” identifier to protect the privacy of the participants; 2) unnecessary system applications are removed from the dataset; 3) the periods for screen usage are formed on the basis of the “screen” sensor data, which indicates the time period in which the smartphone screen was switched on and used accordingly; 4) the end times of the app usage periods are inferred, as these cannot be captured with AWARE in newer Android versions. Then, the app usage intervals are formed, i.e., the period during which the app was active; 5) and in the last step, the screen and app usage are merged into usage sessions, which include the usage behavior between turning the smartphone on and off (Peng & Zhu, 2020). This will be discussed in more detail in the following chapter. A more comprehensive documentation of the pre-processing can be found in the appendix (see appendix 2).

4.7.2 Screen recordings

In addition to the collection of mobile app and screen usage data, as well as the surveys, the observation of the content being received during mobile media usage is an exciting and promising approach that can provide further information about the information usage of Fridays for Future supporters.

To capture content presented on smartphone displays, I rely on the app Screenlogger as well as an extension of this app, Keywordlogger (Krieter, 2019). These Android apps log previously defined keywords or other visual patterns that are presented on the device's screen, logs them with a timestamp, and protects the user's privacy in the process. Both tracking apps are able to solve two main problems of screen recording as a long-term data source: privacy concerns and scalability due to a centralized cloud structure. Both apps are based on decentralized, automated video analytics on users' smartphones, whereby log files are created directly on the device. Thus, the highly sensitive screen recordings remain on the user's smartphone. The generated log files are stored anonymously on a server. In addition to the data protection benefits, this approach is also more cost-effective and sustainable since the decentralized structure eliminates the need for expensive central processing resources on the server side for generating the log files and saves bandwidth on the client side since the screen recordings are not transmitted (Krieter, 2019).

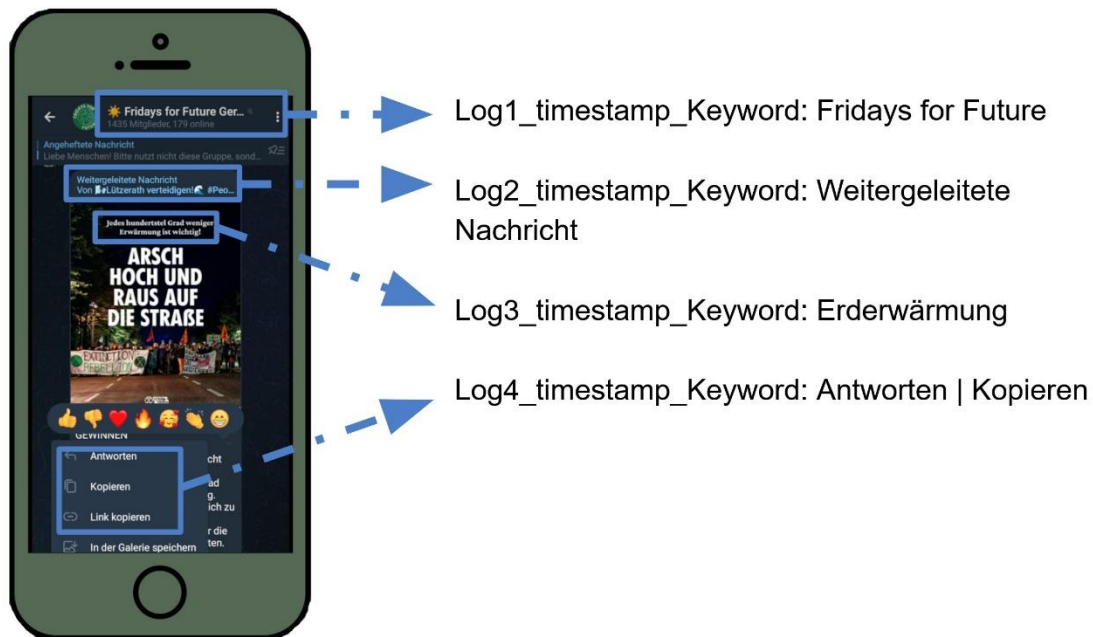
Both app applications analyze screen captures on the graphical user interfaces for specific keywords (Keywordlogger) or visual patterns (Screenlogger) and store the results with timestamps in a log file using computer vision and optical character recognition (OCR). First, the smartphone's screen is recorded in the background, starting when the screen is turned on and ending when the smartphone is turned off or enters power-saving mode. Each screen

recording file is time-stamped and stored on the smartphone. The recordings are saved in full screen resolution with high video quality, which leads to better results in applied computer vision and OCR methods. Depending on the app, the frames are searched for a list of visual patterns or keywords using computer vision or OCR. The log file stores the results for each examined frame. The analysis of video frames is performed only when the screen is off and the smartphone is plugged in to charge. This is necessary because otherwise the process is very likely to be terminated by the operating system as it constantly consumes computing, memory, and energy resources and creates log files. The idea is that the screen recordings of the day are processed at night when the smartphone is plugged in and there is a stable WLAN connection. After analyzing a screen recording, the file is deleted, and the log file is transferred to the server via an SSL-encrypted connection (Krieter, 2019).

Despite the potentially privacy-invasive nature of screen recordings, the way the apps work protects the user's data in the best possible way through several measures (Krieter, 2020). (1) Automated processing of screen recordings allows for a very selective and data-minimalistic approach to extracting information from screen recordings, as no human coding is required, with the coder potentially seeing and extracting more than the pre-specified and desired data. (2) The most important step in the data protection strategy is to store the screen recordings on the user's smartphone and not transfer them to a central server. This means that potentially sensitive information, such as passwords, bank data, and text chats, remains with the user and is deleted immediately after evaluation. (3) In addition, the user gets information about the functionality of both apps and has the option to start or stop them at any time. Furthermore, there is a permanent icon in the message center, and the status bar indicates the recording by the app. (4) To remind the user what the apps are scanning for, a list of all visual patterns and keywords is available. The user's privacy in the resulting log file still depends heavily on the visual patterns and keywords searched. Accordingly, it is important to inform users about the collected data strictly according to the logic of "privacy by policy" (Krieter, 2019, 2020; Spiekermann & Cranor, 2009).

The logfiles generated by Screenlogger and Keywordlogger are prepared in several steps for later analysis. (1) First, the logfiles are downloaded from the project server and read in for further processing (for more details see appendix 2). (2) Relevant information such as user ID, timestamp, events (visual patterns), and keywords are extracted. I combined function-specific keywords (e.g. share, forward, etc.) with topic-specific keywords (output of topic modelling on news coverage about climate change) and a list of media outlets in Germany. (3) These are then merged with the app usage data provided by the AWARE client. In this way, app usage and recorded events or keywords can be combined at the session level. By merging the two data sources, a dense and informative data set has been created.

Figure 1: Keywordlogger



4.8 Survey design & measures

The online survey captures individual characteristics, analog and digital information use, core motivations, political participation, and other political predispositions. The survey was conducted at the beginning of the study period, twice within the study period, and once at the end of the study period, on average every six weeks. The following section discusses the operationalization of the variables.

The various measurement instruments are presented here in the order of the model, which begins with individual characteristics, followed by information use and political participation.

The **measurements of individual characteristics** in this study include age, gender, education, and self-perceived social status. The operationalization of age, gender, and level of education is based on the implementation of the European Social Survey (ESS-ERIC, 2016), while the measurement instrument for social status was taken from Sommer et al. (2019).

The **measurement of information use** encompasses a whole range of different instruments, including *device use* (e.g. Smartphone, PC, TV, etc.; derived from Hölig et al., 2020), *information sources* used in the last seven days (e.g. online TV, classic TV, print newspapers, online news, radio, podcasts, social media, video-platforms, etc.; derived from Hasebrink et al., 2021; Hölig et al., 2020), the relevance of these to *opinion formation* (Hasebrink et al., 2021), as well as more specific questions about the selected information sources and received content, such as content provided by commercial or public broadcasters. This includes ques-

tions related to TV programs, commercial radio shows, radio shows provided by public broadcasters (Hölig et al., 2020), *social media use* (Hasebrink et al., 2021; Mahrt, 2019), *video platforms*, and *podcasts* (e.g. journalistic content, celebrities, etc.). In addition, respondents were asked about the *perceived partisanship* of their own information use (Hölig et al., 2020) and the self-assessed *proportion of political exposure* of various apps (own measuring instrument).

Political participation ($a_{\text{wave } 1}=.86$, $a_{\text{wave } 2}=.91$, $a_{\text{wave } 3}=.92$, $a_{\text{wave } 4}=.9$) was measured using the measurement instrument of Andersen et al. (2021), which comprises four dimensions of political participation (targeted at political system, targeted at community level, non-political, politically motivated) and was supplemented by a fourth (participation in the political system, based on van Deth, 2014). Each dimension comprises six to seven items, which were answered on a seven-point scale according to frequency of political participation, from 1 = “never” to 7 = “very often”. A subsequent factor analysis led to the decision to form one sum-index.

In addition, **political dispositions** were measured, including *political interest*, *party preference*, *opinion leadership*, and *opinion certainty*.

Political interest ($a_{\text{wave } 1}=.65$, $a_{\text{wave } 2}=.73$, $a_{\text{wave } 3}=.82$, $a_{\text{wave } 4}=.83$) is measured with the political interest short scale (PIKS) by Otto and Bacherle (2011). The measurement instrument comprises four items, which are answered on a five-point Likert scale.

Party preference was measured according to the European Social Survey measurement instrument (ESS-ERIC, 2016).

Furthermore, the measuring instrument of (Hölig et al., 2020) was used for the self-classification of *political orientation*, which consists of a 10 scale (left - right) with graphic support and a dodge option.

In addition, *opinion leadership* ($a_{\text{wave } 1}=.85$, $a_{\text{wave } 2}=.9$, $a_{\text{wave } 3}=.9$, $a_{\text{wave } 4}=.91$) was measured. For this purpose, the measurement instrument of Trepte and Boecking (2009) was used, whose six items were adapted thematically and answered with a seven-point scale and include the expressions 1 = “frequently/ much/ very likely” and 5 = “never/ little/ very unlikely”.

A scale from Matthes et al. (2010) was selected to record the subjects' *opinion certainty* on climate change ($a_{\text{wave } 1}=.7$, $a_{\text{wave } 2}=.54$, $a_{\text{wave } 3}=.75$, $a_{\text{wave } 4}=.66$). A 7-point scale was used, with the values 1 = “very uncertain” to 7 = “very certain”.

The structure of the questionnaire is based on the structure proposed by various scholars (e.g. Möhring, 2010, 2013; Weichbold, 2009). After the welcome and information of the participants, the questions about media use are placed, since these are relatively easy questions to answer and serve as icebreakers (Möhring, 2010). This is followed by the first block on political predispositions, in which *political interest* and *party preference* are asked, which is used as a transition to the other political questions. This is followed by questions on political participation.

This is followed by the second block of political predispositions, this time with questions on *opinion certainty* and *opinion leadership*, before the core motivations (*group identity*, *agency* and *emotion*) are asked in the next block of questions. The final block is made up of questions regarding individual characteristics and the farewell, with the possibility of leaving additional information in an open question.

4.9 Data preparation

The processing of the collected data is a relevant and sometimes more complex or simpler component of the process in every research project. When working with (mobile) automated tracking data, the special feature is that the preparation of the data takes up the largest and most relevant part of the project, as it is both more complex and at the same time has a strong influence on the subsequent results. Of course, this can vary depending on the project.

One reason for the need for more extensive processing of mobile automated tracking data lies in the fact that this data was not generated for scientific purposes but mainly fulfills purely technical or administrative purposes (Breiter & Hepp, 2018; Riebling, 2019). Accordingly, this is data that must first be put into a form that makes sense for research purposes. However, it should be noted that automated tracking data, as with all types of digital trace data, is not a completely unaffected raw material (Breiter & Hepp, 2018). The opposite is the case, as this form of data is a product of social institutions and their products or technical devices (Breiter & Hepp, 2018; Freelon, 2014). Against this background, it can be assumed that social, political, or societal assumptions are partly reflected in the data (Breiter & Hepp, 2018). Accordingly, it is important to be aware of a possible bias in the data when processing it for the research project.

Mobile automated tracking data, just like other digital traces, unfolds its full meaning when it is placed in a broader context or in relation to the real world (Breiter & Hepp, 2018). In order to successfully link the automated tracking data with the real world, it must be processed in a meaningful and interpretable way. The trick is to transform data that is actually intended for other purposes into a form that makes sense for communication science and to differentiate between relevant and irrelevant information. While at the same time protecting the privacy of the study participants and maintaining traceability for third parties, ensuring reliability and validity. In this thesis, the preparation of the data represents an important and more complex step in the research process, which is why this process is described in more detail.

In this thesis, I align the data preparation with four dimensions. (1) The first dimension includes the premise that the privacy of the study participants must be protected. Accordingly, all information that is not relevant to the research interest is removed from the data to be analyzed. (2) The second dimension is closely related to the first and can be described as the principle

of data minimalism. The aim here is to differentiate between information that is relevant and information that is irrelevant to the research interest and to sort it out accordingly. (3) The third dimension comprises the meaningful and targeted processing of the automated tracking data into interpretable chunks of information. (4) The fourth dimension comprises traceability by third parties. Here, the need for precise and comprehensible documentation of one's own approach is particularly relevant, as is the need to avoid unnecessarily complex steps, true to the motto: keep it simple (or at least as simple as possible).

4.9.1 Protection of privacy

As explained in the previous section, a number of measures were taken to protect the privacy of the study participants in the course of the data collection for this thesis. When processing the automated tracking data obtained, further steps were taken to ensure the privacy of the study participants. The basic idea was to reduce or completely exclude potentially hidden information contained in the data that would allow conclusions to be drawn about the study participant (Nissim et al., 2018).

The main aim here is to reduce or completely prevent the possibility that the pseudonymization of participants can be broken by third parties by adding further information not contained in the data set (Nissim et al., 2018). For example, third parties who have further information about a study participant, e.g., at what time they wrote to them in WhatsApp or spoke to them on the phone, and who are able to identify the person behind the pseudonym via the information contained in the data set about the app used and the time, and thus gain access to further information about the study participant.

In order to minimize the probability of this and thus generally strengthen the protection of the privacy of the study participants, individual apps were grouped into categories. On the one hand, this fulfills the purpose of protecting privacy and, at the same time, reducing the amount of information available in the data set, making it easier to evaluate and interpret. The second aspect is discussed in more detail in the following section.

To protect privacy, all sensitive app applications or those considered private were identified by means of a blacklist and replaced with the category label "blacklisted" in the dataset. Specifically, app applications in the health segment (including health insurance companies, fitness apps and menstruation apps), in the dating segment (mainly dating apps), as well as financial applications (including banking apps, etc.) and other applications classified as sensitive were replaced in the data set by the category label. In this way, the information about the start time of the applications required for subsequent processing and evaluation steps is retained in the dataset but can no longer be assigned to a direct application. I consider this step to be absolutely necessary in order to remove personal information indirectly contained in the data, such as sexual orientation, hobbies, or health status, from the dataset.

Furthermore, the dataset was checked for additional personal information that had entered the dataset through incorrect use of the tracking software by study participants. Specifically, incorrectly entered pseudonyms were discovered and removed. It is important not to rely on the participants to carry out the onboarding process correctly and in compliance with data protection regulations. Instead, it is important to check it for accuracy and thus ensure that no personal data has been added by the study participant.

The categorization of app applications already mentioned not only serves to protect privacy but also enables more targeted and clearer work with the dataset.

4.9.2 Selection of relevant data

The second dimension of data processing mentioned above is the selection of relevant information from the information contained in the primary dataset. This selection process refers to several steps in the research process, which range from the selection and configuration of the tracking app to the actual data preparation, and is critically accompanied by the idea of data minimalism.

With regard to the configuration and selection of the tracking app, a tracking app was selected, as already described, which both enables the collection of the data required to answer the research question and at the same time allows sensors that are not required to be switched off. In this thesis, only data from the two sensors “application” and “screen” was collected and used to answer the research question; other sensors, such as GPS or Wi-Fi data, were switched off, and the data was not collected as it would not have added any value to the research question.

Once the tracking app has been configured, the collected data is processed with a view to data minimalism, which entails separating information relevant to the research question from unnecessary information. At the same time, this step further strengthens the protection of the privacy of the study participants. The first differentiation step relates to the sorting out of system apps that do not offer any added value in this thesis. The system apps are largely background processes that, for example, start the new window and move it to the foreground when the app used on the smartphone is changed. Most of these processes are not directly visible to the person using the smartphone. Many of these processes are not relevant to the question posed in this thesis, but a number of system apps also contain relevant information. Specifically, the system applications that are necessary for using the smartphone keyboard were kept in the dataset, as this provides information about the usage times of the keyboard within the various smartphone applications. It can therefore be important to look at the system apps, although these can differ depending on the manufacturer and Android version. Which makes monitoring and selecting the right system applications more complex and a moving-target problem.

The categorization of smartphone applications takes place against the background of research interest and the relevance of apps as a source of political information derived from the current state of research. One part of data processing is the differentiation between relevant and non-relevant information. The categorization of the tracked smartphone applications is helpful here. One aim here is to separate smartphone applications that, according to the current state of research, are potentially relevant as a source of political information (e.g. Anter & Kümpel, 2023; Malhotra, 2023; Urman & Katz, 2020; Vermeer et al., 2021) from apps that have a clear, specific, and non-political use.

The mere distinction between a potential source of political information or not is not sufficient for a detailed analysis. Accordingly, a more differentiated categorization of the smartphone applications potentially relevant as a source of political information is undertaken. This leads to some theoretical problems and implications, such as the problem of separating different applications from their intended use and the associated functions that the application entails (Humphreys et al., 2018; Karnowski, 2020). The wide range of possible uses offered by some digital platforms and their smartphone apps makes it difficult to clearly assign them to a category (e.g. Anter & Kümpel, 2023). To give a concrete example: Should the Instagram app be a social media, video application, or pure communication app? The Instagram app allows a range of usage options, which include viewing multimedia content (images, text and videos), as well as socializing or interacting with others. Furthermore, Instagram can fulfill a whole range of different information needs for users, ranging from a group-related, entertainment-driven, or political need for information (Anter & Kümpel, 2023). The assignment to an app category is correspondingly difficult.

In addition to the more theoretical challenges of delimiting and assigning the apps, there are also more practical challenges in the implementation of the categorization. As with other digital trace data, the automated tracking data in this thesis shows a very uneven distribution (Sen et al., 2021), with a few applications accounting for a large proportion of usage time and a large number of apps with low usage time. This thesis focuses on the context of political information use and the associated modes of use. Accordingly, the best possible coverage of the smartphone applications included in the analysis is important. This means that a large number of applications have to be categorized, even though they are not used very frequently.

Against the background of the theoretical and practical challenges, an approach for the categorization of smartphone applications in a tracking dataset was developed in this work, which has the goal of both making a theoretically appropriate assignment of the various applications and, at the same time, implementing a manageable, time- and resource-saving process. The categorization consists of various steps, which are explained in more detail below.

In the first step, all smartphone apps tracked and thus installed by the study participants are assigned to a Google Playstore category using the Google Playstore dataset (Prakash & Koshy, 2021). This ensures that all smartphone apps in the data set are included as comprehensively as possible. The main purpose of this is to ensure that as many apps as possible in the tracked data set are assigned to a category. This reduces the likelihood of relevant smartphone applications that are unknown to the researchers being sorted out by mistake. This could happen in particular if only the known and frequently used applications are considered (such as Instagram, YouTube, etc.) and all other smartphone apps are sorted out from the start for reasons of supposed irrelevance.

In the second step, the provisionally categorized applications are evaluated using the provisional categories used for the initial sorting of the apps according to possibly a political information source and not a political information source (see Table 1). The Playstore dataset contains a whole range of 48 different categories, which enables a relatively detailed assessment of the area of use of the respective application. On the basis of these categories and against the background of the political information sources known from the literature, such as news, social media, podcasts, video formats, and peer-to-peer talks (Hölig et al., 2020; Newman et al., 2021), a classification is made as a possible political information source or no possible political information source. It is important to understand that the preliminary categories of the Playstore data set must be understood as indicators of the possible relevance of the respective app as a source of political information and not as a serious scientific categorization. This is particularly important in view of the fact that the Playstore dataset is not a categorization made for scientific purposes and may also contain biases. Categories such as communication, messenger and telephone (including Telegram, WhatsApp, Telephone), music & audio (including Radio Station Apps, Spotify), news apps and news magazines (including DER SPIEGEL), Browser (including Google Search), social (including Instagram, Facebook) and video & streaming, as well as video on demand (including YouTube, TikTok, Netflix) were classified as possible sources of political information. Categories that are not relevant as a source of political information against the background of the current state of research were recoded into the residual category "others". These included, in particular, lifestyle, beauty, food & drink, dating, games, and shopping applications.

In the next step, several relevant categories were derived from the literature and the theoretical framework on information behavior. The basis for the categories is Newman et al. (2020) information source scale, which was adapted for use in this thesis and supplemented with further findings from the literature. These include the categories (1) news apps, (2) browsers, (3) social media, (4) communication, (5) video & streaming, and (6) audio. The first category is similar to Wenz et al. (2024) (1) News Apps, which includes smartphone applications provided by private or public broadcasting news outlets such as DER SPIEGEL as well as news aggregator

applications (e.g. google news, upday). Various studies show the relevance of search engines and browser applications in regard to political information behavior, which leads to the second category (2) browser. This category includes smartphone applications for search engines such as Google Chrome, DuckDuckGo, or Ecosia. The third category (3) social, is based on Newman et al. (2021), which show the importance of social media as a source of political information. Accordingly, this category includes social media applications such as Instagram, Facebook, and Snapchat. Hasebrink et al. (2021); Newman et al. (2021) show in their study the increased relevance of mediated communication from person to person as a relevant source of political information. This includes communication applications such as Telegram and WhatsApp (with the option of many to one or one to many communication). The fifth category (5) video & streaming, is based on Moller et al. (2019), who show the importance of video and streaming platforms such as YouTube as an information source for political content. The last category, (6) audio, is based on the findings of Hasebrink et al. (2021), who show the relevance of audio content such as radio or podcasts as an information source.

In the final step, the Playstore categories classified as relevant were merged with the categories derived from the literature. For this purpose, the matching Playstore categories were assigned to the derived categories, which was done by recoding and merging Playstore categories. In this way, the categories shown in Table 1 are obtained.

Table 1: App categories

Category	Definition	Example
News Apps	News apps are mobile applications developed for the digital distribution and consumption of news content. These mobile applications enable users to receive up-to-date information, reports and news articles on their mobile devices.	DER SPIEGEL, Google News, Upday
Browser	A browser app is a mobile application that enables navigation and access to content on the World Wide Web. Users can interact with digital content, retrieve information and view multimedia content.	Chrome, DuckDuckGo, Ecosia
Social	A social media app is a mobile application that enables users to interact digitally with each other, create, share and consume content and maintain social contacts, allowing users to share personal information, opinions, media content and other forms of digital interaction with a network of contacts.	Instagram, Facebook, Snapchat

Communication	A communication app is a mobile application that facilitates the exchange of information, messages and multimedia content between users by bridging physical distance, enabling fast and efficient exchange of information in real time. These apps enable one or more of various forms of communication, including text messaging, voice calls, video conferencing and the exchange of media files.	WhatsApp, Telegram, Slack, Zoom
Video & Streaming	A video and streaming app refers to a mobile application that provides audiovisual content, such as videos, films or live streams, on digital platforms and offers it for consumption by streaming or downloading content that serves as a means of disseminating visual information, entertainment and cultural content. Furthermore, these apps often offer functions such as comments, interactions and recommendations.	YouTube, TikTok, Netflix
Music & Audio	A music & audio app is a mobile application that provides acoustic content such as music, (political) podcasts or audio books on digital platforms and offers them for consumption by streaming or downloading. Audio and music apps thus serve as a means of disseminating sonic information, artistic expression and entertainment.	Spotify, Podcasthelden, Google Music
Others	This category includes all applications that do not fall under any of the above definitions.	

4.9.3 Mobile sessions as a meaningful aggregation of sequential data

Media and information use are sequential processes that unfold over time. In such usage behaviors, the actions of the individual are contextualized by other and earlier behaviors of the individual, which may be long-term and relatively stable usage patterns of the individual as well as small-scale behaviors that precede in the reception situation.

In this thesis, the session approach is applied to the relatively small-scale sequences of mobile use, which are incorporated into individual-level information repertoires in the course of the

analysis. Accordingly, in this work, a session is understood as a sequential, uninterrupted sequence of observed usage behaviors, where an interruption of longer than one minute in the usage behavior marks the end of such a usage session (Peng & Zhu, 2020; Zhu et al., 2018).

The advantages of the session approach lie in capturing the context of use. This approach makes it possible to record and evaluate further information about mobile use and, at the same time, to have a manageable unit of analysis. This approach makes it possible to identify previously or subsequently used apps or app categories and include them in the analysis, as well as identify broader usage patterns (Tong et al., 2022). It is also possible to analyze additional variables, such as the frequency of smartphone use, the average sequential usage time, or the number of sessions per time unit. Overall, this is a relatively flexible analytical approach that combines context assessment with manageability (Tong et al., 2022).

Deriving the sessions from the collected tracking data is a three-stage process in which the use of the smartphone screen is first considered, then the duration of the individual accessed apps is calculated, and these two pieces of information are merged.

The first step includes the calculation of so-called screen-sessions on the basis of the “screen” sensor data, which indicates the time period in which the smartphone screen was switched on. An active smartphone screen is the best indicator for an ongoing and uninterrupted usage sequence. Accordingly, I am using the information provided by the “screen” sensor to calculate the start, end, and usage period of the sessions. I can use the timestamps and screen (screen on or off) variables provided by the sensor for the calculation of the needed start, end, and usage period. Every row in the dataset is one timestamp with the appropriate screen status (switched on or off). The following timestamp is now defined for each row as the end time of the current row, if the participants and devices in both rows are identical. In this way, I obtain the start time, when the smartphone screen is switched on, and the end time, when the screen is switched off, of our sessions, which I fill in the final step with the corresponding app usage during this period.

The second step consists of creating app usage periods, as these cannot be captured with AWARE in newer Android versions. Accordingly, I have to calculate the end time of every accessed app. To achieve this, I rely on the data provided by the “application” sensor, which – similar to the screen data – consists of one timestamp and the corresponding accessed app per row. This means that each row represents the date and time at which the smartphone application named in this line was brought to the foreground – in other words, activated. This means that I calculate the time during which the app was open and active on the main screen of the smartphone. For this purpose, I also include information about when the screen is switched off, as this is also a possible end time for an accessed app. I am using the same procedure as for the screen session by defining the following timestamp for each row as the

end time of the current row, if the participant and devices are identical. In this way, I receive the start and end times as well as the usage times for each accessed app in our dataset. Now I have prepared the content of our sessions and still have to merge this information with the screen information.

In the final step, the screen sessions and the accessed apps are merged into a usage session, which includes the usage behavior between switching the smartphone on and off (Peng & Zhu, 2020). Accordingly, the two previously created datasets are merged here, whereby the entries are sorted chronologically by starting point, considering the participants and devices. First, in this merged data set, the accessed apps are assigned to the appropriate screen session with the help of a function. The app usage per category is then aggregated for each session, so that each session provides information about the usage time of the respective category within this session. The end product is a session, which has a start and end time and contains information about the usage times of the app categories used in this session. The screen recordings logged in the session are also attached. As a final step, outlier sessions were excluded from the dataset. Specifically, sessions that exceeded a duration of 12 hours were excluded because a technical error was assumed.

With this in mind, it is important to identify the underlying patterns within the usage sessions in order to categorize them and make them comparable. The three characteristics of the sessions presented (duration, repertoire size, order and sequence) form the basis for identifiable patterns. An explorative structure-discovery procedure, such as cluster analysis, is necessary for the identification of the patterns of usage behavior addressed, which are reflected in the sessions.

4.10 Operationalization & strategy of analysis

The operationalization of the research questions in this thesis builds on the strengths of the chosen research design and emphasizes the explorative character and the descriptive description of the findings of the explorative analysis. The operationalization and subsequent evaluation are intended to provide detailed insights into the use of political information by Fridays for Future supporters. Furthermore, the possible link between the usage behavior and the forms of political engagement chosen by the supporters will be drawn.

In the course of this, the following research questions were formulated in this thesis, which work towards answering an empirical orientation. In order to be able to answer these empirical questions, methodological innovations and new operationalizations are necessary, especially for research questions RQ1, RQ2 and RQ3.

RQ 1: How can different forms of mobile political information used by supporters of Fridays for Future be identified and characterized?

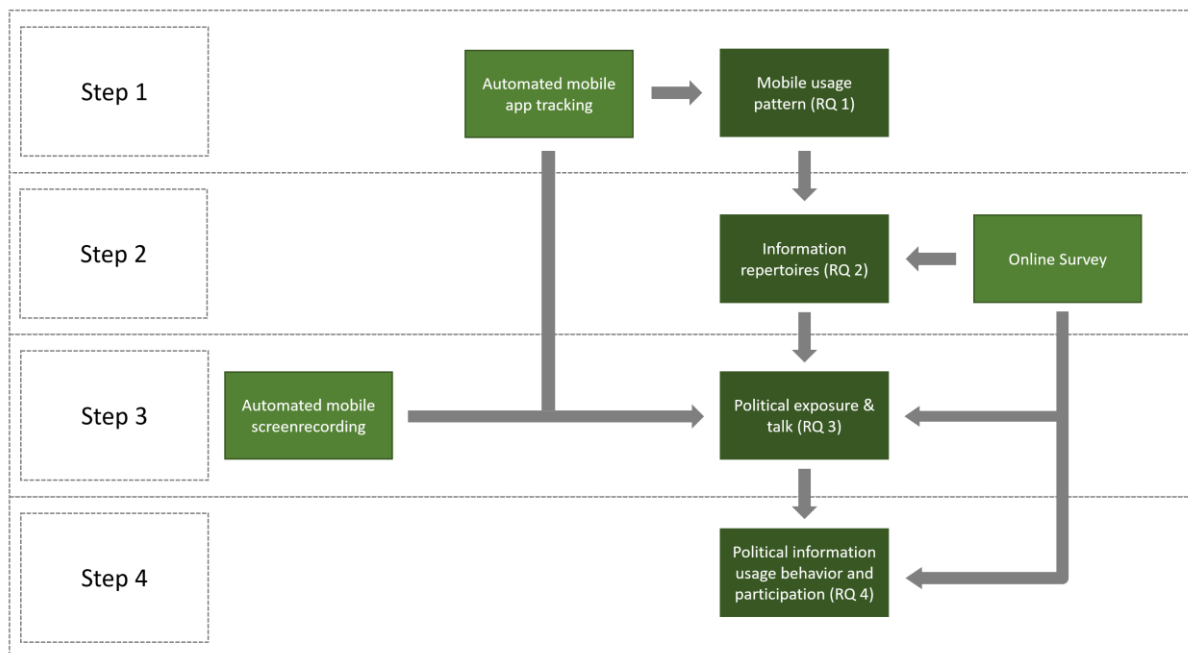
RQ 2: How can different types of information repertoires of supporters of Fridays for Future be identified and characterized?

RQ 3: How do the share and the manner of mobile political exposure and talk differ within the information repertoires of supporters of Fridays for Future?

RQ 4: How do the forms of political participation differ between the information repertoires of supporters of Fridays for Future?

To answer the research questions, one or more types of data collected using automated tracking, screen recording, or surveys are used for the analysis, depending on the research question. Analyzing data from multiple data collection methods presents analytical challenges. For a meaningful interpretation of the results, it is particularly important to consider the different levels of analysis. Accordingly, the innovative operationalization and the chosen analysis strategy for the research questions are explained below.

Figure 2: Overview research design



4.10.1 RQ 1: Mobile information usage patterns - Operationalization

The smartphone is a relevant source of political information. Capturing the content exposed on the smartphone poses a methodological challenge, which is increased by the high degree of functionality and the small-scale actions on the device (Karnowski, 2020). Against this background, the direct usage context on the smartphone is a relevant indicator in the identification of usage patterns and usage practices on the smartphone, which can be mapped using the session approach (Peng & Zhu, 2020). For this purpose, this session approach is adapted and operationalized for a communication science application. The first research question aims to

identify overarching mobile information usage patterns of Fridays for Future supporters within the sample.

RQ 1: How can different forms of mobile political information used by supporters of Fridays for Future be identified and characterized?

To investigate this question, the sample of supporters of Fridays for Future recruited for this study is examined more closely. The individual usage sessions of the individual participants form the cases and thus the basis for the analysis. Each case consists of a series of variables that contain information about the usage times of the overall session and the respective app categories within this session. On their basis, overarching usage patterns are formed across the supporters of Fridays for the Future in my sample.

Recall that in this thesis, *usage patterns* are defined as overarching patterns of uninterrupted use of the smartphone, which ends when the screen is switched off and the smartphone is not used for more than one minute. The behavior that takes place within this period is assigned to this session.

To deal with the complexity of the data, three basic steps are taken for this work: (1) the so-called session approach is used, which describes the aggregation of user behavior between two time periods (Peng & Zhu, 2020), (2) a medoids cluster analysis is applied to identify usage patterns (Park & Jun, 2009), and (3) descriptive analysis of the results is conducted. Before we look at the analysis strategy, let's first look at the operationalization of the usage sessions.

4.10.1.1 Measurement

The first step, which serves to answer the research question, relates to the measurement of usage sessions. In this work, a session is understood as a sequential, uninterrupted sequence of observed usage behaviors, where an interruption of longer than one minute in the usage behavior marks the end of such a usage session (Peng & Zhu, 2020; Zhu et al., 2018).

Sessions reflect the mobile usage sequence in relation to the smartphone applications used. To achieve this, they combine a number of mandatory and additional variables. On the one hand, each session requires a start and end time that define the usage sequence and distinguish it from other usage sequences. Accordingly, these are mandatory variables. Other information, such as the individual actions contained within this sequence, such as accessed apps or content, can vary depending on the research interest. In the course of this work, only sessions were included in the analysis that contained at least one accessed app within the session. All other sessions were eliminated because these sessions only consist of a brief, possibly automated, switching on and showing of the start screen, and it is assumed that this is not a relevant form of information behavior (e.g. the screen turns on when the alarm goes off). Apart from this overarching operationalization of usage sessions, two levels of sessions can

be distinguished in this work: Level 1 and Level 2 sessions. Both session levels refer to the identical session but differ in the degree of aggregation and thus the granularity of the variables.

Level 1 sessions are the more granular version, which contain more detailed information about the individual actions (e.g. accessed apps, sequences) within the session. These level 1 sessions contain the most information and therefore allow the most detailed conclusions to be drawn about the characteristics (duration, repertoire size, order, sequence) of the sessions. Accordingly, level 1 sessions contain the start time of the session, the end time of the session, and the usage interval of the session (start date and time until end date and time). Furthermore, the start date, end date, usage time, and usage interval are included for all accessed apps within the session. There are also additional variables, such as the logged events or keywords, their start time, end time, and the visibility duration of the keywords on the screen. The example in Table 2 shows the structure and information level of the level 1 sessions.

Table 2: Example of Level 1 session

Session	Time stamp	App	App category	Interval
1	12-04-2022 16:33:21	WhatsApp	Communication	16:33:21 - 16:34:11
1	12-04-2022 16:34:12	Instagram	Social	16:34:12 - 16:38:42
1	12-04-2022 16:38:43	Telegram	Communication	16:38:42 - 16:39:31
2	12-04-2022 17:10:21	Netflix	Video and Streaming	17:10:21 - 17:52:28

This table does not show real data

Level 2 sessions, on the other hand, represent a more aggregated version that focuses on the duration of use of the respective app categories. By focusing on one of the relevant characteristics of the session (duration), the previously very granular information is summarized to a greater extent, thus improving the analytical implementation. Accordingly, the level 2 session includes the variables of the session usage duration, the usage duration of the news apps category, the usage duration of the browser category, the usage duration of the social category, the usage duration of the communication category, the usage duration of the video & streaming category, the usage duration of the music & audio category, and the others category. Whereby the usage durations refer to the usage durations within the respective session. Table 3 provides an example of the variables contained in the level 2 session.

Table 3: Example of Level 2 session

Session	Interval	Duration in seconds				
		<i>Commu- nication</i>	<i>Social</i>	<i>Video and Streaming</i>	<i>...</i>	<i>Other</i>
1	12-04-2022 16:33:21 - 16:38:43	99	270	0	...	0
2	12-04-2022 17:10:21 - 17:52:28	0	0	2.527	...	0

This table does not show real data

4.10.1.2 Strategy of analysis

With the description of the measurement, the first step in answering the research question is complete, and we continue with the second step, the identification of usage patterns. The level 2 sessions form the basis for the explorative analysis.

In the context of this work, the use of medoid clustering as an unsupervised machine learning algorithm for structuring and thus identifying similar sessions is appropriate. Medoids clustering identifies the median, or centroid, of each cluster, which can then be used to divide the dataset into different groups based on their similarity to this central point (Bacher, 2010; Backhaus, 2016; Ng, 2018).

The use of medoids as clusters lends itself to identifying patterns in sessions for several reasons: (1) Automated cluster analysis is more effective and resource-efficient, especially for large datasets, as in this project. (2) Furthermore, medoids clustering allows the analysis of very large datasets with relatively low computational resources, which makes it attractive for use in this project. (3) Additionally, the method proves to be relatively stable with respect to outliers or skewed data, allowing for robust analysis of the sessions (Park & Jun, 2009).

By interleaving the session approach with the cluster analysis method, the aggregation of automated tracking data is possible with little loss of information. Accordingly, it is possible to aggregate the large number of individual data points and map the characteristics of duration. In this way, it is possible to assign each session to a usage pattern identified by the cluster analysis. The other characteristics are at least implicitly included in the level 1 sessions, which include repertoire size as well as order and sequence in the data. The data aggregated in this way serves as the basis for the subsequent descriptive analysis, which is described in more detail below.

The third step in answering the first research question is a descriptive description of the previously identified usage patterns. For this purpose, the level 1 sessions, which are now assigned to specific usage patterns, are used for a closer look at the session characteristics, such as (1) repertoire size, (2) sequence, and (3) order.

For this purpose, (1) the repertoire size is considered, which comprises the number of distinct apps accessed. Accordingly, the average number of apps accessed for each usage pattern is determined by calculating the number of unique apps accessed for each session and averaging them. A closer look at the (2) sequences, the order in which the app categories are accessed, and the transitions between them are also considered. For this purpose, the most frequently accessed app categories within the usage pattern are determined, along with their frequency in relation to the order in the session sequence (first app accessed, second app accessed, etc.). To examine the transitions, the most frequent transitions of accessed app categories are identified. For this purpose, the two sequential apps and their categories are determined in the form of a dyad, and their frequency in the usage pattern is computed (e.g. communication app followed by video and streaming app).

These three steps enable a more detailed answer to the research question by first defining sessions on the basis of which overarching usage patterns can be identified, which are then subjected to a more detailed descriptive analysis.

4.10.2 RQ 2: Information repertoire - Operationalization

The smartphone is not the sole source of political information, which is embedded in cross-platform and cross-device usage practices. Accordingly, a more comprehensive investigation of media and information usage behavior is necessary, which entails the methodological challenge of combining mobile tracking with survey data. In the course of operationalizing this research question, a methodological implementation for tackling this problem will be developed. The second research question focuses on the identification of different information repertoires among the supporters of Fridays for Future within the sample.

RQ 2: How can different types of information repertoires of supporters of Fridays for Future be identified and characterized?

I therefore examined the recruited sample of Fridays for Future supporters in more detail, whereby each supporter of Fridays for Future forms one case. Each case consists of various variables that contain information about the mobile and analog information usage behavior of that supporter. On the basis of this variable's information repertoires, they are identified across the supporters of Fridays for Future in the sample. Information repertoires are defined as the types of information and media usage behavior of Fridays for Future supporters, which includes both mobile and analog usage behavior.

Information from the automated tracking and the survey is combined in order to obtain the most comprehensive information possible on mobile and analog usage behavior. The data from mobile automated tracking and surveys is linked and analyzed in several steps. (1) First, the frequency of the previously identified usage patterns per supporter of Fridays for Future is calculated. This provides a data set in which the frequency of usage patterns per participant is shown. (2) Secondly, an index is created for each information usage variable from the survey (*device use & information sources*), which shows the sum of all values for this variable over the four survey intervals. The frequency of usage patterns per participant is then merged with the index variables. This results in a dataset that contains mobile and analog information usage variables at the level of Fridays for Future supporters. In addition, an index is also calculated for the variables required for the following descriptive analysis. (3) The third step consists of conducting a medoids cluster analysis to identify overarching patterns in information usage behavior, which provide insight into different information repertoires. (4) In the last step, these information repertoires are analyzed descriptively. Demographic variables, political predispositions, and other information usage variables, such as the relevance of various information sources for forming one's own opinion, are used for this purpose. First of all, we look at the operationalization of the mentioned variables before I describe the strategy of analysis in more detail.

4.10.2.1 Measurement

We will first focus on the first two steps, which relate to the measurement of information usage behavior. The measurement of these variables forms the basis for the subsequent analysis of information use to identify different information repertoires.

(1) The first step is the operationalization of *mobile usage patterns per participant*. For this purpose, the occurrence of the respective mobile usage patterns per participant was summed up. Accordingly, the *mobile usage patterns per participant* include the variables of the total occurrence of usage patterns per participant: the frequency of the news apps category, the frequency of the browser category, the frequency of the social category, the frequency of the communication category, the frequency of the video & streaming category, the frequency of the music & audio category, and the frequency of others category.

(2) The second step involves creating an index for *device use* and *information sources*. Both measurement instruments were surveyed in all four waves of the survey. Accordingly, the values are combined to form a sum index in order to increase the robustness of the values. The sum index is obtained by adding up all the available values and dividing by the number of available values. In this way, the indices have a value range between 0 and 1. The indices for *device use* include news via smartphone, news via PC, news via tablet, news via smart TV, news via smart speaker, news via smart watch, and news via none of the devices. The indices

for *information sources* include traditional TV, TV online, traditional radio, online radio, podcasts, print press, online news, news apps, free mail providers as news sources, social media, video as news sources, online search, and personal contacts as news sources. An overview can be found in Figure 18.

In addition, some variables are required for the subsequent descriptive analysis. Four measurement points are also available for these variables, and more robust indices are also calculated. On the one hand, this concerns the relevance of *opinion formation*, which includes traditional TV, TV online, traditional radio, online radio, podcasts, print press, online news, news apps, free mail providers, social media, video, online search, and personal contacts. In addition, an index for *political interest* was calculated, as well as for *political orientation*, *opinion leadership*, and *opinion certainty on climate change*. A detailed description can be found in Table 13.

4.10.2.2 Strategy of analysis

With the description of the measurement, the first two steps in answering the research question are complete, and we continue with steps three and four – the analysis. Therefore, the aforementioned information use indices (*device use* and *information sources*) form the basis of the subsequent explorative cluster analysis.

For this, as with the identification of mobile usage patterns, I use medoid clustering to identify similar information repertoires between Fridays for Future supporters. As explained earlier, medoid clustering is based on identifying the median of each cluster, which can then be used to divide the dataset into different groups based on their similarity to this central point (Bacher, 2010; Backhaus, 2016; Ng, 2018).

The reasons for using medoids clusters for this research question are very similar to the previous research question. Accordingly, they are only briefly touched upon here. (1) On the one hand, automated cluster analysis is more effective and resource-efficient; (2) on the other hand, the use is also resource-saving for large data sets; (3) in addition, the method is relatively robust against outliers (Park & Jun, 2009).

Accordingly, medoids clustering is suitable for identifying the information repertoires of Fridays for Future supporters in the sample. For this purpose, each participant or supporter of Fridays for Future represents a case for the analysis, which has the indices for *device use*, *information sources*, and the frequency of *mobile usage patterns* as predictors. These values of the indices are standardized before the clustering is carried out.

In the final step and fourth, which serve to answer the research question, the clusters (information repertoires) generated in the previous step are analyzed in more detail. For this purpose, the predictor variables (indices on device use and information source, as well as mobile

usage patterns) per repertoire are examined and analyzed. Secondly, other concepts such as *political interest*, *political orientation*, *opinion leadership*, and *opinion certainty on climate change* are calculated for each repertoire and compared with each other. Here, ANOVA, or Kruskal-Wallis, is used to test for significant differences between the individual repertoire groups. The ANOVA as well as Kruskal-Wallis are suitable in this case, as more than two groups are compared with each other (Field et al., 2012).

These four steps serve to answer the research question. The combination of automated tracking and survey data at the participant level enables a cluster analysis to identify information usage patterns. These identified patterns are subjected to a more detailed descriptive analysis as information repertoires, in which further relevant variables are tested for differences between the repertoires in order to obtain a more precise picture of the phenomena.

4.10.3 RQ 3: Mobile political exposure & talk - Operationalization

The third research question builds on the information repertoires and focuses on the investigation of political exposure in relation to the different information repertoires of the Fridays for Future supporters in the sample. The recording of *mobile political exposure* represents a methodological challenge. Several platforms and apps are used on smartphones, which can potentially be used for political content. Furthermore, for conventional variants of app tracking, the content displayed in the apps represents a black box that cannot be recorded. Accordingly, innovative methods of data collection, such as screen recording, are used to record *mobile political exposure* and tested under field conditions.

RQ 3: How do the share and the manner of mobile political exposure and talk differ within the information repertoires of supporters of Fridays for Future?

To this end, I analyzed the sample of Fridays for Future Supporters, where each information repertoire forms a unit made up of several supporters or mobile sessions (cases). Each case consists of different variables that contain information about the mobile information usage behavior of the respective supporter. These variables are used to draw conclusions about the proportion of political exposure per repertoire.

First of all, I would like to briefly revisit the concept of *mobile political exposure*. In this thesis, *mobile political exposure* is understood as the engagement with political content, which includes not only passive reception but also the active creation, forwarding, and discussion of political content on mobile devices. Accordingly, the concept of *mobile political talk* is a more specific form of political exposure that explicitly refers to political talks via mobile devices.

The identification of *mobile political exposure* is a methodologically challenging task, for which two different approaches are used in this thesis. The aim is to achieve a better and more accurate picture, as well as a higher degree of validation for the respective method. On the

one hand, screen recordings are used to measure political exposure, and on the other, a combined measurement instrument consisting of a survey and mobile automated tracking is applied.

4.10.3.1 Measurement & analysis of mobile political exposure with screen recordings

The first approach to measuring *mobile political exposure* is a combination of mobile app-tracking and screen recording. The basic idea is that screen recordings identify political keywords on the smartphone screen and record the duration for which these keywords are visible. With the help of app tracking and the processing of the app tracking data into sessions, it is then possible to assign the logged keywords to sessions. This makes it possible to examine the context of the political keywords. The definition of keywords, which represent the first step in measuring *mobile political exposure*, is correspondingly relevant.

(1) The selection of keywords is intended to enable the recording of *mobile political exposure* for supporters of Fridays for Future. Accordingly, based on the topic model of climate-related press coverage (Rabitz et al., 2021), the following keywords were selected that are related to climate policy. The terms identified by the topic model have a high probability of being relatively unique and meaningful for the topic area of climate politics. These include terms relating to development projects and sustainability, damage to the ecosystem, pollution and decarbonization, and local climate. Furthermore, keywords for related topics such as politics, foreign affairs, climate research, protests, and politics were also included. A detailed overview can be found in Table 4.

Table 4: Selected keywords

Category	Original German keywords	Translated keywords
Development projects and sustainability	Landwirtschaft; Europa; Klima; Jahr; Umwelt; Staat; Euro; Stadt; Aktivitäten; Entwicklung; Projekt; Veränderung; Wissenschaft; Elektro; Mobilität; Fahrrad; Recycling; Vegan; Vegetarier; vegetarisch	Agriculture; Europe; Climate; Year; Environment; State; Euro; City; Activities; Development; Project; Change; Science; Electric; Mobility; Bicycle; Recycling; Vegan; Vegetarian; Vegetarian
Damage to the ecosystem	Wald; Wasser; Menschen; Klima; Natur; Pflanzen; Bäume; Arten; Stadt; Schutz; Erde; Umwelt; Brand; Waldbrand; Tiere; Fleisch	Forest; Water; People; Climate; Nature; Plants; Trees; Species; City; Protection; Earth; Environment; Fire; Forest fire; Animals; Meat
Pollution and decarbonization	Energie; Abfall; Jahr; Luft; Umwelt; Autos; Verschmutzung; Verkehr; Klima; Solar; reduzieren; CO2; Europa; Strom; Kohlenstoff; Kohle; Abbau; Rodung; Autobahn; fossil; Brennstoffe	energy; waste; year; air; environment; cars; pollution; traffic; climate; solar; reduce; CO2; Europe; electricity; carbon; coal; mining; deforestation; highway; fossil; fuels
Local climate	Klima; Temperatur; Luft; Grad; Wetter; Winter; Hitze; Sommer; Veränderung; Niederschlag; Schnee; Kälte	Climate; Temperature; Air; Degree; Weather; Winter; Heat; Summer; Change; Precipitation; Snow; Cold
Foreign Affairs	USA; Europa; Präsident; Frankreich; Klima; Russland; NATO; Handel; Land; Ausland; Staaten; Amerika; Gas	USA; Europe; President; France; Climate; Russia; NATO; Trade; Country; Foreign; States; America; Gas
Climate research	Klima; USA; Jahr; global; Wissenschaftler; Veränderung; Kohlenstoff; Dollar; Eis; Öl; Wasser; Erde; Bericht; Gas; Paris; Arktis; Meer	Climate; USA; year; global; scientists; change; carbon; dollar; ice; oil; water; earth; report; gas; Paris; Arctic; sea

Protest	Menschen; Klima; Leben; Europa; Welt; Fridays; Fridays for Future; Ende Gelände; Extinction Rebellion; Protest; Straße; Demo; Demonstration; Polizei; Blockade; Versammlung; Luisa Neubauer; Greta Thunberg	People; Climate; Life; Europe; World; Fridays; Fridays for Future; Ende Gelände; Extinction Rebellion; Protest; Street; Demo; Demonstration; Police; Blockade; Assembly; Luisa Neubauer; Greta Thunberg
Politics	Bundestag; Politik; Die Grünen; CDU; SPD; Linke; FDP; AfD; Corona; Covid; Parlament; Abstimmung; Fraktion; Bund; Bundesland; Landtag; Steuer; Gesetz; Berlin; Regierung; Opposition; Scholz; Lindner; Baerbock; Habeck; Faeser; Buschmann; Heil; Lambrecht; Özdemir; Spiegel; Lauterbach; Wissing; Lemke; Stark-Watzinger; Schulze; Geywitz; Schmidt; Minister; Ministerium	Bundestag; Politics; The Greens; CDU; SPD; Left; FDP; AfD; Corona; Covid; Parliament; Vote; Parliamentary Group; Federal Government; Federal State; State Parliament; Tax; Law; Berlin; Government; Opposition; Scholz; Lindner; Baerbock; Habeck; Faeser; Buschmann; Heil; Lambrecht; Özdemir; Spiegel; Lauterbach; Wissing; Lemke; Stark-Watzinger; Schulze; Geywitz; Schmidt; Minister; Ministry

(2) In the second step, the logged keywords and the duration of the visibility of those keywords are assigned to the previously generated sessions. This allows the keywords to be viewed in a broader context.

(3) The operationalization of *mobile political exposure* includes two constructs: on the one hand, the *duration of mobile political exposure*, and on the other hand, the *frequency of mobile political exposure*. The former, the *duration of mobile political exposure*, is calculated by adding up the duration of visibility of the keywords per participant. This involves calculating the total duration of visibility as well as the duration of visibility per active day. Active days are defined as the days on which screen recordings are available for the respective user. This division into total duration and duration per day is also applied to the frequency of *mobile political exposure*. First, the total number of *mobile political exposures* per participant is calculated before the total number is divided by the number of active days to determine the average frequency of *mobile political exposures* per active day.

(4) The measurement of the more specific concept of *mobile political talk* is based on a similar approach, whereby a distinction is also made between the duration and frequency of mobile political talk. *Mobile political talk* is measured in this thesis by the combination of the conditions: on the one hand, the occurrence of keywords, and on the other hand, the simultaneous active keyboard. This is a very narrow approach to measuring *mobile political talk*, which can be viewed on the one hand by adding up the duration to a total duration per participant. On the other hand, by dividing this total duration by the active days of the participant, I can obtain the average duration of *mobile political talk* per day. This approach is also used to measure the frequency of mobile political talk. Here, the overall frequency is first determined by adding up the occurrence of mobile political talk per participant. The total number is then divided by the number of active days of the participant to obtain the average number per day.

(5) The analysis of both *mobile political exposure* and *mobile political talk* is carried out in both cases through a general descriptive analysis across the sample as well as through a descriptive analysis in relation to the information repertoires. ANOVA, or Kruskal-Wallis, is used to test for differences between the information repertoires.

4.10.3.2 Measurement & analysis of mobile political exposure by combining mobile tracking and survey

The second approach to identifying *mobile political exposure* is a combined measurement instrument consisting of mobile automated tracking (app usage) and a survey. The basic idea is that the respondents indicate the estimated share of use of a series of mobile applications for political exposure. These values are then used as a weight for the mobile usage times of these applications to determine the proportion of political exposure per person and information repertoire. As already stated, the measurement instrument is made up of two components: (1) the scale in the survey and (2) the tracked mobile app usage. (3) Building on this, I will examine the more specific concept of *mobile political talk* and its operationalization in the course of this thesis. (4) This is followed by a brief description of the planned analysis of the constructs. I will start with the description of the scale in the survey before discussing mobile app usage and political talk.

(1) The scale in the survey is a relevant component of the measurement instrument. The question text for this is: "We would like to know how important the apps listed are for your political exposure. This could be simply finding out about political topics or events (e.g. reading Telegram info channels) as well as agreements or discussions in 'Fridays for Future' chats and forwarding information (e.g. news articles, videos, podcasts) to others." The respondents then had the opportunity to rate the self-assessed share of WhatsApp, Telegram, Signal, Threema, Facebook Messenger, Discord, TikTok, YouTube, Twitter, Facebook, Snapchat, Instagram, Slack, & Trello on a scale from 0 to 100% (in increments of 10). The survey was presented to

the participants four times. Accordingly, a sum index per mobile application is formed from the values. The sum index is composed of the sum of all available values divided by the number of available values. Due to the repeated self-assessment survey, it can be assumed that an index value based on four surveys is more robust than values from one survey wave. These index values form the weighting of the tracked app usage of the corresponding applications.

(2) The operationalization of mobile tracking data with the aim of determining the *duration of political exposure* involves several steps. The first step is to determine the total duration of the political exposure per participant. For this purpose, the total duration of use of the mobile applications from the survey scale is calculated (WhatsApp, Telegram, Signal, Threema, Facebook Messenger, Discord, TikTok, YouTube, Twitter, Facebook, Snapchat, Instagram, Slack, & Trello). The total duration of use determined in this way is calculated with the weighting from the survey to obtain the total duration of *mobile political exposure*. In the second step, the days on which automated tracking data is available for the respective user are determined. These provide information on the number of days the participant has used the smartphone. In the next step, the duration of the *mobile political exposure* per participant per active day is calculated. This is done by dividing the total duration of the political exposure by the number of active days. In this way, a reference value is obtained in relation to the proportion of use for *mobile political exposure*, which is based on a combination of self-assessment and automated tracking of the duration of use. This value of *mobile political exposure* can be calculated both per participant and per information repertoire.

(3) The operationalization of *mobile political talk* is based on a similar approach, which also consists of several intermediate steps. The first step consists of identifying the app sessions, consisting of WhatsApp, Telegram, Signal, Threema, Facebook Messenger, Discord, TikTok, YouTube, Twitter, Facebook, Snapchat, Instagram, Slack, & Trello, in whose usage period the keyboard was used when the respective app was active. In the second step, the duration of use of the previously identified app sessions is calculated and weighted based on the self-assessment of the survey. In this way, the total duration of the *mobile political talk* per participant is calculated. In the third step, the days on which the participant used the smartphone are also determined, or, in other words, the number of days on which tracking data is available for this participant. These are used in the fourth step to calculate the average duration of the *mobile political talk* per participant. For this purpose, the total duration of the *mobile political talk* is divided by the number of active days per participant. In this way, conclusions can be drawn about the proportion and duration of mobile political talk per participant and the information repertoire.

(4) The analysis strategy for the analysis of *mobile political exposure* and *mobile political talk* consists of a descriptive analysis. On the one hand, a general analysis based on the overall

sample is carried out, as is a comparison of the *mobile political exposure* and *talk* per information repertoire. For this purpose, an ANOVA is used to test for significant group differences. In this way, a detailed picture of the occurrence of *mobile political exposure* and *talk* in the sample of Fridays for Future supporters is obtained.

Overall, both approaches to measuring mobile political exposure and talk represent viable ways of measurement, whereby measurement using screen recordings is more accurate and narrower, while the combination of app tracking and surveys represents a somewhat broader but possibly also less accurate way of measurement. Nonetheless, both approaches offer interesting and detailed insights into the occurrence and duration of political exposure and talk in relation to the supporters of Fridays for Future in this sample.

4.10.4 RQ 4: The relationship between information usage behavior and participation - Operationalization

The fourth research question brings together all the previous analysis steps with the aim of investigating the political information behavior of Fridays for Future supporters with regard to their political participation.

RQ 4: How do the forms of political participation differ between the information repertoires of supporters of Fridays for Future?

For this purpose, a sample of Fridays for Future supporters and their political information behavior is used. The possible connection between political information usage behavior is considered both at the level of the individual supporters and in relation to the different information repertoires. Accordingly, each information repertoire forms a unit consisting of several cases—the supporters of Fridays for Future. Each case combines a number of variables that contain information about the mobile information usage behavior of the respective supporter. The aim here is to identify patterns between political information behavior and forms of political participation. To this end, relevant components of political information behavior in relation to types of political participation are considered in several steps. (1) On the one hand, the different information repertoires and the associated mobile usage patterns are used and considered in relation to the forms of political participation. (2) On the other hand, both *mobile political exposure* and *talk* are considered in relation to information repertoires and the forms of political participation. (3) Furthermore, other constructs that are not directly related to political information behavior are considered additional variables. These include *opinion leadership* and *opinion certainty*, *political interest* and political orientation, as well as age, level of education, and perceived social status. By looking at these three components together, a deeper and more detailed analysis of the phenomenon is possible.

4.10.4.1 Measurement

In order to take a closer look at the phenomenon of *political information behavior*, a number of constructs are used to answer the research question. These include political participation, information repertoires, *mobile political exposure*, *mobile political talk*, as well as constructs of non-information usage behavior such as *opinion leadership*, *opinion certainty*, *political interest*, and political orientation.

Political participation ($a_{\text{wave 1}}=.86$, $a_{\text{wave 2}}=.91$, $a_{\text{wave 3}}=.92$, $a_{\text{wave 4}}=.9$) was measured using the measurement instrument of Andersen et al. (2021) (a detailed description can be found in chapter 2.3). For more robust values, an index was created in addition to the four measurement times, which combines the values of these by. To obtain more robust values, an index was created in addition to the four measurement times, which combines the values of these by adding them up and dividing by the number of existing values.

Information repertoires were measured on the basis of mobile usage patterns (automated tracking) as well as device use and information sources (survey). A detailed description of the operationalization can be found in Section 4.10.2.

Political exposure and *talk* are measured either on the basis of screen recordings and app tracking or on the basis of surveys and app tracking. A detailed description of the two approaches can also be found here under section 4.10.3.

In addition to these constructs, all of which are part of political information usage behavior, other relevant constructs are also included. *Political interest* ($a_{\text{wave 1}}=.65$, $a_{\text{wave 2}}=.73$, $a_{\text{wave 3}}=.82$, $a_{\text{wave 4}}=.83$) is measured with the political interest short scale (PIKS) by Otto and Bacherle (2011). *Party preference* was measured according to the European Social Survey measurement instrument (ESS-ERIC, 2016). *Political orientation* was measured by the measuring instrument of Hölig et al. (2020). Furthermore, *opinion leadership* ($a_{\text{wave 1}}=.85$, $a_{\text{wave 2}}=.9$, $a_{\text{wave 3}}=.9$, $a_{\text{wave 4}}=.91$) was measured by the measurement instrument of Trepte and Boecking (2009). Additionally, *opinion certainty* on climate change ($a_{\text{wave 1}}=.7$, $a_{\text{wave 2}}=.54$, $a_{\text{wave 3}}=.75$, $a_{\text{wave 4}}=.66$) was measured by the scale proposed by Matthes et al. (2010). For all variables listed, the values at the four measurement points of the survey were combined to form an index. To calculate this more robust index, the values from the four measurement times were added together and divided by the number of available values per participant. A detailed description of all the measuring instruments mentioned can be found in Section 4.8.

4.10.4.2 Strategy of analysis

The analysis of the relationship between political information behavior and forms of political participation is made up of several components.

(1) First, a general descriptive analysis of *political participation* is carried out in aggregated form, as an index, as well as over time across the four survey intervals for the entire sample. This approach is also used for the predictors for the *information repertoires*, which include *mobile usage patterns*, *device use*, and *information sources* in aggregated form and over time. This is also done again for *mobile political exposure* and *talking* in the same way. This first analysis step serves as a baseline and reference framework for the subsequent analyses.

(2) In the second step, the basic logic of the analysis is repeated in relation to the *information repertoires*. For this purpose, both *political participation* and *mobile political exposure* and *talk* are presented and analyzed both in aggregated form and over time for each information repertoire. The analysis of the data focuses on identifying similarities and differences between the information repertoires in relation to the forms of participation. Individual forms of political participation are examined in more detail if there are indications of this in the data. The approach here is rather loop-like, in that an anomaly is identified in the data at a higher and more aggregated level, which is then examined in more detail at lower aggregation levels. The differences in the aggregated data are also tested for significance using ANOVA or Kruskal-Wallis.

(3) In the third step, the other relevant constructs, which include *political interest*, *political orientation*, *opinion leadership*, and *opinion certainty*, are included to expand the analysis and shed light on the phenomenon more broadly and comprehensively.

Overall, the analysis serves to work out the relationship between political information use behavior and participation and the associated patterns and mechanisms. By taking a detailed look at different types of behavior with regard to political information use, both in aggregated form and over the period under investigation, the aim is to gain deeper insights into the phenomenon.

5 Results

This thesis is dedicated to a comprehensive analysis of the relationship between political information usage behavior and the forms of political participation of supporters of the Fridays for Future movement. In the digitalized and hybrid media environment in Germany, the smartphone plays a central role as a source of information. The aim of this chapter is to obtain a comprehensive overview of the information usage behavior of the Fridays for Future supporters studied, which is made up of their smartphone usage as well as other digital and analog information usage. Furthermore, these findings will be put in relation to the forms of political participation of these supporters, and an attempt will be made to identify relevant patterns between information and participation behavior.

The first part of this analysis chapter focuses on the identification and in-depth investigation of mobile usage patterns. For the younger generation in particular, the smartphone acts as a key tool for accessing political information, making a deeper understanding of these usage patterns necessary. The aim here is to identify different forms of use and characterize them more closely in terms of duration, the number of apps used, and the sequence of use.

The second section of the analysis chapter is dedicated to the identification of information repertoires in order to provide a more comprehensive insight into the information use of Fridays for Future supporters. The focus is expanded beyond the smartphone to include various analog and digital information sources in order to capture the complexity of political information use. To this end, the analysis is based on the previously identified mobile usage pattern, among other things. By including the mobile usage pattern in the formation of information repertoires, the supporters of Fridays for Future can be assigned to groups of repertoires based on the more precise behaviors mapped in the mobile sessions. This approach enables a detailed view of the phenomenon than the use of usage shares of mobile apps to determine the repertoires.

The third part of the analysis chapter presents the results of two research approaches that aim to identify political exposure on mobile devices. Specifically, these are the evaluation of screen recordings and the linking of app tracking and self-reports. The focus here is on the analysis of usage shares with regard to political content, political conversations, and the generation of political user-generated content, which are also considered with regard to the different information repertoires. These approaches should help to draw a comprehensive picture of the political interaction and exchange in the sample.

The final part of the analysis chapter brings together all of the previous findings and relates them to the various forms of political participation. This holistic view enables an in-depth evaluation of the possible interactions between information behavior and the different forms of

political engagement of Fridays for Future supporters. Overall, this thesis aims not only to capture the current patterns of use but also to work out possible relationships and mechanisms for the political participation of supporters of Fridays for Future in Germany.

Before we turn to this final analysis, we start by looking at the mobile usage patterns of the Fridays for Future supporters studied in order to gain a better understanding of how information is used on smartphones.

5.1 RQ 1: Mobile information usage patterns of supporters of Fridays for Future in Germany - Results

For the average younger supporters of Fridays for Future, the smartphone plays a relevant, if not the most relevant, role as a source of information about political developments and everyday information. If we are interested in the composition of information sources and usage behavior of this group, we cannot avoid a detailed examination of their mobile information usage patterns. The tracking approach used in this work provides a detailed data base that provides information about the usage behavior of Fridays for Future supporters on their smartphones.

The challenge of this detailed data base is to prepare the data in a meaningful way without losing too much information through unnecessary aggregation. Accordingly, a K-medoids cluster analysis of mobile sessions, which represents a form of aggregated usage behavior between turning the smartphone on and off and thus retains information about the context of use, was performed.

5.1.1 Overview usage patterns total sample

In the following, we first look at the entire sample in order to gain a better understanding of the distribution and characteristics of the data available in this thesis, as well as the first overarching findings. The identification of usage patterns is based on a total of $N = 96,250$ sessions, which are made up of tracking data from a total of 28 participants over the study period. In the course of analyzing this data, (1) we first look at the number of sessions and the usage time per active day, whereby an active day is a day for which tracking data is available for the participant. (2) The next step is to look at the cumulative app views and usage duration per app category. (3) We also look at the app views over the course of the day for each app category. After this rather general look at the sessions and the app accesses, we look at the identified usage patterns at a higher level. (4) Here we first take a look at the distribution of sessions per usage pattern. (5) And also consider the values of the predictors that were used to determine the usage patterns at an overarching level. (6) We also look at the overall repertoire size, i.e., the number of distinct accessed applications, for the sample. (7) Additionally, we look at the frequencies of the apps in the ranking of accessed apps within the sessions (e.g. the first opened apps are X percent communication apps such as WhatsApp). (8) Finally, we look at

the frequency of transitions and consider the most frequent transitions from app 1 to app 2 within the sample. By analyzing the above points, we get a good overview of the existing data in relation to usage patterns.

(1) The number of sessions allows conclusions to be drawn about the frequency of smartphone use by Fridays for Future supporters over the course of the day. In this work, a session is understood as a sequential, uninterrupted sequence of observed usage behaviors, where an interruption of longer than one minute in the usage behavior marks the end of such a usage session. It is important to repeat that only sessions that contained at least one accessed app were included in the analysis. Accordingly, the number of sessions does not give us any information about the frequency with which the screen is (automatically) switched on, but about the number of interactions with the smartphone, which include the use of apps and thus very likely have a higher relevance for information behavior with regard to political content. In other words, this thesis focuses on longer information usage behavior since it is assumed that, e.g., briefly checking the time has no influence on my political information behavior in the vast majority of cases. When looking at the frequency of sessions, it can be seen that Fridays for Future supporters interact with their smartphones on average $M = 52.17$ times per active day in the form of sessions. In this case, the median does not deviate very much from the arithmetic mean ($median = 50$). However, due to the relatively high value of the standard deviation ($SD = 24.92$), it can be assumed that the values vary greatly within the distribution. An examination of Table 5 shows that the distribution of the sample varies greatly at two levels. Firstly, there is a relatively strong variance between the individual supporters of Fridays for Future. Here, the data shows that the participants sometimes differ greatly in the frequency of use sessions. A closer look at the values within the participants also suggests that there is a high degree of variation between the frequency of sessions within a participant and between their active days. Both the variance between participants and the variance within participants can probably be attributed to different usage practices. Furthermore, there is always the possibility that participants have switched off tracking or that technical problems have occurred. Nevertheless, the data allow initial conclusions to be drawn; for example, they show us that the supporters of Fridays for Future in this sample use their smartphones relatively frequently and that their frequency differs greatly between individuals and days.

This also applies to the distribution of screen time. The screen time indicates the cumulative duration of screen usage per active day. In short, the screen time indicates the time during which the smartphone screen was switched on. This value gives us a better understanding of the total smartphone usage per day on Fridays for Future supporters. The average screen time for this sample is $M = 224.83$ minutes (3.75 hours), which indicates a relatively long period of use of the smartphone. In this case, the median value of $median = 204.69$ minutes deviates somewhat more strongly from the arithmetic mean, which indicates a distribution that is not

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entirely equal to outlier values. This impression is reinforced when we look at the standard deviation, which, at $SD = 133.26$ minutes, also indicates a higher variance of values in the sample. The distribution of screen time appears to be similar to the frequency of sessions described above. The distribution of screen time also varies between the individual supporters of Fridays for Future as well as within the individuals and between their active days. This is suggested by the values in Table 5, where the standard deviation per participant in particular, as well as for the entire sample, allow this conclusion to be drawn. From the values for screen time, we can deduce that the supporters of Fridays for Future in this sample have a relatively high level of smartphone usage time, although this can vary greatly between individuals and between the individual's active days. This finding suggests that there are different forms of usage behavior.

Table 5: Average screen time and sessions per active day (M, SD, Median)

Participant	Sessions per day			Screen time per day in minutes		
	Mean	SD	Median	Mean	SD	Median
1008	62.7	15.71	61	337.51	164.72	323.43
1101	8.9	5.7	7.5	14.64	27.7	3.94
1104	47.24	16.33	46	136.29	49.74	134.41
1105	97.53	20.15	97.5	313.9	109.12	305.39
1106	49.75	17.42	49	261.71	163.63	234.73
1107	10	10.44	4.5	139.31	179.62	31.99
1109	75.5	49.06	72	309.74	183.95	352.73
1110	46.46	12.47	46.5	307.82	111.84	298.9
1111	47.88	18.21	47.5	337.01	115.76	338.77
1112	47.02	18.59	45	109.78	52.53	98.75
1114	34.95	11.37	33	162.68	82.73	152.59
1115	80.27	22.58	80	294.03	123.17	276.33
1116	59.37	16.84	56.5	243.59	111.95	230.6
1118	80.59	25.66	78	302.22	108.68	284.51
1119	41.59	14.07	43	159.36	71.11	162.83
1121	53.07	24.4	57	171.48	103.36	156.58
1124	69.87	17.15	71	260.19	92.14	248.59
1127	45.03	33.9	46	158.41	165.65	135.87
1131	54.98	17.88	57	239.52	98.83	248.8

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Participant	Sessions per day			Screen time per day in minutes		
	<i>Mean</i>	<i>SD</i>	<i>Median</i>	<i>Mean</i>	<i>SD</i>	<i>Median</i>
1132	38.71	15.03	38	116.59	77.57	100.43
1133	6.8	4.55	7	35.26	19.48	25.41
1134	21.2	14.02	22	63.84	41.21	65.01
1135	64.36	16.84	64	163.42	81.91	153.2
1137	79.33	18.48	90	104.66	21.13	103.02
1138	49.58	15.87	46	288.57	118.91	280.81
1139	23.4	17.92	27	58.41	51.82	63.57
1140	34.97	14.84	35	241.53	126.17	224.22
1142	10.96	8.27	8	184.48	118.63	178.05
Total sample	52.17	24.92	50	224.83	133.26	204.69

The average session duration ($M = 2,73$ minutes, $SD = 365.19$ minutes, median = 0.95 minutes) shows that this can vary greatly from session to session, which explains the high standard deviation. Furthermore, it is clear that the mean duration differs greatly between the arithmetic mean and the median, which supports the assumption that the duration of the sessions is very unevenly distributed.

(2) When looking at the cumulative app views and usage times per category for each participant, it can be seen that the composition of the app categories used differs to some extent between the supporters of Fridays for Future. If we first focus our attention on the views per category in Figure 3, it is noticeable that the communication category represents the largest or at least a very large proportion of the total views for almost all participants. This also applies to the social category for most participants, although there are some people whose data shows little to no views in this category. The browser category is also accessed by almost all participants to a much lesser extent than communication and social, but represents a relatively stable, smaller proportion of total views. Although the views of the other categories, which include music and audio, news apps, others, and video and streaming, appear in the data of almost all participants, their share of total views varies more than the aforementioned categories. This could be an indication that the proportions of these app categories are a good predictor of certain behaviors and repertoires in relation to the participants' information behavior.

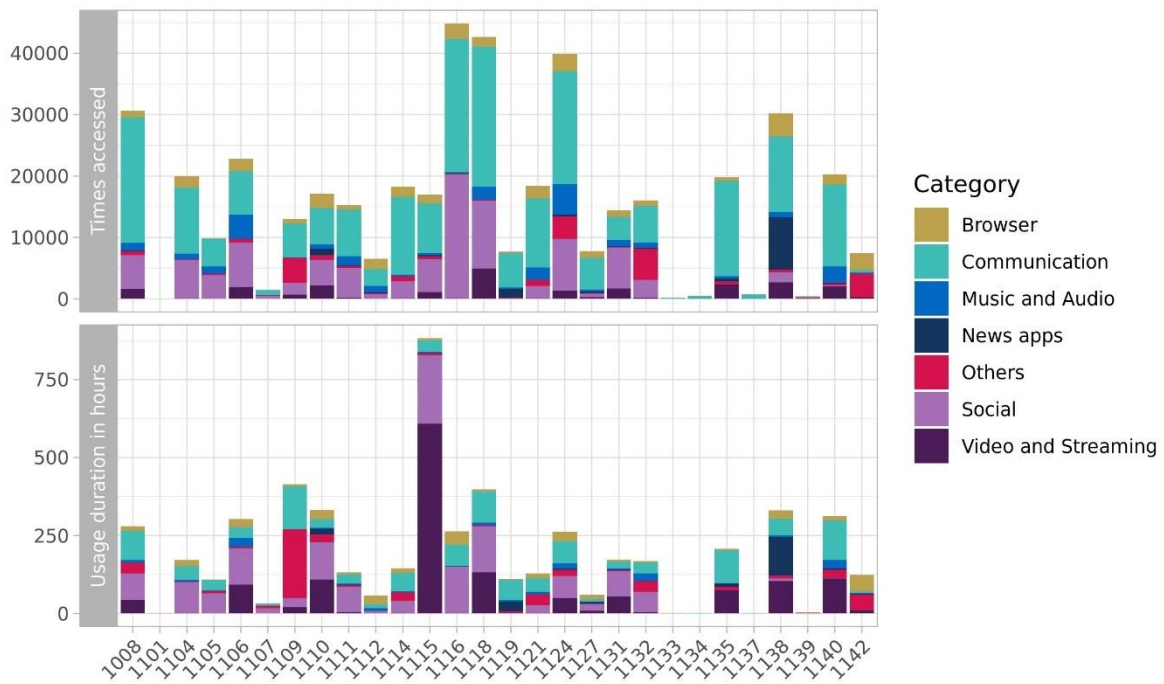
This impression is reinforced when looking at the usage duration per category and participant, as the communication categories, which are relatively stable in terms of their share of total views, and browsers account for a very small share of the total usage duration. In contrast, the

social category has a large, in some cases the largest, share of the usage period in the total usage period. The ratio has changed from a low share of total views to a very high share of total usage time, particularly for the video and streaming categories. This category shows a high, in some cases the highest, share of total usage time among participants who appear to watch videos on their smartphones.

Interestingly, the ratio of views to total views and the duration of use of the category to the total duration of use remain very similar for some categories, such as news apps. These observations point to a possible distinction between the categories based on the ratio of calls and duration of use, which can be roughly divided into three parts. The first part comprises categories with a high number of views and a lower duration of use, which seems particularly plausible for the applications included in the communication category, such as WhatsApp. This type of application is often opened to receive the latest information or to pass it on in the form of text, voice, or picture messages, but this only takes a relatively short period of time. The second part includes categories, such as social or news apps, whose ratio of views to usage time is relatively constant. The applications included in the categories are apps that capture the user's attention for a certain period of time after opening. The third part comprised categories that are rarely accessed but have a high duration of use. These applications contained in the categories are apps that keep the user's attention for a long period of time. These applications include, in particular, video applications such as TikTok and YouTube, which promote a relatively long period of use.

Overall, the data on the number of times the app categories are accessed and their duration of use allows us to identify different forms of use and combinations of app categories within the Fridays for Future following.

Figure 3: Times accessed and usage duration per app-category



In addition to the distribution of views per app category for each participant, (3) we look at the views per app category for the sample over the course of the day. We can see the corresponding visualization in Figure 4, in which the inverted U-shape is relatively quickly apparent as a basic pattern. While there is virtually no app usage at the beginning of the day, the number of views rises sharply in the morning hours and only decreases again in the evening.

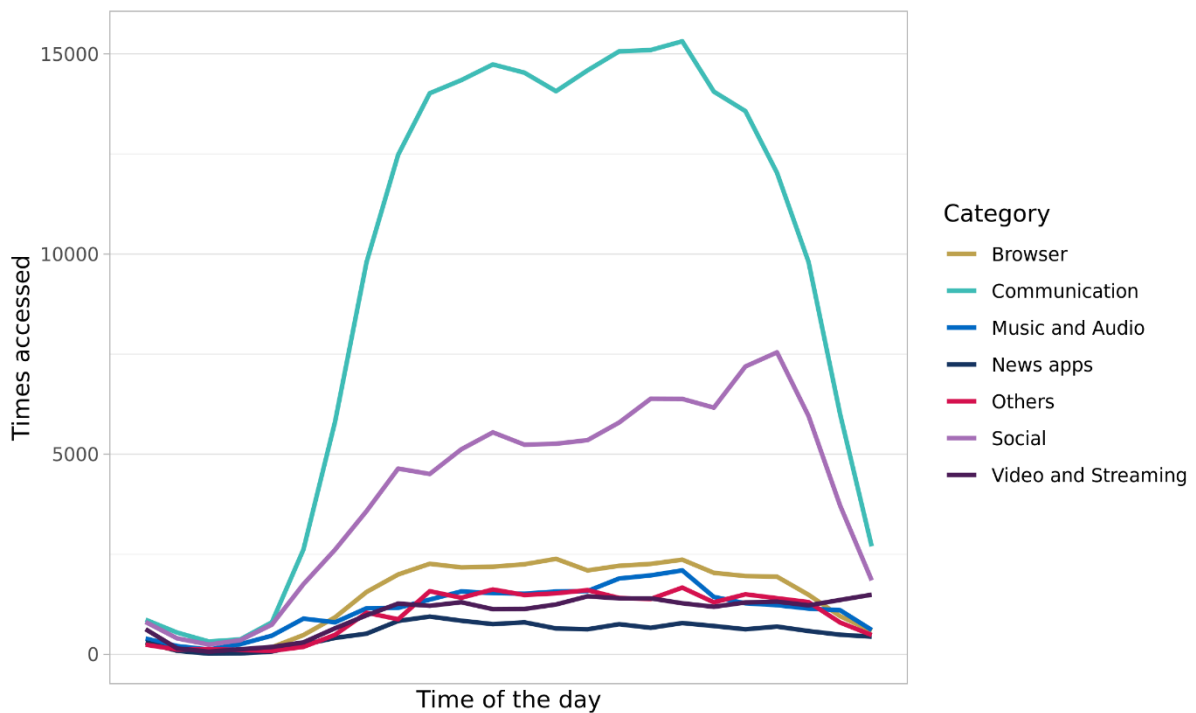
The communication category stands out from this basic pattern, recording the highest number of views and following the pattern described most closely. The curve of app views in the communication category records its highest value in the late afternoon and then falls continuously. The large gap between the number of views and the other categories is striking. This phenomenon, that communication apps in particular have a high number of views, was already evident in the previous observations and is shown again in this chart. Accordingly, the data indicates that communication apps in particular are a companion through everyday life and are characterized by a high number of views in combination with short usage times.

This observation does not quite apply to the social category. The social category has the second-highest number of views and has a relatively clear curve throughout the day, which starts low in the morning hours and then rises relatively continuously—interrupted by a few small breaks—until the peak in the evening and then drops off rapidly. The data suggests that although apps in the social category are used continuously throughout the day, their intensity increases and probably peaks after the day's business has been completed.

The curves for the browser, news apps, others, and music and audio categories all follow the overarching inverted U pattern, although some of these show different peaks over the course of the day. While the browser category follows the inverted U-curve almost perfectly, the curve for news apps is higher in the morning and weakens as the day progresses. Accordingly, the curve is slightly skewed to the right. The opposite is the case for the music and audio category curve, as it reaches its peak in the afternoon and is therefore slightly skewed to the left. The curve for the video and streaming category stands out completely from this pattern, which starts low and increases during the course of the day but does not fall in the evening like all other categories but continues to rise into the night.

Based on the different curves, conclusions can be drawn about how the different applications are used and their function within the course of the day for the supporters of Fridays for Future. While the high presence of communication applications over the course of the day indicates a high media-mediated need for information, which is addressed by the use of the communication apps, it can be seen that news tends to be received in the morning, and the drop-in use over the course of the day indicates that this need for information has largely been satisfied. In contrast, the use of the browser application, like the communication apps, appears to occur relatively continuously throughout the day, but at a considerably lower level. This speaks for the relatively frequent occurrence of information needs that require a search during the course of the day.

Figure 4: Times accessed apps over the course of the day



By looking at the distribution of views and usage time of the various app categories, both per participant, for the entire sample and over the course of the day, we were able to gain an initial impression of the usage behavior of the various mobile applications, which form the basis for the identified usage patterns. We will take a closer look at these mobile usage patterns below, focusing first on the entire sample before characterizing the individual mobile usage patterns.

(4) To identify the mobile usage patterns, a K-medoid cluster analysis was carried out based on the sessions and app categories, which represents a form of aggregated usage behavior between switching the smartphone on and off and thus contains information about the usage context. The clusters obtained in this way provide information about typical usage patterns of supporters in terms of duration, applications used, and frequency. Because of the initially unknown number of clusters, I determined the optimal number of clusters using the so-called GAP statistics and the Within Groups sum of squares (WSS), both tests indicating a number of 12 clusters (Appendix 1: Optimal number of clusters). As a distance measure, the squared Euclidean distance was used, and K-medoids clustering was employed as a cluster algorithm (Park & Jun, 2009). K-medoids clustering is a technique where we place each observation in a dataset into one of the K clusters. The aim is to obtain K clusters in which the observations within each cluster are very similar to each other, while the observations in different clusters are very different from each other (Park & Jun, 2009). This method is particularly suitable for the tracking data at hand, as it is more robust against outliers (Park & Jun, 2009) and can process large amounts of data quite quickly (Park & Jun, 2009). I validated the cluster solution by discriminant analysis (Schendera, 2010), which allowed a correct assignment of 87% of the cases, which in turn represented a good result (Appendix 1: Validation of cluster analysis – discriminant analysis). The calculation of the F-value shows five completely homogeneous clusters out of 12 clusters (Backhaus, 2016) (Appendix 1: Validation of cluster analysis – F-scores).

The identified clusters represent specific mobile usage patterns that vary in the characteristics of the app categories used and in size and can therefore be easily differentiated from one another. The usage patterns include: *Checking*, *Social media & chatting*, *Quick look into social media*, *Extensive social media usage*, *Quick browsing*, *Browsing & chatting*, *Music & audio only*, *Short watching & chatting*, *Medium watching & chatting*, *Long watching & chatting*, *News apps only*, and *News apps chatting & browsing*. For a better overview, the usage patterns were initially arranged thematically, i.e., the usage patterns with similar, highly distinctive app categories were arranged in descending order of size. Specifically, for example, all usage patterns in which social media is strongly pronounced were arranged one after the other. A more detailed explanation of the usage pattern and a characterization of similarities and differences is provided in a later section (sections 5.1.2 – 5.1.6). I would like to point out at this point that this is not a categorization but merely a clear presentation of the results.

The distribution of the sessions across the individual usage patterns is very uneven and once again illustrates the tendency of the tracking data towards skewed distributions. The first usage pattern *Checking* alone accounted for $n = 79,313$ out of $N = 96,250$ sessions (82.4% of all sessions). This high concentration on one usage pattern shows that large parts of mobile usage behavior can be reduced to a few very common patterns. However, this does not mean that this is necessarily the most relevant usage behavior. It can be assumed that less frequent usage patterns can also be relevant, depending on the usage context (e.g. the duration of use and the apps used). Even if the majority of the sessions can be combined into one strong usage pattern, the data for the other usage patterns show that these differ greatly from the *Checking* pattern, particularly in terms of the duration of use. Accordingly, the previously observed phenomenon of a high number of short usage times or sessions continues here, while at the same time there are considerably fewer but longer usage sequences. Their substantial low occurrence can be seen in Table 6, both in terms of the absolute size of the usage pattern and their share of the total sessions.

(5) The values of the t-values of the predictors, which are the usage times of the respective app category, provide information about the over- or under-representation of the respective app category in the usage patterns. A positive t-value stands for over-representation, while a negative t-value stands for under-representation. To give a concrete example: The negative t-value for the session duration in the *Checking* usage pattern indicates that the session duration in this usage pattern is less pronounced compared to the overall sample. In short, the duration of use for *Checking* is shorter than for the other usage patterns. A more detailed look at the respective characteristics of the app categories per usage pattern is provided later in the description of the usage patterns.

Results

Table 6: Usage patterns size and predictors (t-values)

No.	Usage pattern	Size			Predictors (t-values)							
		Number of sessions	Share of total sessions in %	Share of total duration in %	Session duration	Communication	Social	News apps	Video and Streaming	Music and Audio	Browser	Others
1	Checking	79313	82.4	3.52	-0.007	-0.013	-0.177	-0.042	-0.082	-0.023	-0.082	-0.006
2	Social media & chatting	2656	2.76	18.37	0.042	0.045	2.224	-0.02	-0.011	-0.004	0.011	0.028
3	Quick look into social media	7042	7.32	17.85	0.011	0.009	0.487	-0.039	-0.066	-0.023	-0.063	-0.003
4	Extensive social media usage	518	0.54	10.57	0.139	0.175	8.206	-0.008	0.267	0.046	0.249	0.031
5	Quick browsing	2674	2.78	7.83	0.014	0.015	-0.129	-0.025	-0.077	-0.019	0.818	0.007
6	Browsing & chatting	865	0.9	9.57	0.072	0.342	0.463	0.057	-0.024	0.026	4.464	0.057
7	Music & audio only	538	0.56	2.84	0.03	0.041	-0.11	-0.031	-0.051	3.7	-0.03	0.009

Results

No.	Usage pattern	Size			Predictors (t-values)							
		Number of sessions	Share of total sessions in %	Share of total duration in %	Session duration	Communication	Social	News apps	Video and Streaming	Music and Audio	Browser	Others
8	Short watching & chatting	797	0.83	7.07	0.056	0.049	-0.037	0.007	2.453	0.016	0.019	0.02
9	Medium watching & chatting	439	0.46	7.09	0.109	0.079	0.736	0.006	4.869	0.06	-0.029	0.017
10	Long watching & chatting	256	0.27	8.85	0.241	1.167	0.958	0.443	11.61	0.072	2.692	1.237
11	News apps only	737	0.77	2.31	0.015	0.014	-0.11	1.279	-0.048	-0.027	-0.026	-0.003
12	News apps chatting & browsing	415	0.43	4.13	0.064	0.037	-0.079	6.272	0.258	-0.016	0.261	0.006
Total sample		96250	100	100								

Note: A positive t-value indicates an over-representation of a predictor in this cluster.

(6) In addition to the characteristics of the app categories in the respective mobile usage patterns, the repertoire size is a relevant characteristic. The repertoire size indicates the average number of distinctly accessed apps within the usage pattern. When looking at the entire sample consisting of all sessions, an arithmetic mean of 3.4 and a median of 3 distinct accessed apps can be seen. This relatively low value makes sense in relation to the high occurrence of relatively short sessions and the resulting skewed distribution. The value of the standard deviation supports this assumption. It is therefore hardly surprising that the repertoire sizes of the usage patterns—with the exception of *Checking* - are considerably higher than the value for the entire sample. The values thus indicate that the majority of sessions are attributable to usage behavior based on opening a few applications. At the same time, the data makes it clear that the usage patterns identified here differ greatly and show a much broader repertoire of apps. Given that most usage patterns have longer usage times (see Table 6), it is hardly surprising that longer usage sequences also tend to involve the use of several different mobile applications. Despite these, with the exception of *Checking* - larger repertoires of the usage patterns compared to the overall sample, a look at Table 7 shows that there are also differences in repertoire size between the usage patterns. These will be addressed in detail in the description of the individual usage patterns.

Table 7: Repertoire size of usage patterns

No.	Usage pattern	Mean	Median	SD
1	Checking	3.12	3	1.25
2	Social media & chatting	5.04	5	2.38
3	Quick look into social media	4.38	4	1.9
4	Extensive social media usage	5.69	5	2.88
5	Quick browsing	4.75	5	1.84
6	Browsing & chatting	6.02	6	2.67
7	Music & audio only	3.91	3	1.84
8	Short watching & chatting	4.81	5	2.1
9	Medium watching & chatting	5.21	5	2.45
10	Long watching & chatting	5.75	6	2.85
11	News apps only	4.51	4	1.89
12	News apps chatting & browsing	5.06	5	2.19
	Total sample	3.4	3	1.58

(7) Before we take a detailed look at the individual mobile usage patterns, we turn our attention to the sequence of accessed apps and their categories. To do this, we look at the order of

accessed app categories within the total sample of sessions. In other words, we look at the distribution of the first, second, and third-accessed app categories in the sessions. In 43.31% of cases, a communication app is the first mobile application opened in a session. This high value is not surprising given the frequent but usually short-term use of communication apps and illustrates an information behavior that is strongly related to mobile interaction with others. This theme is continued in the second most frequently used app category, social, which is also based on sharing and receiving user-generated content from others. With music and audio as the third most frequently accessed app category at the start of a usage sequence, it can be assumed that sharing information with others is not the predominant need for information. Instead, it is more likely to be entertainment-related behavior or a more passive information behavior, in the case of podcasts. The frequency of the app categories in the second app opened within a usage sequence is very similar to the first. The frequency of opened app categories only changes in the third position within a usage sequence, and here only in the third place, as the browser category appears here with 5.48%. The data suggests that most usage sessions start with checking the most relevant peer-to-peer communication applications from the communication and social app categories (e.g. WhatsApp, Instagram, etc.) and then end or switch to other app applications.

Table 8: Order of accessed app categories in total sample

Order	App category	Top 3 Apps	Frequency	Share in %
1	Communication	WhatsApp, Telegram, Phone	32535	43.31
1	Social	Instagram, Snapchat, Twitter	11307	15.05
1	Music and Audio	Spotify, Amazon Music, Audible	6520	8.68
2	Communication	WhatsApp, Telegram, Phone	25558	46.6
2	Social	Instagram, Snapchat, Twitter	8700	15.86
2	Music and Audio	Spotify, Amazon Music, Audible	3324	6.06
3	Communication	WhatsApp, Telegram, Phone	16834	42.9
3	Social	Instagram, Snapchat, Twitter	6613	16.85
3	Browser	Chrome, Ecosia, Brave	2150	5.48

(8) In addition to the order of the mobile applications accessed in a session, we also look at the most frequent transitions between two applications. Specifically, we look at the frequency of two consecutive mobile applications accessed by participants in the overall sample. Here, Table 9 shows that the most frequent pairing is from communication app to communication

app, which indicates that the communication apps that are already frequently opened are also opened very regularly, one after the other. This also applies to the applications in the social app category, which also occur as a transition with the second highest frequency. Also interesting is the third and fourth most common transition, which runs once from a social to a communication application and also frequently occurs in reverse order. This indicates a relatively frequent switch between these two app categories. Also noteworthy is the occurrence of 1.8% of transitions in the form of communication to browser applications. This could be due to the opening of links sent to them or to behavior independent of this, but this cannot be said conclusively on the basis of the available data. Nonetheless, looking at the transitions between the mobile applications provides a better understanding of the usage behavior of Fridays for Future supporters in the sample studied. By showing that the most frequent transitions take place within app categories and changes between app categories occur much less frequently. However, it can be assumed that this pattern is also due to the uneven distribution of the apps accessed.

Table 9: Top 10 diads of app categories

Transition	Frequency	Share in %
Communication Communication	93474	40.21
Social Social	38154	16.41
Communication Social	12838	5.52
Social Communication	9719	4.18
Browser Browser	9570	4.12
Video and Streaming Video and Streaming	8774	3.77
Music and Audio Music and Audio	7926	3.41
Others Others	6382	2.75
Communication Browser	4198	1.81
News apps News apps	4082	1.76

In summary, the analysis of the sessions of the entire sample of Fridays for Future supporters shows that there are clear differences in the frequency of smartphone use between individuals and days. Furthermore, supporters use their smartphones very frequently, reflecting the high amount of screen time. The differences in the ratio of views to usage time are also striking, with mobile applications in the communication category in particular being characterized by a high number of accesses and low usage time. While this ratio is relatively stable for applications in the social category and is even reversed for categories such as video and streaming. With regard to the use of the app categories over the course of the day, the data indicates a

high need for information in communication apps, while news consumption via news apps is concentrated in the morning. The analysis also shows an uneven distribution of usage patterns, with the *Checking* pattern accounting for a significant proportion of sessions. The average app repertoire of the sample is relatively small, but almost all usage patterns have a significantly broader repertoire of apps. In addition, communication apps are often the first category accessed in a session, highlighting a strong link to mobile interaction with others. This is also reflected in the frequency of transitions between the apps opened, with transitions from communication to communication app being the most common variant.

After this general consideration of the entire sample, we now look at the individual usage patterns identified by means of cluster analysis and categorize them according to size, over- and under-representation of the predictors, duration, repertoire size, and the order and transitions within these usage patterns. This characterization is also illustrated using a selected session as an example of the respective usage pattern. The thematic ordering of the usage patterns, which I already presented, is used here based on frequency of occurrence.

5.1.2 Checking

I named the first and largest cluster *Checking* ($n=79313$). This first almost homogenous cluster is characterized by the short duration of use of individual applications within the session, indicated by an underrepresentation of all predictors, as well as by a very short overall duration of use of the session (see Table 6). This means that the use of communication apps, social media, news apps, video & streaming applications, music & audio apps, as well as browsers and other apps, is shorter compared to the other clusters. Accordingly, this cluster differs on the basis of the short-term nature of its use. The short duration of use of this session type is probably directly related to the frequent occurrence of this usage pattern, which accounts for almost 83% of the total sessions studied (see Table 6). It is likely that this pattern of use is the brief checking of smartphone applications—mostly communication or social media applications—for new events, which could explain both the short duration and the frequency of the pattern of use.

The repertoire size of the *Checking* usage pattern comprises the number of different apps accessed and is $M = 3.10$ for this usage pattern. This is the lowest value compared to all other usage patterns and is even below the average of the entire sample. Accordingly, it can be assumed that a few very specific mobile applications are used within the *Checking* usage pattern. The small repertoire size once again emphasizes the short-lived nature of this usage pattern, which is mainly geared towards checking a few apps for new information or new messages.

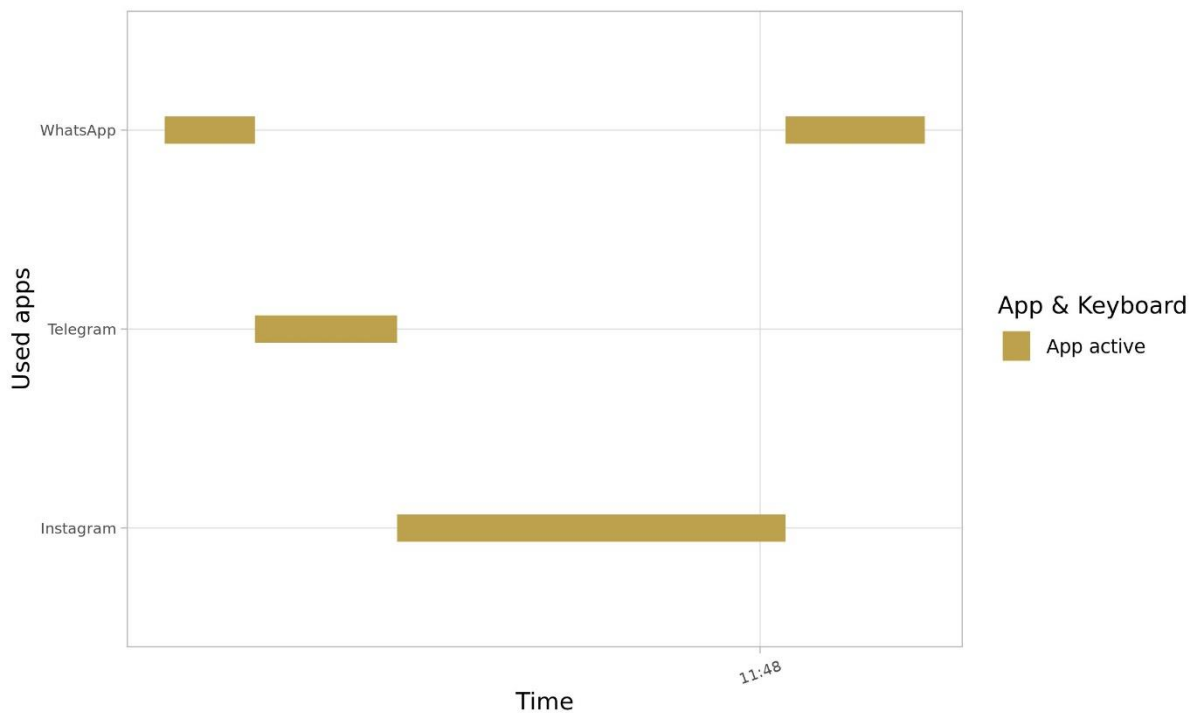
A closer look at the order of the *Checking* usage pattern is unsurprising given that this usage pattern comprises the majority of the sessions examined. The *Checking* usage pattern shows

an almost identical order of open mobile applications at the start of a sequence as the entire sample (see Appendix 1 – Ranks per usage pattern). In more than 46% of all sessions, the first app category opened was a communication application. The second and third most common app categories opened at the start of a session are Social and Music and Audio, which account for 11% and 9% of sessions, respectively. This order remains with only slightly different values for the second, third, and fourth open apps within the session. The high presence of communication and social applications again points to the checking nature of the usage pattern, which is mainly limited to briefly checking the most common peer-to-peer communication applications.

This assumption is also confirmed once again by looking at the app-to-app transitions in the usage pattern (see Appendix 1 – Diads per usage pattern), with 57% of sessions representing the most frequent transition from communication to communication app. This is followed at a considerable distance by the second most frequent transition from social to social (6%) and, in third place, music and audio to music and audio (5%).

The short duration of use of the individual applications as well as the total duration are also reflected in the visual representation of an exemplary session from this cluster (Figure 5). The visualization shows the app used in the session on the y-axis, while the time is shown on the x-axis. The beige bar marks the active time period of the respective app.

Figure 5: Example for Checking usage pattern



The example visualized in Figure 5 clearly shows that switching between multiple applications within a relatively short session, in this case about 1.5 minutes, is a typical pattern for this type

of mobile usage behavior. What is interesting here is the rapid switching between the apps, which only remain active for a handful of seconds before the application is switched. The small repertoire of mobile applications used within the session is also striking. The example shows that only three different applications are used, which belong to two app categories (communication, and social app-category).

In addition to the small repertoire size already discussed, the example also shows the order of the apps accessed. Here, the session begins with opening WhatsApp, which is a communication application, then moves on to another communication app, namely Telegram, before going on to the social network Instagram. The app-to-app transitions that we discussed earlier also become clear here.

To summarize, *Checking* is a frequent but brief usage pattern that involves frequent and rapid swiping between multiple applications, with a small repertoire of mobile applications and frequent starting and transitioning to communications and social apps.

5.1.3 Social media & chatting

The second cluster is called *Social media & chatting*, which is completely homogenous and a medium-sized cluster ($n=2656$) with a share of just under 2.8% of sessions, although this usage pattern is still relatively common. This cluster stands out in terms of social media app usage. The duration of use of social media apps is strongly overrepresented compared to all other clusters, while the use of communication apps as well as browsers and others is slightly overrepresented. All other app categories are underrepresented in this usage pattern. Accordingly, it can be assumed that these two app categories in particular make up a relevant part of the usage pattern. Within this usage pattern, communication and social mobile applications such as WhatsApp and Instagram play an important role.

At the same time, the total session duration is overrepresented, indicating a longer usage time than the average session. This assumption is confirmed when looking at the mean value ($M = 18.17$ minutes) and the median (median = 13.88 minutes), both of which are above the average of the sample (see Appendix 1: Overview usage pattern). However, the values for the duration of use of the sessions within the usage pattern appear to vary considerably, as the standard deviation is relatively high ($SD = 22.14$). Overall, this usage pattern ranks in the middle in terms of duration.

In terms of repertoire size, it can be seen that, on average, slightly more than five distinct apps are used within the *Social media & chatting* usage pattern. This value is considerably higher than that for the *Checking* usage pattern described above, although this seems plausible due to the longer usage time within the *Social media & chatting* pattern. This repertoire size is relatively large compared to the other usage patterns, some of which have far longer usage

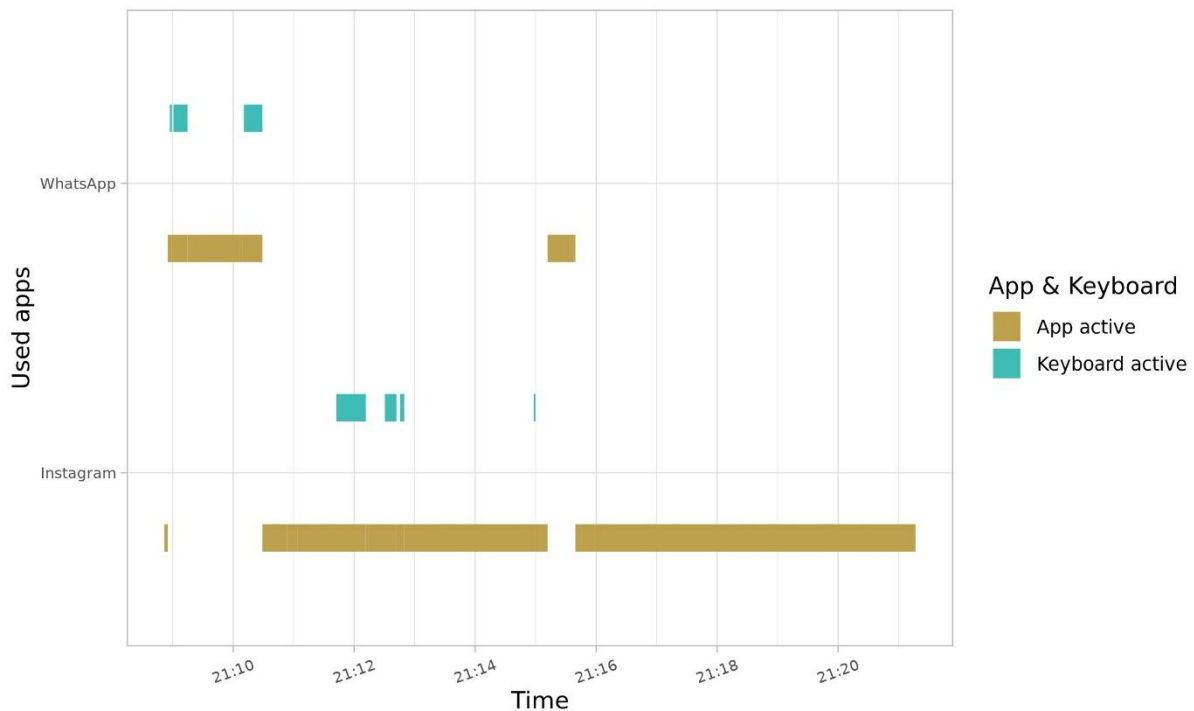
times. Accordingly, this could be an indication that a relatively large number of different mobile applications are used within the *Social media & chatting* usage pattern, whereby the number of different applications accessed does not appear to increase proportionally with longer session durations.

When looking at the order of the *Social media & chatting* usage pattern, it is relatively obvious that social and communication applications occur very frequently. The *Social media & chatting* usage pattern differs from the entire sample in terms of the frequency of the order in which mobile applications are opened at the start of a sequence. In more than 40% of all sessions, the first application category opened was a social application. The second and third most frequently opened app categories are communication and music & audio, accounting for 33% and 5% of sessions, respectively. Accordingly, these are the same app categories that are opened at the beginning, but their distribution differs greatly from the previous usage patterns and the overall sample. This order is changed by the addition of the browser application, but the values remain the same, with the values for the second, third, and fourth apps opened within a session differing only slightly. The presence of social media applications is correspondingly strong, which indicates a more peer-to-peer and entertainment-driven information behavior.

This assumption is also confirmed by a look at the app-to-app transitions in usage behavior, with 40% of sessions representing the most frequent transition from social to social apps. This is followed at some distance by the second most frequent transition from communication to communication (24%) and in third place by social to communication (10%). This reflects the dominance of social media applications in this usage pattern, although these are supplemented by communication applications. The consistent presence of communication applications in usage patterns on the smartphone appears to be a common phenomenon.

The aforementioned characteristics of the *Social media & chatting* usage patterns are reflected in the visual representation of an exemplary session from this cluster (Figure 6). The visualization shows the app used in the session on the y-axis, while the time is shown on the x-axis. The beige bar marks the active time period of the respective app. The teal bar indicates an active keyboard.

Figure 6: Example for Social media & chatting usage pattern



The visual observation of an exemplary usage pattern (Figure 6) shows, on the one hand, only two applications used, of which Instagram is active most of the time as a social media app. In this example, including the keyboard, which also counts as an app application, results in a slightly smaller repertoire size than the average for this usage pattern. This is reflected in the relatively long usage time of the entire session, which at just over 13 minutes corresponds almost exactly to the median of the sample.

Not only is the total duration of the session relatively long, but so is the usage sequence of Instagram, which is only sporadically interrupted by WhatsApp. One notable detail is that the first mobile application opened was Instagram, but this was almost immediately abandoned and WhatsApp was opened. This could indicate that Instagram was opened as a previously opened application immediately after unlocking the smartphone, but the actual reason for using the mobile device is WhatsApp, which is accessed instantly, and the active keyboard indicates writing messages. Accordingly, the relatively frequent transition from social to communication is also reflected here in the example. Instagram is then used, whereby the relatively low use of the keyboard is striking, which may be an indicator for scrolling through the feed or staying on a post.

In summary, the *Social media & chatting* cluster is characterized by the dominant use of social media applications, which is partly accompanied by the sporadic use of communication apps. The pattern is also characterized by a medium-average useful life compared to the other usage

patterns. The strong presence of social media and communication applications is also reflected in the order and frequency of transitions.

The third cluster is called *Quick look into social media*, which is completely homogenous, and the third largest cluster ($n=7042$), which is roughly 7.4% of the sessions. This cluster also stands out in terms of the use of social media apps, which are distinguished by a shorter duration of use compared to other clusters. This is evident from the strong overrepresentation of social media apps compared to all other clusters, with a simultaneous underrepresentation of almost all other predictors. Accordingly, the use of social media apps is relevant for the cluster's characterization. At the same time, the total session duration is slightly overrepresented, which indicates a comparatively short total session duration. Similar to the *Checking* cluster, this could be due to the shorter duration of the usage pattern, indicating, in particular, a quick check of social media apps for a new event. Specifically, the usage pattern would likely include a quick scroll through the most recent posts in the feed before ending the usage pattern. Accordingly, the participants use their smartphones in this way for a short time but frequently.

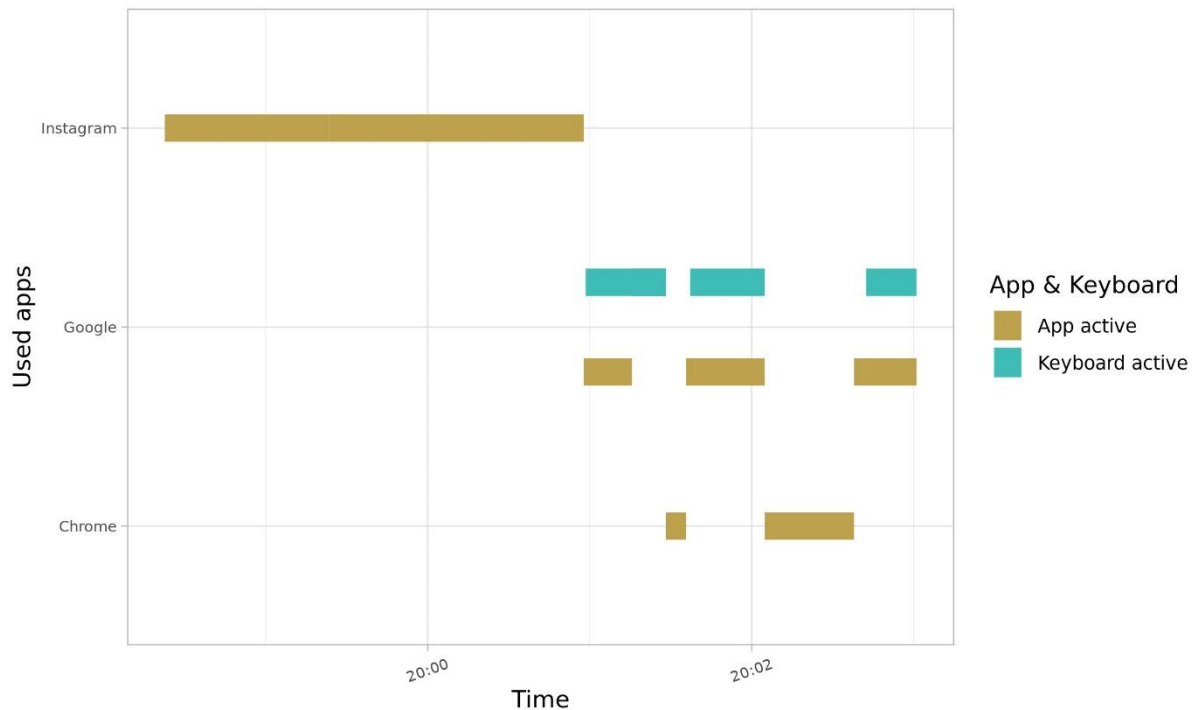
However, with $M = 4.38$ distinctly used apps, the *Quick look into social media* usage pattern has a slightly larger repertoire size than the *Checking* pattern. However, this value is still the third lowest in comparison to all other usage patterns, and it can therefore be assumed that the use of different apps is relatively limited and targeted.

The targeted opening of a few mobile applications is also reflected in the order of the applications accessed within the sequence. The basic pattern here is similar to that of the social media usage pattern already presented, as the applications accessed first come largely from the social category (44%) and the communication category (33%) and thus cover the majority of sessions. This pattern also continues in the distribution of app categories in the second and third opened applications, with only the third most common app category varying slightly. The presence of social media applications in this usage pattern is correspondingly strong.

Against the background of the order of the opened apps, the most frequent transitions between the app categories only represent the logical continuation of the strong social media focus that characterizes this usage pattern. The most common transition here is from social to social applications at 36%, with the second most common transition also being from communication to communication applications at 29%. When looking at these values, the occurrence of the combination of the communication and social categories in the third and fourth most frequent transitions, in the form of communication to social (11%) and the reverse variant (7.6%), seems unsurprising. Overall, these values indicate a strong focus on the use of social media applications, which is also evident from the high overrepresentation of the category in the usage pattern, although this is supplemented by short but frequent sections on the use of communication

apps. This is indicated by the frequent occurrence of the communication category in the order as well as the transitions in this usage pattern.

Figure 7: Example for Quick look into social media usage pattern



A look at the visualization of an example session of the cluster shows that the total duration of the usage pattern is relatively short, at just under four minutes. The usage time within the example is mainly divided between Instagram, at just under 2 minutes, as well as Google and Chrome. The relatively small repertoire size of the usage pattern is also evident in this example, where only Instagram, Google, Chrome, and the keyboard are used. The session starts with opening Instagram; the app remains active for most of the session before switching to Google or Chrome, respectively, and the keyboard becomes active (Figure 7). The combination of a search engine with the use of the keyboard indicates a search behavior, but whether this can be directly attributed to the previous Instagram use cannot be said on the basis of this data.

Nevertheless, the *cluster Quick look into social media* can be characterized by the relatively short use of social media apps, which is supplemented by the brief but frequent use of communication applications. Basically, the usage patterns have a relatively small repertoire size, which is also reflected in the dominance of the frequency of these fewer applications in the occurrence of transitions. In a nutshell, this usage pattern could be described as the social media version of the *Checking* pattern.

I name the fourth-cluster *Extensive social media usage*, which is not homogenous and a relatively small cluster (n=518). The name of the cluster is derived from the most pronounced use

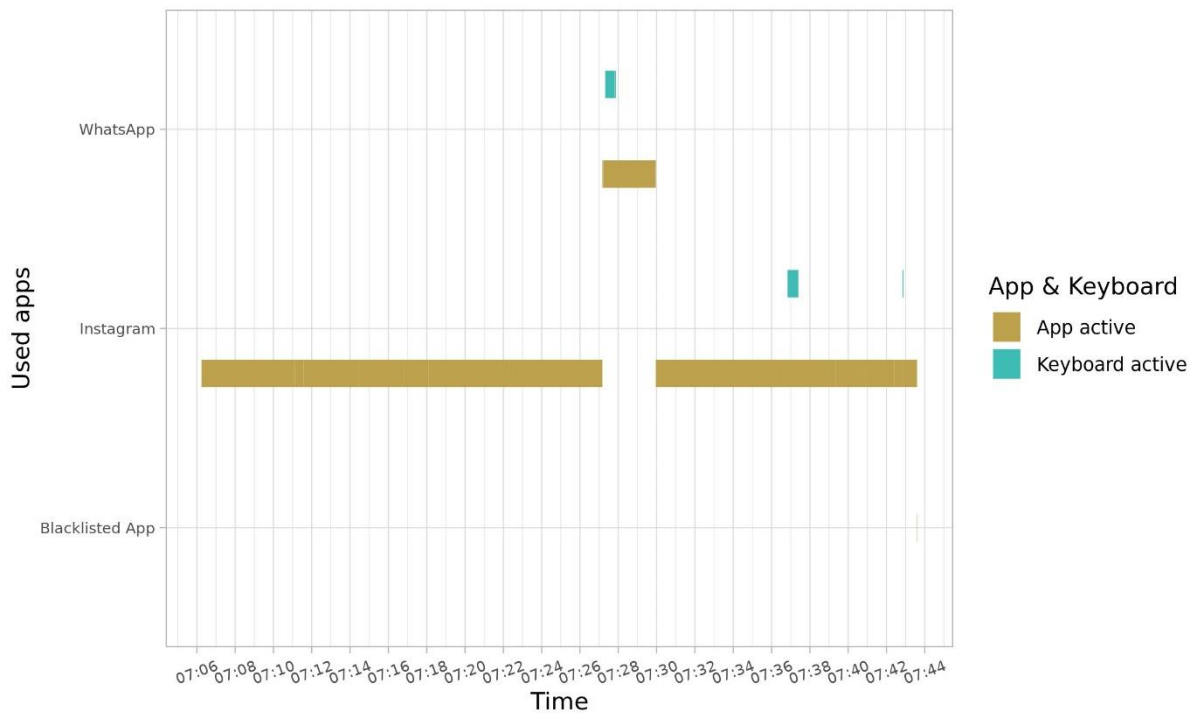
of social media combined with the second longest session duration ($M = 53,6$ minutes; $SD = 48,1$ minutes). Communication, video & streaming, music & audio, browsers, and other applications are also overrepresented in this cluster, but are overshadowed by the very high values for social media. The very long duration of use of this pattern is reflected in the relatively low frequency. With just under 0.5% of the sessions examined, the occurrence of this usage pattern is rare. This usage pattern differs from the other social media patterns, especially in the high usage time, which may be an indicator of extensive scrolling through the feed or watching multiple video posts. Despite the infrequent occurrence of the usage pattern in comparison with the sessions of the entire sample, it can be assumed that some participants exhibit this usage behavior several times a week.

The long duration of this usage behavior is also reflected in the relatively large repertoire of apps used, with an average $M = 5.69$ and $SD = 2.88$. The relatively large repertoire indicates that several different app applications are used over the course of a long period of time, although the focus of use is on social media applications. As a result, long social media use is very likely to be interrupted by shorter episodes of other app use.

This assumption is supported by the distribution of app categories in the first, second, and third positions of opened apps within the sequence of a session. In terms of the distribution of the apps opened first, the social category accounts for the largest share at around 38%, while communication apps make up 33% of cases. This pattern also remains when looking at the mobile applications opened second and third. Here, the percentages shift somewhat, although the social category always remains the most common option.

The expectation that this usage pattern is characterized in particular by long periods of social media use, which are interrupted by frequent but short sequences of use of communication applications, is reinforced by the evaluation of the most frequent transition between app categories. The most common transition, with around 43% of sessions, is the switch from one social application to another social application. The second most common transition is again from communication to communication application (21.7%), while the third most common transition is from communication to social (9.2%). The overall view reinforces the impression that the majority of the usage time within this usage pattern is spent on social media applications, which are interrupted by short sequences of using communication applications such as Telegram or WhatsApp.

Figure 8: Example for Extensive social media usage usage pattern



The visualization of an example shows the long duration of use of the overall session, which is dominated by an almost continuous and very long use of the social media application Instagram (Figure 8), which is opened at the beginning of the session and remains active for almost 40 minutes with only one short interruption. The actual expected size of the app repertoire is not clear in this example; nevertheless, a number of different app applications are used with WhatsApp, Instagram, an application recoded for privacy reasons, and the keyboard. Instagram accounts for the absolute majority of usage time. The order in which the apps opened first and second, and their transition, is also reflected in the visualization of the example. Instagram is opened first, followed by a switch to the communication app WhatsApp, before the transition back to Instagram takes place.

Accordingly, the cluster *Extensive social media usage* is characterized by the extensive and long duration of use of social media applications mentioned in the designation. In addition, this usage pattern has a relatively large app repertoire. Despite the large number of apps used, the majority of usage time is spent using social media applications, which are interrupted by short sequences of communication applications.

5.1.4 Browsing

The fifth cluster, *Quick browsing* is characterized by the overrepresentation of browser applications ($n=2674$; 2,8%) and is completely homogenous. The cluster name is derived from the average total session length combined with the strong presence of browser apps, which is the third strongest compared to all other usage patterns. In addition, the usage pattern shows a

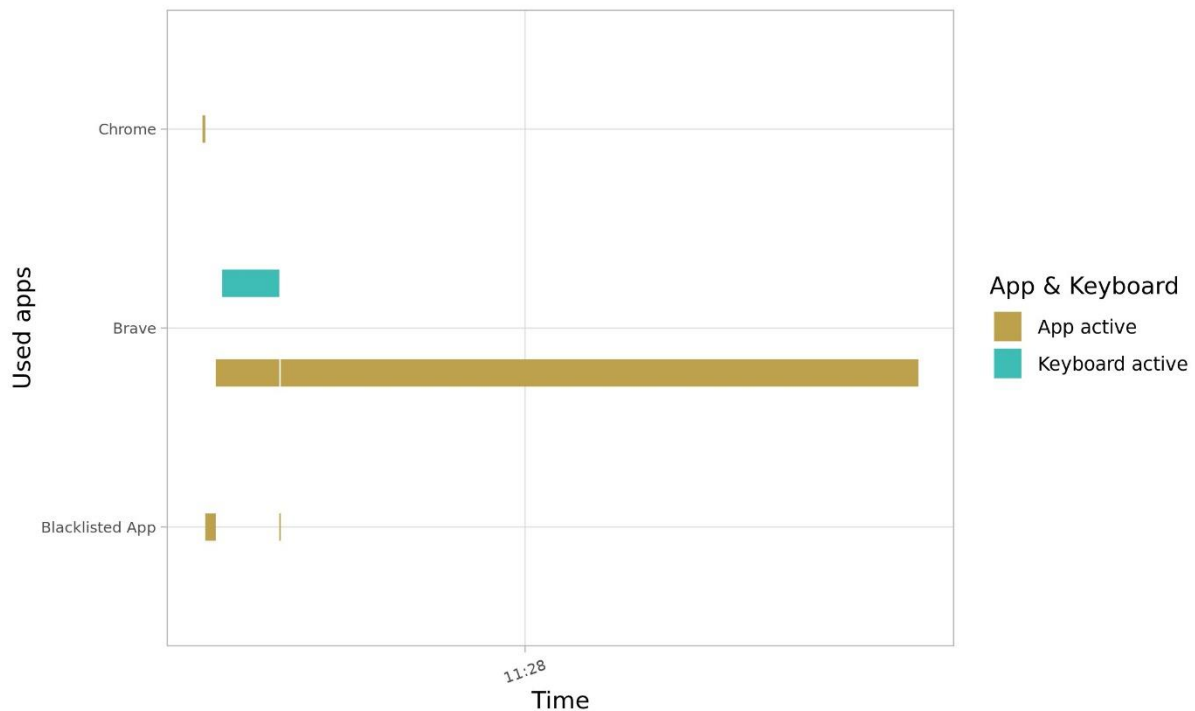
slight overrepresentation of communications applications. Accordingly, the usage pattern is characterized by a strong focus on browser applications, which are supplemented by shorter sequences of communication applications. In terms of usage time, this usage pattern is slightly above average, with a median of 4.7 minutes and a mean of 7.7 minutes, where the values appear to vary more strongly. ($SD = 10.3$). Accordingly, this is also a relatively short period of time, which is mainly taken up by the use of browser applications.

Given the slightly above-average duration of use, the number of distinctly used apps is also rather average ($M = 4.75$, $SD = 1.84$). This suggests that not many other applications are used in addition to the browser application and shorter accesses to social or communications applications. Accordingly, the size of the repertoire is in line with the assumption that this usage pattern is a shorter search using a browser application to which messenger and social media applications are also checked for updates.

This reading is supported by looking at the order in which mobile applications are accessed in this usage pattern. The apps accessed first are communication (29%), browsers (22%) and social applications (7%). The situation is reversed for the second most accessed application, with browser (34%), communication (23.8%) and social (5.5%) coming first. This order continues for the application that opened in third place. These results indicate that the sequence often begins with the opening of a communication application, which is also the case in most usage patterns, and then the browser application is opened. This could indicate that checking for the latest updates is a continuous usage pattern that is followed by the actual focus of the usage pattern, which has a longer usage period – in this case, browsing.

This is also reflected in the consideration of transitions from one application to another. Here, the switch from the communication to the communication category is the most common form of switch (32.3%). Switching from the browser to the browser category (24.8%) is the second most common variant. In third place is the transition from communication to browser application (8.4%).

Figure 9: Example for Quick browsing usage pattern



The visualization of an example session shows the underlying pattern, which starts with the opening of a browser application—in this case, Brave—which is initially accompanied by an active keyboard, which is later not in use. This pattern can be seen as indicative of a search behavior in which the participant performs a brief web search and, through the initial use of the keyboard, enters their search input and then views the corresponding search results. Furthermore, the rather short nature of the usage pattern is evident, the duration of which is dominated by the use of the browser application. In this example session, the occurrence of communication and social applications is not evident.

Overall, *Quick browsing* is a short to average-length usage session that is primarily filled by the use of browsing apps. Furthermore, this usage pattern is characterized by an average repertoire size, which is due to the frequent occurrence of social and communication applications. This usage pattern often begins with the use of a communications application, which is also reflected in the frequency of transitions within this app category.

The sixth cluster – *Browsing & chatting* – is almost homogenous and smaller than the previous cluster, accounting for about 0.9% of the sessions ($n=865$). The cluster is characterized by the strongest overrepresentation of browser usage, which is accompanied by a lower but nonetheless considerable use of social media and messengers. Accordingly, this usage pattern differs from the previous *Quick browsing* pattern in particular due to the clear emphasis on the social and communication categories. Furthermore, *Browsing & chatting* have a much longer duration of use than the previously presented usage pattern ($M = 29$ minutes, $SD = 30.9$

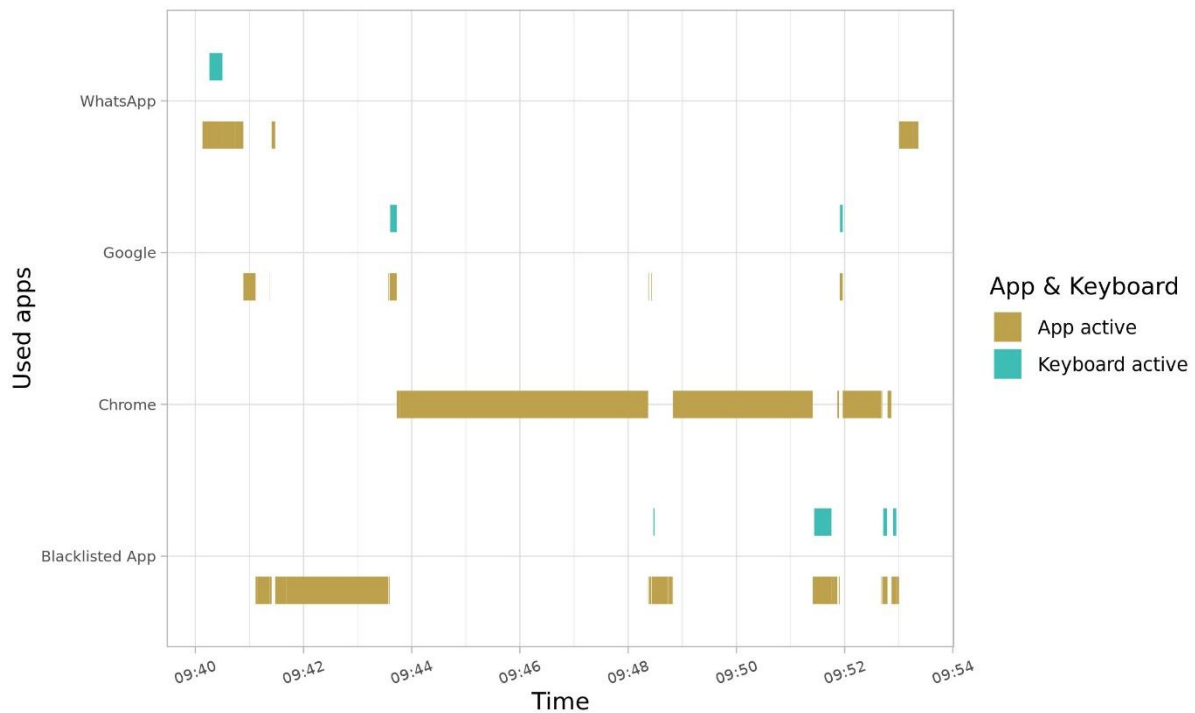
minutes). Accordingly, it can be assumed that this relatively long usage pattern is strongly dominated by the presence of browsing applications, with both communications and social media applications accounting for a relevant proportion of usage time.

The relatively long duration of the usage pattern is also reflected in the high number of mobile applications used, which indicates a comparatively large repertoire ($M = 6.02$, $SD = 2.67$). Against this background, it can be assumed that in addition to the use of browser applications and the almost ubiquitous communication applications and social media, other shorter usage sequences are covered by other app applications.

Due to the high presence of communication applications in this usage pattern and the existing findings regarding the distribution of applications opened one after the other within a session, it is not surprising that communication applications (28.3%), browsers (17.48%) and social (14.86%) fall under the first opened application. This sequence continues with the distribution of the application opened in second place and only reverses with the mobile applications used in third place. In third place among the applications opened one after the other within the sessions of the usage pattern, the distribution of apps changes, with browsers (28.43%) taking the largest share, while communication (25.14%) and social (14.97%) continue to have relevant shares. Against this background, the finding that a frequent start to a smartphone usage sequence is the opening of a communications application continues.

The most frequent transition in the *Browsing & chatting* usage pattern is the change from browser to browser application (20.21%), while the transition from communication to communication (19.92%) is almost identical. Nonetheless, the frequent occurrence of switching from browser to browser indicates that it is a continuous and ongoing browser use; the extent to which this is search behavior or the reception of text or video content cannot be determined at this point.

Figure 10: Example for Browsing & chatting usage pattern



When looking at the visualization of an example of the usage pattern (Figure 10), it becomes clear that these are usage patterns that are largely filled by browsing applications. This also shows the relatively long usage time, which in this example, however, is below the average value for the usage pattern. Furthermore, browsing applications are not the only applications used, as social media and especially communication apps, such as WhatsApp in this example, are also used. The example also shows that WhatsApp, from the category of communication applications, is used at the beginning of the sequence. It is difficult to say to what extent the change between the applications used is directly related. In addition, the change between different applications can be seen well in the example. The teal bar marks the use of the keyboard, which could be possible search inputs in the context of browser use.

In summary, the *Browsing & chatting* usage patterns are relatively long usage sequences with a high proportion of browser apps, which go hand in hand with the appearance of social media and communication apps. The characteristically long duration and high presence of browser and communication applications are also reflected in the order of the apps opened one after the other and their most frequent transitions, in which browser and communication applications in particular take up relevant proportions.

5.1.5 Audio, video & streaming

The seventh and almost homogenous cluster, *Music & audio only*, covers roughly 0,56% of all sessions and is relatively small (n=538). This cluster differs from all other clusters regarding

the usage of music and audio applications. Music and audio apps are strongly overrepresented, with the highest value compared to all other clusters, with simultaneous underrepresentation or average representation of all other app categories. The average total duration of this usage pattern is in the lower middle range ($M = 13.8$ minutes; $SD = 34.95$ minutes) and is therefore rather shorter compared to the other usage patterns, although there are clearly shorter usage patterns. In terms of usage time, the duration of use of the music and audio applications ($M = 10.46$ minutes, $SD = 35.77$ minutes) accounts for the largest share of the total duration of the usage pattern. This result suggests that these sessions are primarily used to play or pause music and other audio content. It should be emphasized that only use with the screen switched on was recorded by tracking and is shown accordingly in the session. Therefore, the cluster reflects the interaction with audio applications, e.g., selecting songs, pausing, or playing, and not the actual duration of listening to audio content and music.

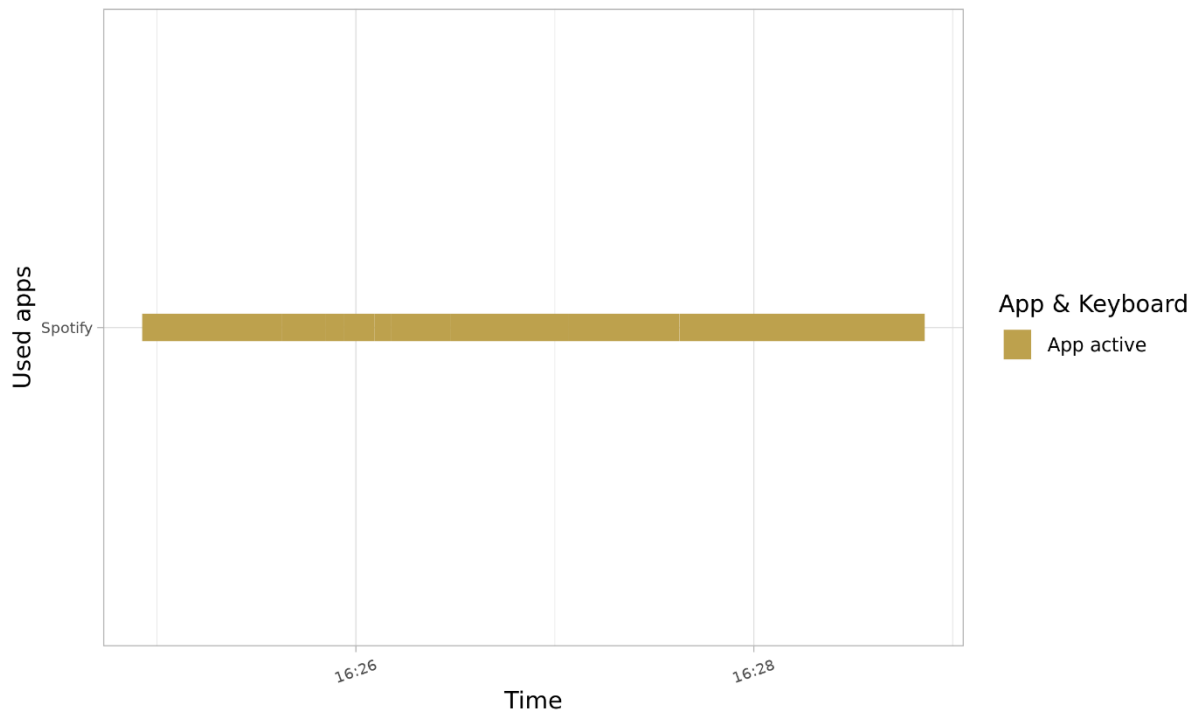
The almost exclusive focus on music and audio applications in combination with the comparatively shorter duration of use is also reflected in the average number of distinctly used app applications within this pattern ($M = 3.91$; $SD = 1.84$). This small repertoire size indicates a very specific behavior with regard to this usage pattern, which is reflected in the low number of applications used and the strong presence of audio and music applications. Accordingly, this usage pattern appears to relate mainly to the use of music and audio applications, and almost no other mobile applications are used.

This interpretation is also supported by looking at the order of the apps opened one after the other within the usage sequence. Here, more than half of the sessions examined begin with a music and audio application (53.36%), slightly less than a quarter of the sessions begin with a communication app (23.01%) and slightly fewer with a social media application (7.31%). This order is also maintained for the second and third consecutively opened applications. This means that the *Music & audio only* usage pattern is one of the few behavior patterns that is less strongly characterized by frequent but short-term access to communications applications. Instead, there is a clear focus on music & audio applications, which are most likely used to manage the current playback.

The high relevance of music & audio applications for this usage pattern is also reflected in the most frequent transitions from one app to another. This shows that the most frequent transition is from one music & audio application to another or to the same music & audio app (42%), meaning that almost half of all transitions within this usage pattern are between music & audio applications. In addition, around a quarter of transitions are between communications and communications applications (25.99%) and a small proportion are from a communications app to a music & audio application or vice versa (7.8% and 5.92%). In summary, it can be said that

almost every transition within this usage pattern includes at least one audio & music application.

Figure 11: Example for Music & audio only usage pattern



This is also reflected in the visualized example session (Figure 11), as only one audio & music application was active, in this case Spotify, which was active for the entire usage period of just around four minutes. It is not possible to tell from this data whether audio content was consumed before or after the session using the Spotify application running in the background with the screen locked.

In summary, the *Music & audio only* usage pattern reflects the interaction with audio applications when the screen is active. This usage pattern has a comparatively short duration, which is characterized by the strong dominance of music & audio applications. This is also reflected in the order in which the mobile applications are opened and the transition between the individual apps, in which music & audio applications play the most relevant roles.

The eighth cluster is called *Short watching & chatting*, which is completely homogenous and a medium-sized cluster ($n=797$). This cluster stands out in terms of video & streaming app usage. The duration of use of video & streaming apps is strongly overrepresented compared to all other clusters, with all other predictors, except use of the social apps' category, slightly overrepresented. At the same time, the total duration of sessions is only slightly overrepresented, which indicates an average duration of use compared to the following usage patterns ($M = 23.3$; $SD = 15.9$). At this point, it should be noted that the duration of use is in the medium range compared to all other usage patterns but is short in direct comparison with the two other

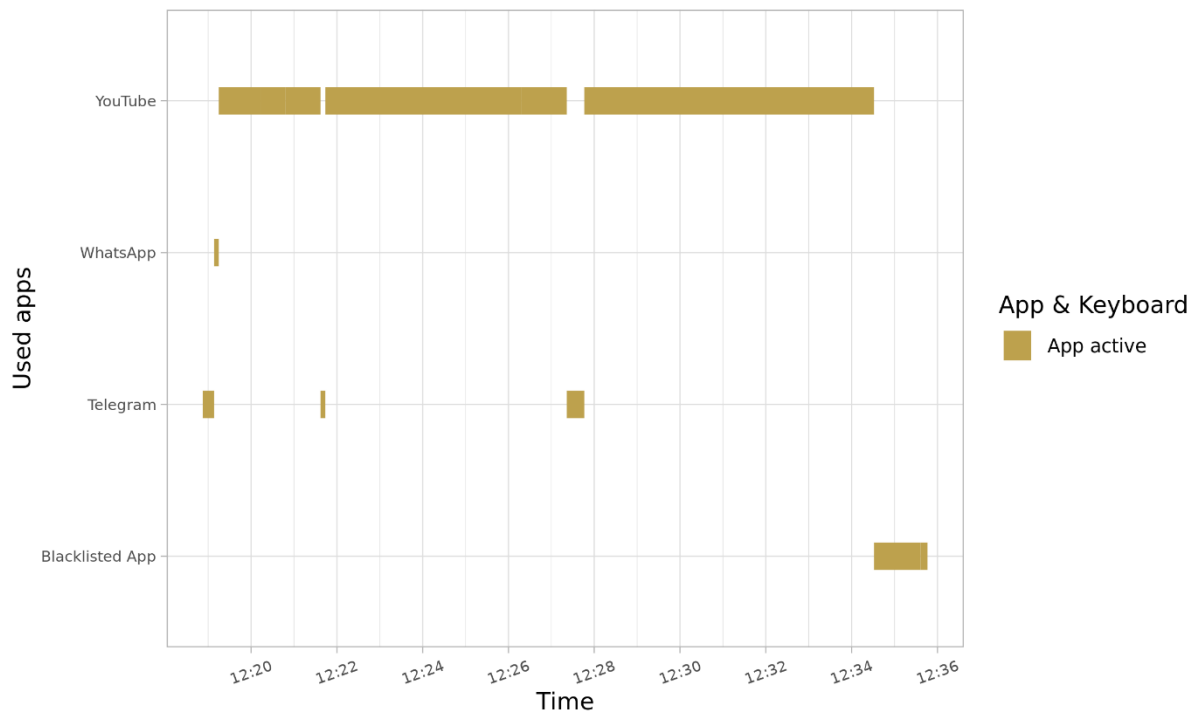
video & streaming usage patterns. This usage pattern therefore differs from other patterns, which also focus on video & streaming applications. In the usage patterns that are characterized by video & streaming applications, the clear distinction between usage sessions of different lengths—short, medium, and long—becomes particularly clear.

The average duration of use is also reflected in the number of distinct apps used, which is also in the mid-range ($M = 4.81$; $SD = 2.1$). Accordingly, it can be assumed that other mobile apps are used in these sessions in addition to video & streaming applications. Here, the slight overrepresentation of other categories within this usage pattern indicates that no specific app categories are accessed but that a wider range of applications are used. However, given the size of the repertoire mentioned, these will tend not to be used all together but individually in a session.

In terms of the order in which the apps are opened at the start of a usage sequence, this picture is only partly true. In terms of the app opened first, the analyzed sessions have both video & streaming (36.35%), communication (29.79%) and social (11.15%) app categories. This order continues, with the proportion of the video & streaming categories increasing for both the second and third apps opened (47.12%; 43.89%). Given the underrepresentation of the social category in this usage pattern, a lower occurrence of this app category in the order would have been expected. However, the data here seems to indicate that the app was opened during a short period of use, as otherwise the social app category would have been overrepresented. This could be an indicator of the phenomenon already frequently seen in other usage patterns: communications and social media applications are usually checked for updates at the start of a session.

The distribution in the order in which mobile applications are opened one after the other continues with regard to the most frequent transitions from one app to another. Here, the most frequent transition is from video & streaming to the video & streaming category (30.34%), the second most frequent transition in the sessions is from communication to communication (28.02%) and the third most common transition is from communication to streaming & video (7.29%). This supports the assumption that, in addition to the focus on the use of video & streaming offers, a relatively short period of time is also spent on checking the communications applications, at the end of which the user switches to the video & streaming application. The extent to which there is a direct connection between the switch from communication to a video & streaming app, for example, due to a received link to YouTube or TikTok, cannot be determined with certainty at this point but remains a possibility.

Figure 12: Example for Short watching & chatting usage pattern



If we look at an example from this cluster (Figure 12), it becomes clear that the video & streaming application YouTube accounts for the majority of usage, which is only interrupted by individual and brief uses of other apps. The example also shows the medium duration of use as well as the start of the sequence with the opening of the Telegram communication app.

In summary, video & streaming apps are mainly used for a medium period of time, probably watching video content. The moderate length of the sessions is also reflected in the moderate size of the repertoire. Furthermore, the usage pattern is characterized by the high presence of video & streaming applications, which are often opened after the use of communication applications.

The ninth cluster is called *Medium watching & chatting*, which is almost homogenous and a medium-sized cluster ($n=439$; 0,46%). Like the previous cluster, *Medium watching & chatting* is characterized by a strong overrepresentation of video & streaming applications. Almost all app categories are also slightly overrepresented, with the exception of the browser category. In contrast to the previous usage pattern, the social media category is also overrepresented in this pattern, which indicates a greater influence of social media applications on the formation of the usage pattern. The difference to the previous usage pattern lies primarily in the longer duration of use of this pattern, which is indicated by the above-average duration of use compared to the total sessions ($M = 42.45$; $SD = 22.59$).

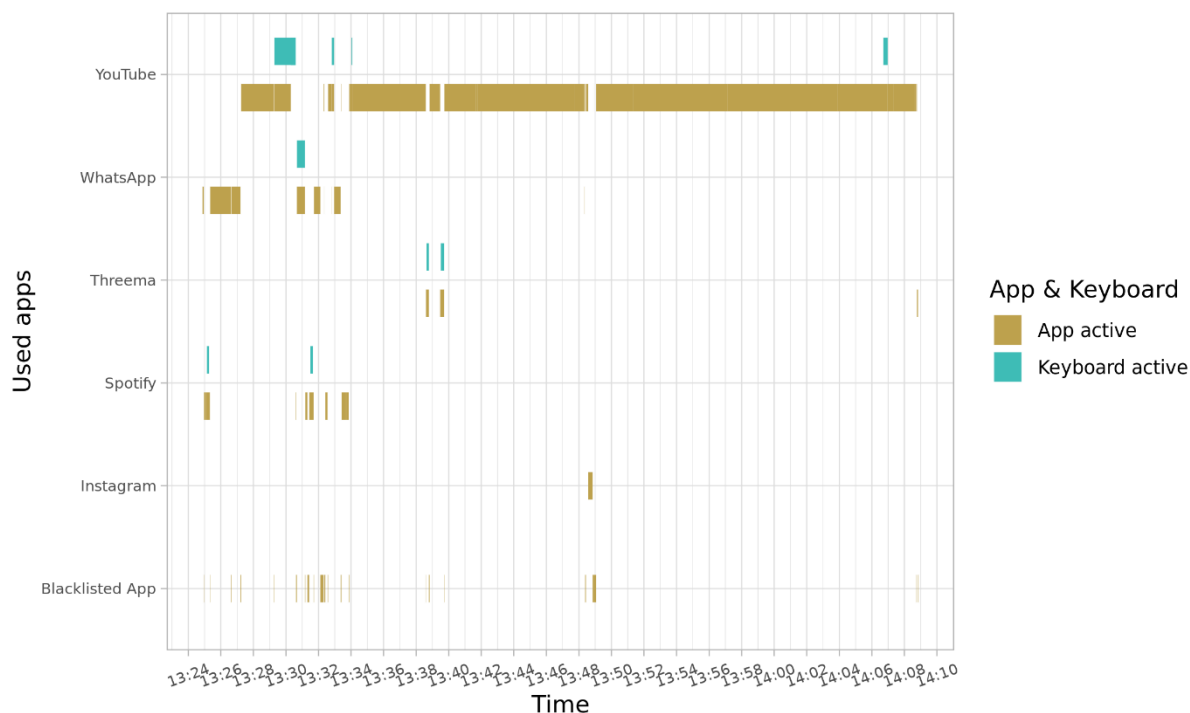
The relatively long duration of use of the *Medium watching & chatting* usage pattern is also reflected in the relatively high number of distinct apps used within the sessions ($M = 5.21$; SD

= 2.45). The number of mobile applications used within this usage pattern is in the upper range compared to the other usage patterns, which thus illustrates the relatively wide range of apps used.

When looking at the order of the apps opened one after the other within the session, the already known phenomenon can be seen that communication applications (30.48%) make up a high proportion of the app categories opened first. In this case, it accounts for the largest share by a very narrow margin, with almost a third of sessions starting with video & streaming applications (29.52%) and slightly fewer sessions starting with the social category (14.05%). This order is reversed for the second app to be opened, with considerably more sessions featuring video & streaming applications (40.94%), while communication (30.97%) and social apps (15.49%) remain almost unchanged. This ranking also remains the same when looking at the third app opened within the session.

The high presence of video & streaming applications in this usage pattern is also reflected in the most frequent transitions. Here, the most frequent transition is the change from video & streaming to a video & streaming application (31.66%), whereby it is not possible to distinguish whether it is the same app or a different application within the category on the basis of these values. As already noted in the other usage patterns, the transition from communication to communication application is a frequent case (20.87%), this also applies to the switch from one social application to another social app (12.42%). These values indicate a high presence of video & streaming applications within this usage pattern, which are, however, more frequently interrupted by the use of other mobile applications. Communication and social apps in particular appear to be frequent reasons for interrupting the use of video & streaming services.

Figure 13: Example for Medium watching & chatting usage pattern



The longer duration of use of video & streaming applications is also reflected in the visualized example session, in which YouTube takes up the largest share of the session duration with more than half an hour (Figure 13). Furthermore, the high number of different apps can be seen, which is exemplary for this usage pattern. In the example, a whole series of different applications are called up, but they are only active for short periods of time before the use of the video & streaming app YouTube is resumed.

In summary, it can be said that the usage pattern of the *Medium watching & chatting* is mainly characterized by the longer duration of use of video & streaming services, which are, however, supplemented by the shorter use of a whole range of different app categories – including social media apps.

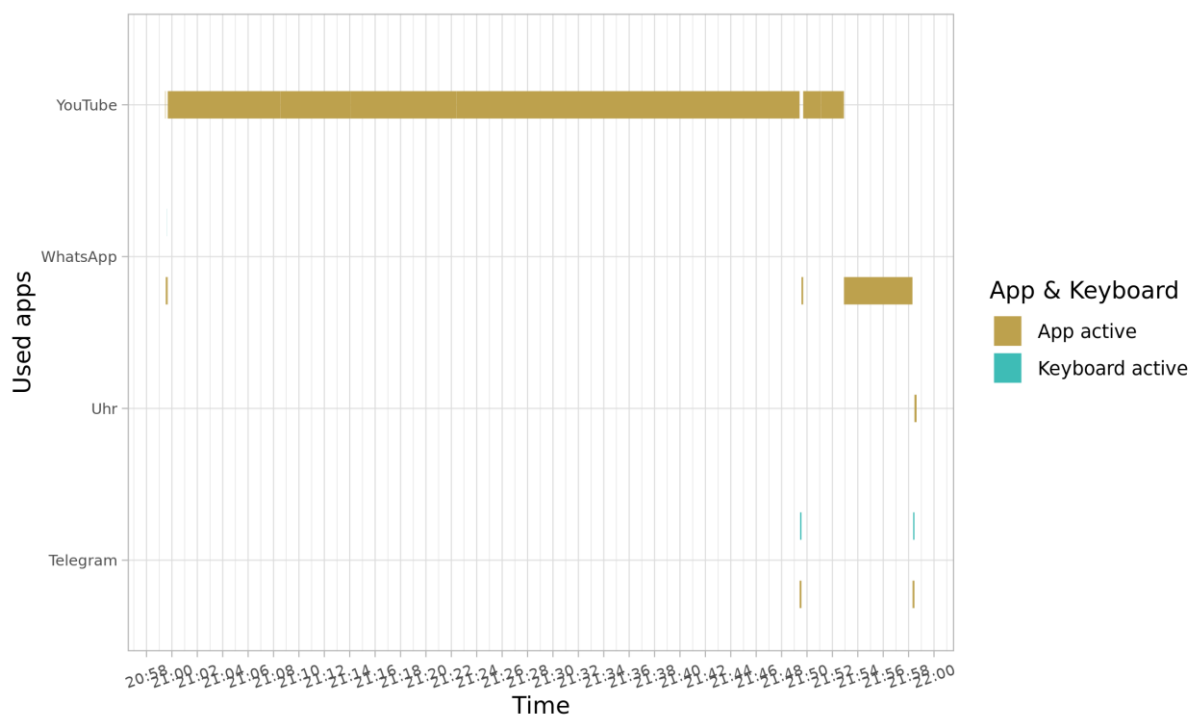
The tenth cluster – *Long watching & chatting* – is comparably small ($n=256$; 0,27%). Like the two previous clusters, this cluster is characterized by the strongest overrepresentation of video and streaming use. This cluster is particularly impressive due to the very high value of video and streaming usage, which is also reflected in the longest session durations ($M = 90.82$; $SD = 55.84$) and the associated lowest frequency compared to all other clusters. In addition to the strong presence of video & streaming applications, all other app categories are also slightly to strongly overrepresented, which speaks for a wider range of different apps used. The relatively strong presence of communication and browser app usage is particularly striking. Accordingly, this cluster is initially characterized by a high use of video & streaming services, which are supplemented by medium periods of browser and communication use.

The wide range of app categories used within this usage pattern, already indicated in the t-values, is also reflected in the high value for the distinct used apps (M = 5.75; SD = 2.85). Accordingly, both the characteristics of the t-values (see Table 6) and the repertoire size indicate the use of a large number of different apps within the long usage period of this pattern.

However, this range of apps used appears to be less pronounced at the beginning of the usage sequence, where most sessions start with a communication app (31.85%), a video & streaming app (27.02) or an app from the social category (13.31%). The ratios swap somewhat for the second most opened app, where most sessions start with a video & streaming app (35.19%), a communications app (27.04) or a social app (14.16%). When looking at the ratios of which app categories are among those opened at the start of a usage session, it is striking that communications applications and social apps are always included. These two app categories are then usually supplemented by the app category most present in the respective usage pattern, in this case the video & streaming category. Nevertheless, opening and checking communications apps such as WhatsApp or Telegram, as well as social media, appears to be a recurring and probably habitualized behavior.

This observation can also be transferred to the transitions between apps, where communications to communications applications (20.56%) and from social to social apps (9%) are also represented, with the largest share for the Long watching & chatting pattern being the transition from video & streaming to the same (32.81%).

Figure 14: Example for Long watching & chatting usage pattern



The unusually long usage times of video & streaming applications can also be seen in the presentation of an example session from the cluster. Figure 14 shows the continuous and, with just under an hour, very long use of YouTube, which is interrupted by short usage sequences of communications applications, in this case WhatsApp and Telegram. Furthermore, the example shows that this session begins with the opening of the WhatsApp communication app, which is closed again after a short time, and the switch to YouTube takes place.

Accordingly, this usage pattern is characterized by a very long usage time for video & streaming applications. This characteristic is complemented by others, such as the large repertoire size and the emergence of communications and browser apps, which, to a lesser extent, make up the usage duration of this pattern.

5.1.6 News apps

The eleventh cluster is called *News app only*. The cluster is completely homogeneous and comprises just under 0.77% of all sessions examined, making it a small cluster (n=737). The name is derived from the strong overrepresentation of news app use compared to other cluster solutions. In addition to news app usage, the communication app category is also slightly overrepresented but is overshadowed by the high value of news app usage time. The average usage time for the *News app only* is in the lower range compared to the other usage patterns (M = 8.24 minutes; SD = 7.88 minutes). Accordingly, it can be assumed that, similar to *Checking* or a *Quick look into social media*, this is something in between a brief check for updates and a detailed examination of news content (Figure 15).

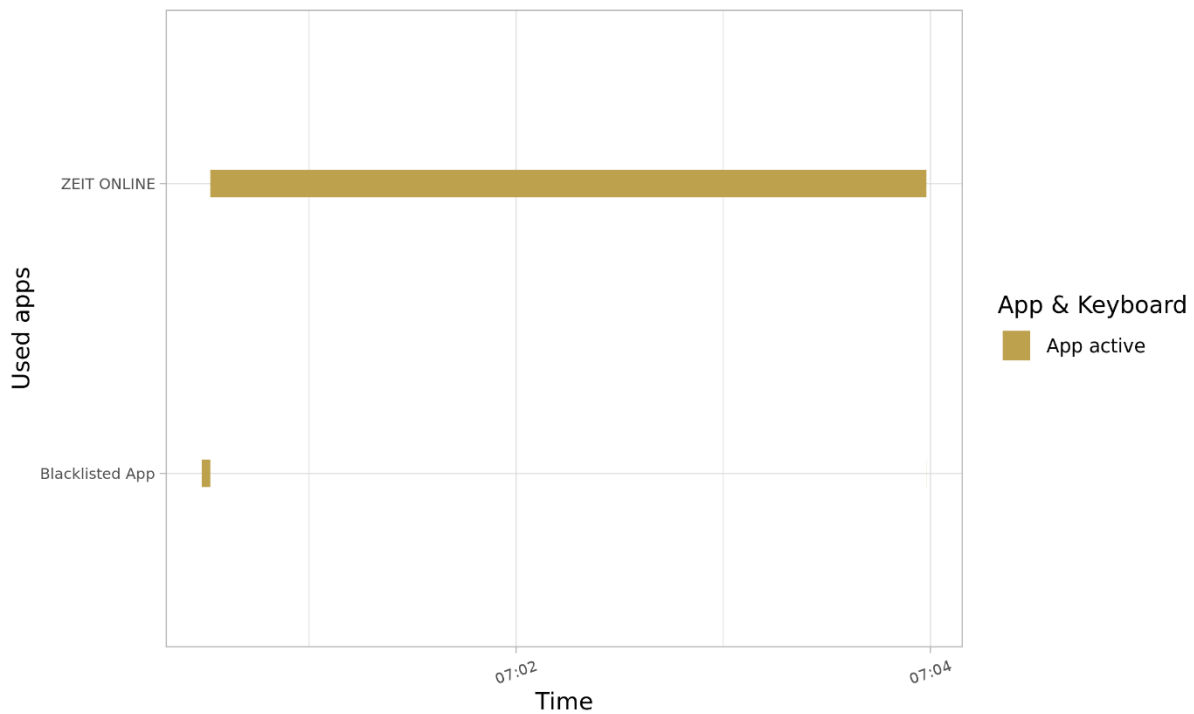
The relatively specific orientation of this usage pattern is also reflected in the comparatively smaller repertoire size, which shows a lower number of distinct apps used within this pattern (M = 4.51; SD = 1.89). Against this background, it can be assumed that mainly news apps and communication applications are used, which are partially supplemented by the use of other applications.

The strong focus of the usage pattern on news applications is also reflected in the sequence of apps opened one after the other within the usage session. The first app category opened at the start of a session is news apps (41.26%), communication (28.51%) and social (6.45%). This order and the distribution of frequencies remain identical or similar for the second and third opened apps. Accordingly, these values support the assumption that this usage pattern revolves strongly around the use of news applications, which are partly supplemented by the already-known phenomenon of checking communication applications.

This interpretation is also supported by the distribution of transitions from one app to another, with the most frequent transitions being from news app to news app (29.77%), from communication to communication application (25.32%) and from communication to news app (8.25%).

In particular, the transition from communications applications to messaging apps can either represent the relatively widespread phenomenon of checking messenger applications for news with a subsequent change to the actually intended behavior or cases in which links or other clues received in messenger are followed up in depth. Unfortunately, the mere analysis of tracking data cannot provide conclusive clarification here.

Figure 15: Example for News apps only usage pattern



When looking at a visualized example from the cluster, it becomes clear once again that almost no other apps are used in the context of news applications. Furthermore, the example shows a relatively short session duration, which is almost entirely accounted for by the use of the news app Zeit Online. In terms of the order in which the apps are opened one after the other, this example does not provide a particularly good picture of the actual distribution, as a black-listed app is opened at the beginning of the usage period.

Accordingly, the *News apps only* can be summarized as a relatively short to medium-length use of messaging applications, which can also be characterized by the occurrence of communications applications and a rather low number of distinct apps. Furthermore, sessions of this usage pattern often begin directly with the opening of a news app or, in rarer cases, with a communication application.

The twelfth cluster, *News apps, chatting & browsing*, is not homogenous and relatively small ($n=415$; 0,44%) and shows the strongest overrepresentation of news app usage compared to all other clusters. In contrast to the previous cluster *News apps, chatting & browsing* is characterized by a higher usage time ($M = 26.15$ minutes; $SD = 26.19$ minutes) as well as the

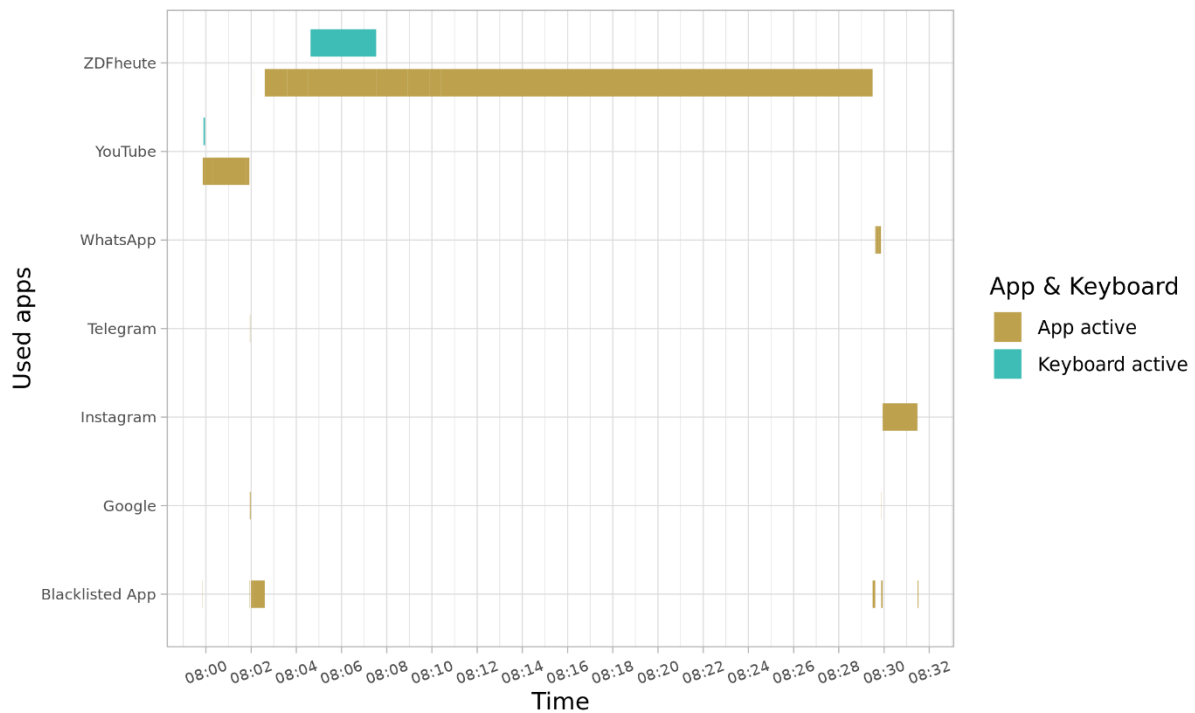
additional use of other applications, mainly video & streaming, browsing, and communication applications. The heavy use of news apps is accompanied by browsing and some use of communication apps, which could be an indicator of further online search behavior as well as forwarding or receiving political information through communication apps. However, this cannot be conclusively confirmed with this data.

An average number of distinct apps are used in the usage pattern compared to the other usage patterns considered ($M = 5.06$; $SD = 2.19$). This is hardly surprising given the rather average length of the usage pattern and the relatively large number of at least slightly overrepresented app categories, which illustrates the larger app repertoire within this usage pattern.

Despite the significantly more pronounced app repertoire of the *News apps, chatting & browsing* usage patterns, the order of the mobile applications opened one after the other at the start of the session does not differ significantly from the previous *News apps only* usage pattern. Most sessions within this usage pattern also start with news apps (44.72%), followed by communications apps (27.39%) and social apps (5.53%). This order also continues with slight deviations in the frequencies for the second and third opened applications, which corresponds to the identical order of the previous usage pattern.

The strong focus of the usage pattern on the use of news apps is also reflected in the most frequent form of transition from app to app, which includes from news app to news app (39.68%) as well as communication to communication (13.87%) and communication to news apps (6.85%). The values show that a large proportion of the transitions between different applications fall into the news category, which is consistent with the over-representation of this category. The previously expressed assumption of a possible connection between the observed behavior between the previous use of messenger applications and the subsequent opening of news apps is also reflected in the data. This is a first indication, but a real mechanism or the motivation behind this pattern of behavior cannot be determined at this point.

Figure 16: Example for News app, chatting & browsing usage pattern



The visualization in Figure 16 of an example is only of limited help here, since communication applications (e.g. WhatsApp) were opened after the news application (ZDF heute). However, we are missing a concrete reference to the sharing of content within WhatsApp. Nevertheless, we can state that this usage pattern is characterized by the prolonged use of news applications in combination with communication and browsing apps.

In summary, the *News apps, chatting & browsing* usage patterns can be characterized by a relatively medium duration of use and a correspondingly high number of distinct apps, in which news apps and communication applications account for a large proportion of the total session duration and the transitions between applications.

5.2 RQ 2: Information repertoires of supporters of Fridays for Future in Germany - Results

The prevailing media landscape enables many different ways of obtaining information. Accordingly, it is very likely that the supporters of Fridays for Future do not receive all relevant political information exclusively via their smartphones but have other sources of information at their disposal. As a next step, we create so-called information repertoires in order to get a more comprehensive picture of information use, both in terms of the sources used and the context of use. We expand our previous knowledge of mobile usage patterns to include analogue media use and the assessment of the relevance of the respective information sources. By incorporating mobile usage patterns into the formation of information repertoires, the surveyed sup-

porters can be assigned information repertoires based on their more accurate behaviors depicted in the mobile sessions. In this way, a higher level of information is retained, which would be lost with other types of analysis. Due to the fact that the session data of the mobile tracking only provides information about the use of information on the smartphone, these were supplemented by the results of the survey on other media use. Accordingly, a K-medoids cluster analysis was carried out considering the previously calculated mobile information usage patterns as well as the information sources and devices used in the survey.

The clusters obtained through this approach offer insights into the diversity of information sources, their frequency of use, and their perceived relevance in shaping opinions among supporters. Due to the initial uncertainty regarding the number of clusters, I determined the most suitable number using GAP statistics and Within Groups sum of squares (WSS), both of which suggested the presence of three clusters (see Appendix 1: Optimal number of clusters). The squared Euclidean distance served as the distance measure, and K-medoids clustering was employed as the clustering algorithm (Park & Jun, 2009). I verified the cluster solution through discriminant analysis (Schendera, 2010), achieving an 88% correct assignment rate, which is considered a favorable outcome (Appendix 1: Validation of cluster analysis – discriminant analysis). The calculation of the F-value indicates the presence of three nearly homogeneous clusters (Backhaus, 2016) (Appendix 1: Validation of cluster analysis – F-scores).

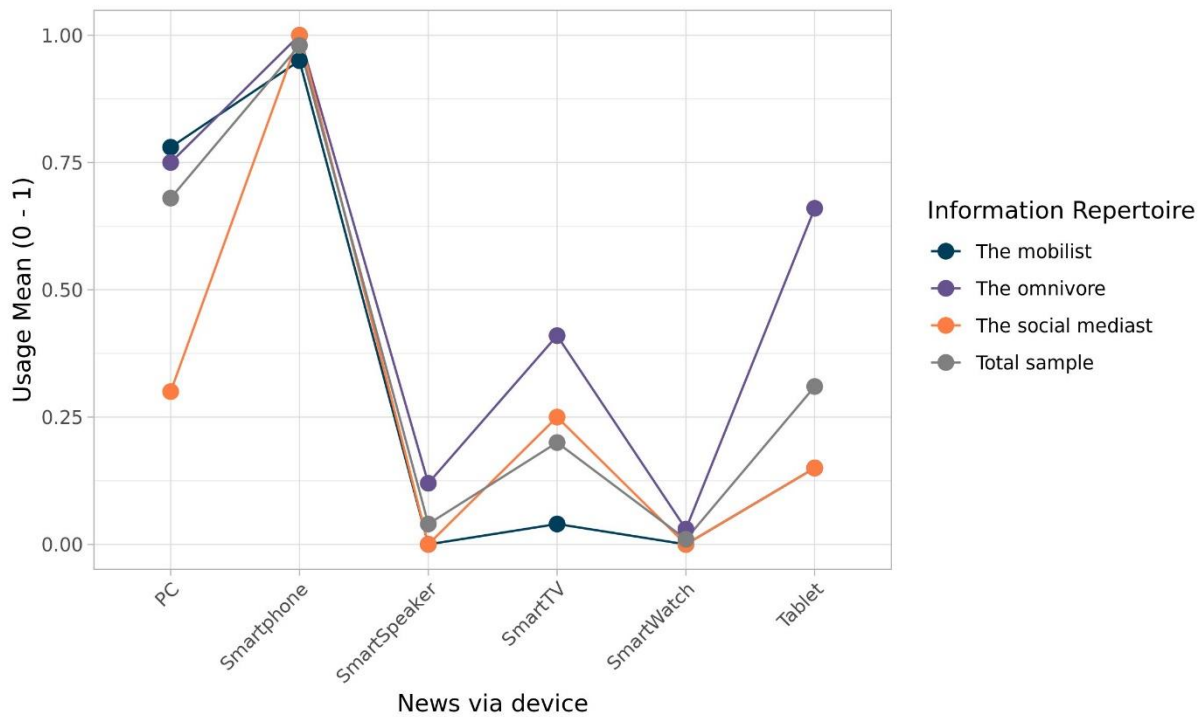
5.2.1 Overview information behavior total sample

In the following, we first look at the entire sample in order to gain a better understanding of the distribution and characteristics of the data available in this thesis, as well as the first overarching findings. The identification of information repertoires is based on a total of $N = 25$ supporters of Fridays for Future who took part in both the survey and automated mobile tracking. Three participants had to be excluded for whom tracking data was available, but no survey data was available. In this thesis, I identified three different information repertoires: the *Mobilist*, the *Omnivore*, and the *Social mediast*. In the course of answering the second research question (1) we first look at the devices used for information in order to identify other potential devices that are used to receive information in addition to the smartphone. (2) In the second step, we look at the distribution of usage patterns that we have previously identified based on the tracking data to get a better understanding of smartphone usage per information repertoire. (3) We also analyze the information sources used on the basis of the survey. (4) In addition to the question of which devices and sources are used, we also address the question of which of these sources are classified as relevant for forming one's own opinion. After this rather general look at the devices and sources used to get political information, we will turn to other relevant constructs. (5) Here we first take a look at the socio-economic variables such as age, gender, education, and social status, which helps us to get a better understanding of the broader social

and individual economic context of the supporters of Fridays for Future and their information repertoires. (6) Additionally, we also consider other political predispositions as relevant constructs, including *political interest* and orientation as well as *opinion leadership* and *certainty*. We first consider the points listed in relation to the entire sample before characterizing each information repertoire on the basis of these.

(1) With increasing technological development, it is possible to receive political information and news via a variety of different devices (Figure 17). For the sample of Fridays for Future supporters studied, the smartphone plays a particularly prominent role ($M = 0.98$; $SD = 0.08$; range from 0 to 1, where 0 indicates that the device has not been used to receive news in the last week and 1 indicates the opposite option). This very high value compared to the other devices surveyed, which are used to access news, illustrates the great relevance of the smartphone for information behavior and the corresponding information repertoires. Furthermore, this is also an important finding from a methodological perspective, as mobile tracking is considered a relevant and suitable method. Apart from the smartphone, the PC has the second highest value for the entire sample ($M = 0.68$; $SD = 0.33$). Although the value is considerably lower than that of the smartphone and also shows a greater variance within the respondents, it can be assumed that the computer is a relevant device for accessing news content, at least for some of the supporters of Fridays for Future. In addition to the smartphone and the PC, both the tablet ($M = 0.33$; $SD = 0.43$) and the SmartTV ($M = 0.2$; $SD = 0.3$) are devices used by some of the Fridays for Future supporters surveyed to access news. However, these are used significantly less than the smartphone and PC. Accordingly, it can be assumed that the use of a tablet and SmartTV only plays a subordinate role in the composition of information repertoires. In addition to the devices already mentioned, the use of smart speakers and smart watches was also surveyed, which were hardly used at all in the sample surveyed. In summary, for the Fridays for Future supporters surveyed, both the smartphone and the PC are the relevant devices for accessing news and political information. While the tablet and smart TV are still relevant devices for some, both smart speakers and smart watches are of little to no importance.

Figure 17: News via devices per information repertoire



(2) We have already established that the smartphone is the most common device for accessing political information and news. We have already identified different smartphone usage patterns for the sample of Fridays for Future supporters, the frequency of which per participant was used as a predictor for determining the information repertoire. These different patterns of mobile usage behavior have different characteristics, including the categories of apps used and how long they are used. The usage patterns include: *Checking*, *Social media & chatting*, *Quick look into social media*, *Extensive social media usage*, *Quick browsing*, *browsing & chatting*, *Music & audio only*, *Short watching & chatting*, *Medium watching & chatting*, *Long watching & chatting*, *News apps only*, and *News apps chatting & browsing*. The distribution of usage patterns within the sample is uneven, with the pattern of *Checking* accounting for a large proportion. At this point, I will not go into the characteristics and distribution of the usage patterns and the associated sessions within the sample. A more detailed description of the usage patterns can be found in the previous section.

Results

Table 10: Share of usage patterns as a percentage of total repertoire sessions

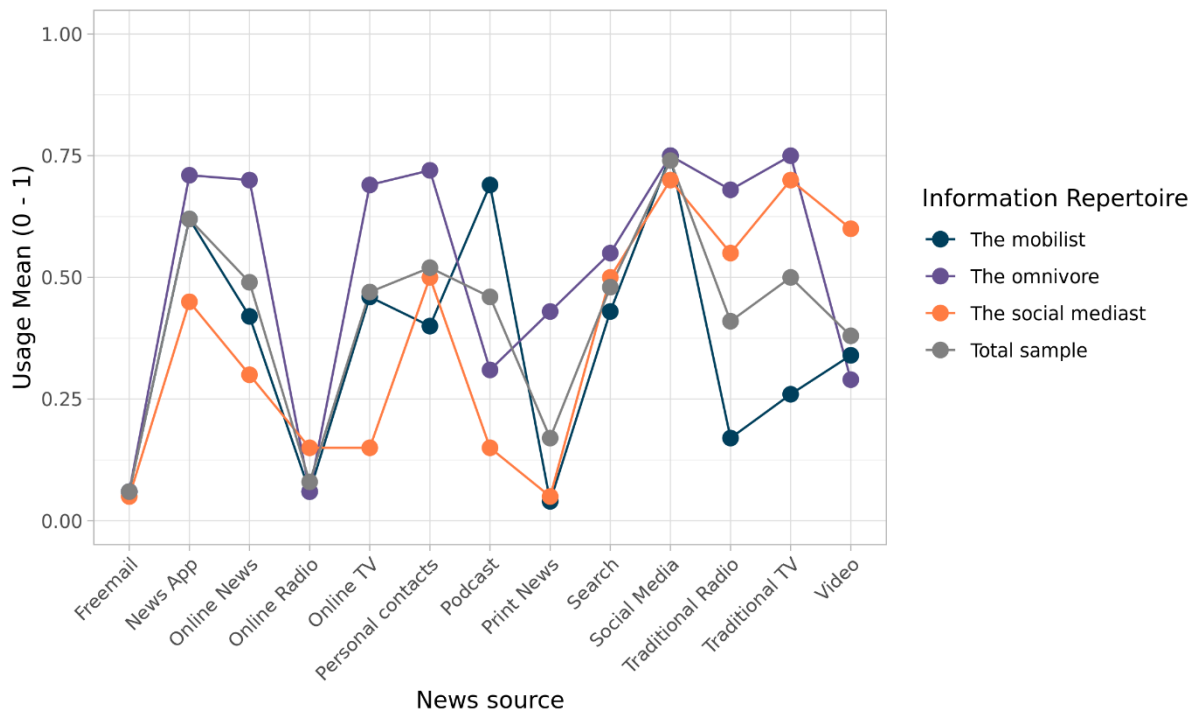
Usage Pattern	The Mobilist	The Omnivore	The Social mediast
	In %	In %	In %
Checking	86.31	79.12	78.83
Social media & chatting	1.86	3.42	3.63
Quick look into social media	5.51	9.57	8.45
Extensive social media usage	0.27	0.63	0.81
Quick browsing	2.04	4.94	2.74
Browsing & chatting	0.54	1.69	0.72
Music & audio only	0.38	0.29	1.05
Short watching & chatting	0.56	0.05	1.8
Medium watching & chatting	0.29	0.03	1.01
Long watching & chatting	0.27	0.05	0.4
News apps only	1.2	0.19	0.42
News apps chatting & browsing	0.76	0.02	0.14
Total	100	100	100

(3) The survey data once again shows the high relevance of digital communication with regard to sources of political information. The supporters of Fridays for Future in this sample state that social media ($M = 0.74$; $SD = 0.37$) is the most frequently used source of political content. Accordingly, social media is more relevant than news apps ($M = 0.62$; $SD = 0.4$), which is the second most common source of information for the supporters surveyed. Accordingly, a large proportion of respondents receive their political information via social media as well as news apps that can be accessed via smartphone. In addition to these purely digital sources of information, personal contacts play an important role as a source of information ($M = 0.52$; $SD =$

0.35), although it is not conclusively clear whether the information is transmitted face-to-face or digitally. For the relatively young supporters of Fridays for Future, traditional TV use ($M = 0.5$; $SD = 0.44$) and the digital version of online TV ($M = 0.47$; $SD = 0.36$) are only the fourth most popular sources of information. This is directly followed by a digital information source. Firstly, online news ($M = 0.49$; $SD = 0.41$), i.e., the websites of established news outlets, is another relatively frequent source of information. Searching for information on the internet using a search engine ($M = 0.48$; $SD = 0.38$) fits into the existing picture here as a relevant source. The relevant role of audio formats as a source of information is also interesting, with podcasts ($M = 0.46$; $SD = 0.43$) standing out as the most important source. While traditional radio ($M = 0.41$; $SD = 0.41$), which is received via a traditional radio device, does not play such an important role as a source of information. This also applies to video platforms such as YouTube and TikTok ($M = 0.38$; $SD = 0.39$), which also do not play a major role as a source of information for the Fridays for Future supporters surveyed. In contrast to the information sources already listed, print news ($M = 0.17$; $SD = 0.31$), the websites of FreeMail providers ($M = 0.06$; $SD = 0.18$) and online radio ($M = 0.08$; $SD = 0.19$) have virtually no relevance as sources of information for the sample studied.

The high number of information sources used indicates that the respondents have a relatively broad repertoire of different sources. Digital sources of information play a particularly important role here, with social media and news apps being the most frequently used sources. However, this focus on digital information sources is fragmented by the many different digital information offerings, which differ only marginally in their frequency of use. Accordingly, the values can be represented mentally in a distribution that resembles the body shape of the diplodocus. The Diplodocus is a flat-eating dinosaur with a long neck, a massive body, and a low tail. Following this image, a few very frequently used information sources are located on the head and neck of the Diplodocus, while a large proportion of the moderately used and mostly digital information sources are located on the body, and some less used and more traditional information sources are distributed on the tail of the dinosaur. Accordingly, Fridays for Future supporters have a strong focus on digital information sources, with a few frequently used sources and a wide range of moderately used ones.

Figure 18: Information source per information repertoire



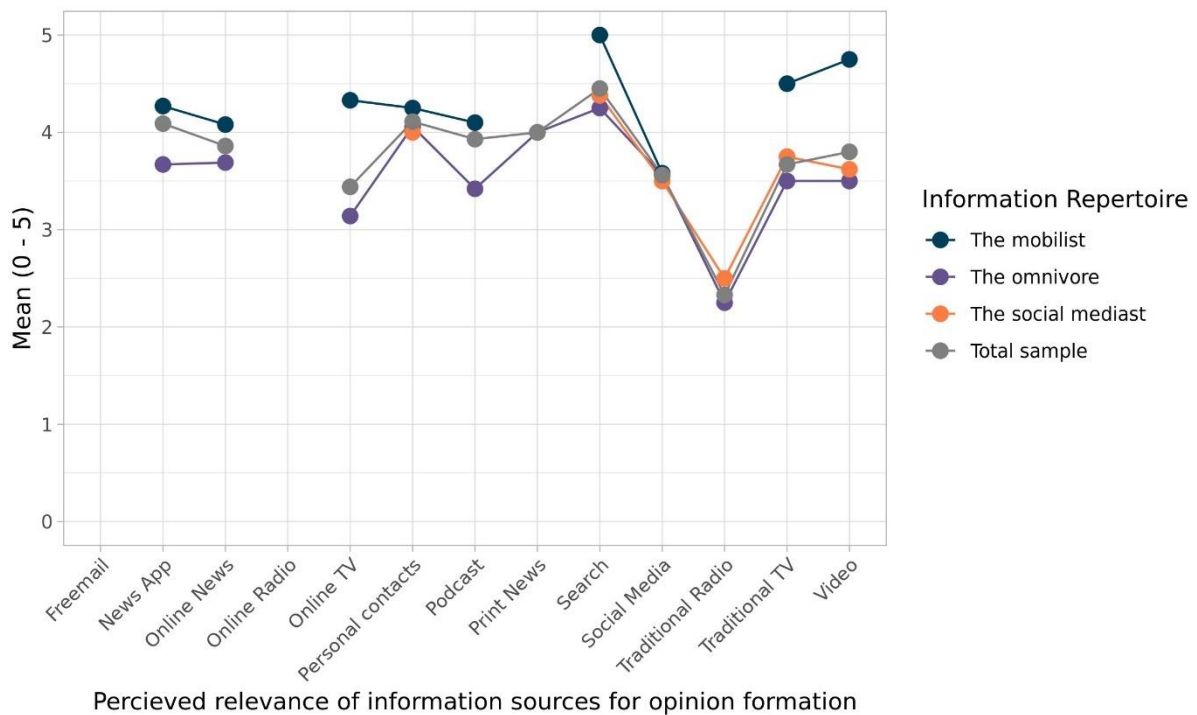
(4) Frequently used sources of information do not necessarily have the greatest influence on a person's opinion formation. It can be assumed that frequently used sources of information have a corresponding effect due to their high accumulation, but the sources of information can be weighted differently with regard to the relevance of opinion formation. The self-assessment of the self-attributed relevance of the different sources of information for the formation of a person's opinion enables us to draw conclusions about the perceived importance of this source for the person and thus provides us with information about the information's behavior.

Interestingly, the attributed relevance for opinion-forming does not necessarily coincide with the most frequently used sources of information for the sample of Fridays for Future supporters. Supporters consider the search for information using search engines ($M = 4.45$; $SD = 0.54$) to be the most relevant source for forming their own opinions. Although the use of search engines as a source of information is only a moderately used source, this information behavior appears to be of particularly high relevance. This also applies to personal contacts ($M = 4.11$; $SD = 0.7$) and news apps ($M = 4.09$; $SD = 0.63$), which are seen as a particularly relevant source of information for forming one's own opinion. With regard to personal contacts, the nature of the question in the survey unfortunately does not provide any information about the form of communication, whether digital or face-to-face. However, audio formats such as podcasts ($M = 3.93$; $SD = 0.66$) also appear to have a corresponding relevance for forming an opinion on a political topic. Podcasts are thus even rated as more important for the opinion-forming process than online news ($M = 3.86$; $SD = 0.84$), although the difference between these two sources of information is marginal. In addition, video platforms ($M = 3.8$; $SD = 0.62$)

such as TikTok and YouTube are considered to be more relevant for opinion formation than traditional television (M = 3.67; SD = 0.59). This also applies to online TV (M = 3.44; SD = 0.85). Social media (M = 3.56; SD = 0.74) is also considered to be of relatively low relevance for forming one's own opinion, although it is the most frequently used source of information for news and political information. This means that social media has the third lowest value, with traditional radio (M = 2.33; SD = 1.19) being attributed a very low relevance for forming one's own opinion.

Overall, the sample of Fridays for Future supporters surveyed considered digital and mobile sources of information in particular, such as news apps and search engines, to be more relevant for forming their own political opinions, while analog and more traditional sources of information were rated as less relevant. One exception here is direct personal contacts, which are highly relevant for opinion formation, although it is unclear on the basis of the data whether communication with these personal contacts is digitally mediated or face-to-face. The distribution of relevance assessments shows a similar picture to that of the Diplodocus curve of the information sources used, in that a few sources have very high relevance, a higher number of sources are assigned medium relevance, and a few information sources are classified as almost irrelevant. This can serve as a further indicator of broad and diverse information behavior.

Figure 19: Relevance of information sources for opinion formation



To gain a better understanding of this sample, we look at some demographic, socioeconomic, and political variables. In addition to the devices used, the mobile usage patterns, and the

information sources and their relevance for opinion formation, we also examine the age, gender, education level, social status and *political interest*, *opinion leadership* and *opinion certainty*, as well as the *political orientation* of the sample of Fridays for Future supporters.

(5) A look at the socio-economic variables shows that the supporters of Fridays for Future in the sample are relatively young ($M = 21.92$; $SD = 2.29$). In addition, there are 14 people in the sample who describe themselves as male, 10 people who describe themselves as female, and one diverse person. In terms of educational qualifications, the supporters of Fridays for Future have a high proportion of people with A-levels (13 people) and university students (6 people) as well as five students and one person who graduated secondary school. In terms of self-assessment of their own social status, supporters of Fridays for Future rate themselves in the upper middle range ($M = 6.32$; $SD = 1.57$; $min = 1$, $max = 10$). Accordingly, supporters of Fridays for Future in this sample can be assumed to be a relatively young, well-educated, and socially well-off group of people.

Table 11: Age and social status per information repertoire

	The Mobilist	The Omni-vore	The Social mediast	Total sample
Size of the repertoire	12	8	5	25
Social status M (SD)	5.92 (1.78)	6.25 (1.16)	7.4 (1.34)	6.32 (1.57)
Age M (SD)	23.17* (2.04)	20.62 (2.26)	21 (1.14)	21.92 (2.29)

Tested for significant differences between repertoires with ANOVA, * $p < 0.05$

Results

Table 12: Gender and education per information repertoire

	The Mobilist	The Omni- vore	The Social mediast	Total sample
Size of the repertoire	12	8	5	25
Male	5	7	2	14
Female	6	1	3	10
Divers	1	0	0	1
Student	0	3	2	5
Graduated Secondary school (Realschule)	0	0	1	1
A-levels (Fach- hochschulreife)	0	1	0	1
A-levels (Abitur)	6	4	2	12
University degree	6	0	0	6

(6) When looking at the broader political variables, it is noticeable that the supporters of Fridays for Future in this sample score relatively high on the *opinion leadership scale*, *opinion certainty* with regard to climate change ($M = 4.74$; $SD = 0.76$) and *interest in politics* ($M = 4.23$; $SD = 0.46$). Accordingly, it can be assumed that the sample studied includes people who can be described as so-called opinion leaders and can therefore be regarded as an important source for opinion formation in their social context. Furthermore, the group of Fridays for Future supporters surveyed were more confident about their own opinions on climate change, which indicates that they consider themselves to be well-informed and have a solid knowledge base. This assessment is also reflected in the high level of *political interest* shown by people. Furthermore, the surveyed supporters of Fridays for Future position themselves clearly to the left on a left-right scale ($M = 1.89$; $SD = 1.01$; left = 0 and right = 11), which corresponds to a very strongly left-wing political orientation.

Results

Table 13: Political predispositions per information repertoire

	The Mobilist	The Omnivore	The Social mediast	Total sample
Size of the repertoire	12	8	5	25
Opinion Leadership I M (SD)	3.16 (1.51)	3.6 (1.42)	2.52 (1.8)	3.17 (1.53)
Opinion Leadership II M (SD)	5.18 (0.99)	5.72 (0.64)	4.63 (0.59)	5.24 (0.88)
Opinion Leadership III M (SD)	4.51 (1.24)	4.95 (1.06)	5.05 (1.23)	4.76 (1.16)
Interest in politics M (SD)	4.28 (0.51)	4.21 (0.53)	4.13 (0.21)	4.23 (0.46)
Opinion certainty climate change M (SD)	4.76 (0.75)	4.86 (0.74)	4.5 (0.94)	4.74 (0.76)
Political orientation M (SD)	1.65 (0.82)	2.15 (0.85)	2.05 (1.64)	1.89 (1.01)

Tested for significant differences between repertoires with Kruskal-Wallis

In summary, the present sample is a group of supporters of the Fridays for Future movement who are relatively young, well-educated, and economically well-off. This group is characterized by people with strong *political interests* who hold established opinions in their own social environment and have a pronounced left-wing political orientation.

Once we have gained an overview of the characteristics of the sample, we move on to characterizing and describing the individual information repertoires, for which the overview we have compiled serves as a frame of reference. The three available information repertoires—the *Mobilist*, the *Omnivore*, and the *Social mediast* are characterized on the basis of the characteristic's device usage, information sources, and relevance for opinion formation, as well as their socio-economic variables and their political predispositions.

5.2.2 The Mobilist

The first information repertoire cluster is called the *Mobilist*, which is the largest cluster ($n=12$). This user group is characterized above all by its strongly overrepresented use of the usage patterns *Checking*, *News apps only*, and *News apps chatting & browsing*, whereby the information source news via smartphone, which is based on the survey, is underrepresented. However, the PC and podcasts in particular are another characteristic source of information. A closer look at the received content shows that the supporters of Fridays for Future in this group prefer journalistic and professional, politically informative content. They mainly use news apps and podcasts. For podcasts in particular, they use formats that are of journalistic origin or content from civil society actors. They tend to use less traditional news sources, such as television, radio, and print magazines, and they also use social media less than other users.

With regard to the digital devices used to access information, the *Mobilist* also uses the PC ($M = 0.78$; $SD = 0.18$) in addition to the smartphone ($M = 0.95$; $SD = 0.11$). All other possible devices that could potentially be used to access or receive information are not used. Accordingly, the focus is clearly on the digital devices used to access news and other political information.

The strong focus of this group on the smartphone as a device for obtaining information is also reflected in the distribution of usage patterns. This shows that, on the one hand, the largest number of sessions fall into this information repertoire ($n = 48,333$). However, this is not surprising, as this repertoire includes the most supporters of Fridays for Future. The already-mentioned observation that the sessions of the *Checking* usage pattern ($n = 41,718$) make up a large part of the behavioral sequences within the repertoire is also not surprising. However, at this point, we can say with a relatively high degree of certainty that this is a cross-personal pattern of behavior and that the frequency of the usage pattern cannot be attributed to a few extremely active individuals. Furthermore, the *Mobilist* information repertoire is the group of supporters of Fridays for Future in which the news apps-related usage patterns *News apps only* and *News apps chatting & browsing* occur most frequently. This indicates that people rely heavily on their smartphones as a source of information.

Interestingly, the *Mobilist* does not use news apps ($M = 0.62$; $SD = 0.48$) the most as a source of information compared to the other information repertoires, as we would expect when looking at the distribution of news app usage patterns. The value of using news apps as a source of information is based on the four survey waves. This also applies to the values for social media as a source of information ($M = 0.75$; $SD = 0.35$), which is the most frequently used source of information for the *Mobilist*. It is striking here that social media is the most frequently mentioned source of information in all information repertoires. In contrast, the frequent use of podcasts as a source of information ($M = 0.69$; $SD = 0.4$) is a unique feature of this information repertoire

compared to the others. Accordingly, supporters of this information repertoire seem to prefer audio formats as opposed to mostly text-based online news ($M = 0.42$; $SD = 0.4$).

The choice of information sources used is also reflected in the attribution of relevance to the formation of one's own opinion. People with this information repertoire evaluate the relevance of personal conversations ($M = 4.25$, $SD = 1.06$), which can take place both mediated and in person, as well as podcasts ($M = 4.1$, $SD = 0.68$), online news ($M = 4.08$, $SD = 0.95$) and news apps ($M = 4.27$, $SD = 0.58$) as very high for forming their own opinions. Social media ($M = 3.58$, $SD = 0.87$) is also considered relevant. It is interesting to note that people with this information repertoire consider online news and personal contacts to be relevant sources of information for forming their own opinions, even though they do not use them to a very great extent.

The consideration of the characteristics of the information repertoire does not only refer to information sources and related constructs but also includes demographic, socio-economic, and political variables in order to get a better picture of the supporters of Fridays for Future with the information repertoire, the *Mobilist*.

A look at the demographic and socio-economic variables shows that the average age of the *Mobilists* is higher than that of the other information repertoires ($M = 23.17$; $SD = 2.04$). Furthermore, the gender distribution is almost balanced. As far as educational qualifications are concerned, the *Mobilists* have a high proportion of people with A-levels (50 %) and university degrees (50 %). In terms of self-assessment of their own social status, the *Mobilists* are in the upper mid-range but have a slightly lower value compared to the other repertoires ($M = 5.92$; $SD = 1.78$; $\text{min} = 1$, $\text{max} = 10$). Accordingly, it can be assumed that the *Mobilists* are a relatively young, well-educated, and socially well-off group of people.

When looking at the broader political variables, it is noticeable that the *Mobilist* score relatively high on the *opinion leadership* scale, *opinion certainty* with regard to climate change ($M = 4.76$; $SD = 0.75$) and interest in politics ($M = 4.28$; $SD = 0.51$). In terms of their own political positioning on a left-right scale (left = 0 and right = 11), the *Mobilist* have an average score of 1,6, which represents a very strong left-leaning political orientation. In view of the high scores for *opinion leadership*, *opinion certainty*, and *political interest*, it can be assumed that people with this information repertoire are highly interested in politics and can occupy an exposed position in their social circle in terms of influencing the opinions of those around them.

Overall, the *Mobilist* can be seen as a politically interested, well-educated news user who consumes journalistic or civic content mainly via smartphone and has a strong political viewpoint. These supporters of Fridays for the Future tend to be interested in staying up-to-date with the latest news and events. Based on the use of information as well as the *opinion leadership* of these persons, it can be assumed that they are in regular political contact with others. They

probably value the convenience and flexibility of being able to access news and podcasts on their mobile devices, allowing them to stay informed and entertained.

5.2.3 The Omnivore

The second information repertoire cluster is called – the *Omnivore*, which is not completely homogenous and the second largest cluster ($n = 8$). This group of media users is characterized by their heavy reliance on smartphones for both chatting and browsing. However, people in this group use almost all other mobile usage patterns to a lesser extent than the other two information repertoires. In addition, the *Omnivores* consume a wide range of news sources, including news on their computers and tablets, smart TVs, news apps, traditional television and radio, printed magazines and newspapers, and through personal contacts. Interestingly, public service journalism content is also frequently used here, for example, by consuming TV news or following journalistic content on social media.

The *Omnivores* not only use the smartphone as a device for accessing news and political information but also use a wider range of access paths. Alongside the smartphone, access via PC ($M = 0.75$; $SD = 0.35$) is the most common method. Compared to the other information repertoires, the *Omnivore* also uses the tablet ($M = 0.66$; $SD = 0.48$) to access political content. In addition, the SmartTV ($M = 0.41$; $SD = 0.35$) is a relevant device that is used frequently compared to the other repertoires. Furthermore, smart speakers and smart watches are used to a small to very small extent as access devices for political information. Nevertheless, smartphones, PCs, and tablets are the most frequently used devices.

Although the survey results indicate that the smartphone is the most frequently used device for obtaining political information, the distribution of usage patterns shows a somewhat different picture. On the one hand, it is striking that the *Omnivore* group uses the smartphone the least compared to the other repertoires, which is at least suggested by the lowest number of mobile sessions ($n = 17254$). In addition to this low frequency of smartphone use, the news app-related usage patterns *News apps only* ($n = 32$) and *News apps chatting & browsing* ($n = 3$) are also the least pronounced compared to the other repertoires; this also applies to all other usage patterns with the exception of *Quick browsing* ($n = 853$). Accordingly, the usage patterns based on tracking data tend to indicate relatively low use of the smartphone in this repertoire.

In addition to the less pronounced smartphone use, the *Omnivores* show a wide repertoire of different sources of information, ranging from digital formats such as online news ($M = 0.7$; $SD = 0.38$), social media ($M = 0.75$; $SD = 0.46$) and online TV ($M = 0.69$; $SD = 0.35$) to more traditional sources of information such as traditional TV ($M = 0.75$; $SD = 0.46$), print news ($M = 0.43$; $SD = 0.43$) and personal contacts ($M = 0.72$; $SD = 0.31$). Interestingly, the supporters with the information repertoire also indicate that news apps ($M = 0.71$; $SD = 0.28$) are a relevant source of information, although we do not find this behavior in the tracking data. Nevertheless,

we can assume that *Omnivores* use a wide range of information sources that go beyond digital formats and include more traditional forms.

The large number of information sources used is also reflected in their evaluation for the formation of one's own opinion. People with this information repertoire evaluate the relevance of search engines ($M = 4.25$, $SD = 0.71$) as well as personal conversations ($M = 4.06$, $SD = 0.77$), which can take place both mediated and in person, as very high for forming their own opinions. The high relevance attributed to these two sources of information makes sense against the background of the frequent use of this informational behavior. On the other hand, less frequently used sources of information include social media ($M = 3.56$, $SD = 0.73$) and video platforms ($M = 3.5$, $SD = 0.65$), such as YouTube or TikTok, as well as podcasts ($M = 3.42$, $SD = 0.12$) and traditional television ($M = 3.5$, $SD = 0.35$), online TV ($M = 3.14$, $SD = 0.75$), online news ($M = 3.69$, $SD = 0.85$) and news apps ($M = 3.67$, $SD = 0.63$) are also seen as relevant, whereas traditional radio ($M = 2.55$, $SD = 1.46$) is perceived as less relevant.

We have already gained a relatively good overview of the characteristics of the *Omnivore* in relation to the information behavior of this group. Next, we look at the demographic, socio-economic, and political characteristics of this information repertoire to get a better understanding of the possible background and context of information use.

A look at the demographic variables shows that *the Omnivore* is the youngest group on average compared to the other information repertoires ($M = 20.62$; $SD = 2.26$). Furthermore, the gender distribution is very clearly male-dominated. When looking at the level of education, it becomes clear that the *Omnivores* have a high proportion of high school graduates and school pupils. In terms of self-assessment of their own social status, the *Omnivore* lies between the other two information repertoires ($M = 6.25$; $SD = 1.16$; $\text{min} = 1$, $\text{max} = 10$). Accordingly, it can be assumed that *Omnivores* are a relatively young, well-educated, and socially well-off group of people.

When looking at the broader political variables, it is noticeable that the *Omnivore* can be considered an opinion leader. They also have a high *opinion certainty* with regard to climate change ($M = 4.86$; $SD = 0.74$) and are interested in politics ($M = 4.21$; $SD = 0.53$). Compared to the other information repertoires, the data also show higher *opinion leadership* and *opinion certainty* (not significant). In terms of their own political positioning on a left-right scale (left = 0 and right = 11), the *Omnivores* show a relatively strong left-leaning political orientation ($M = 2.15$; $SD = 0.85$).

Overall, the *Omnivore* presents a different picture than the *Mobilist*. The slightly younger, well-educated *Omnivore* is characterized by a wide range of digital and analogue information sources, which are also only perceived as relevant to a limited extent for forming their own opinions. This differs in the use of search engines and personal contact, both of which are

considered highly relevant for opinion-forming. Interestingly, the *Omnivore* states in his self-report that he/she uses his/her smartphone a lot as a source of information, although this is not directly reflected in the mobile usage patterns. Like the *Mobilist*, the *Omnivores* show a high level of *political interest*, strong *opinion leadership*, and certainty on the issue of climate change.

5.2.4 The Social mediast

The information repertoire cluster – the *Social mediast* - is the smallest of all groups ($n = 5$), but stands out for their high level of smartphone usage. They focus heavily on social media platforms such as Instagram, where they mainly follow celebrities or personal contacts. Despite their strong focus on social media and video content, they get news mainly from more traditional sources, such as traditional television and radio (both online and offline). Accordingly, for this group, social media serves more as an entertainment medium through which social contacts are maintained than as a source of information on political issues. This group's strong focus on social media and video content sets them apart from other repertoires.

Just like the other repertoires, the *Social mediast* have a strong focus on the smartphone, which is supplemented by the use of PC ($M = 0.3$; $SD = 0.33$) and SmartTV ($M = 0.25$; $SD = 0.31$). The tablet is only used to a very limited extent ($M = 0.15$; $SD = 0.34$). This means that the *Social mediast* has the lowest use of the PC compared to the other repertoires and also has a considerably narrower range of devices used than the *Omnivore*.

The high level of smartphone use among this group of Fridays for Future supporters is also reflected in the high number of sessions with the corresponding usage patterns. Here, despite the relatively small group size of five people, the *Social mediast* combines the second-highest number of sessions ($n = 28,056$), which indicates a very high level of smartphone use by this group. This assessment is underpinned when looking at the usage patterns *Social media & chatting* ($n = 1,018$), *Quick look into social media* ($n = 2,371$) and *Extensive social media usage* ($n = 228$), as the *Social mediast* has the highest and second-highest number of sessions compared to the other larger repertoires. This not only applies to the usage patterns related to social media but can also be found in the usage patterns *Short watching & chatting* ($n = 505$), *Medium watching & chatting* ($n = 284$) and *Long watching & chatting* ($n = 112$). Social media also has the highest or second-highest number of sessions compared to the other repertoires. Accordingly, the focus of social media on social media applications and video platforms can be clearly seen in the use of smartphones.

The high level of smartphone use is only partially reflected in the compilation of information sources for the *Social mediast*. Here, social media ($M = 0.7$; $SD = 0.33$) and traditional TV ($M = 0.7$; $SD = 0.45$) share the place as the most frequent source of information, while video platforms are in second place ($M = 0.6$; $SD = 0.45$). The *Social mediast* also use traditional

radio ($M = 0.55$; $SD = 0.45$), search engines ($M = 0.5$; $SD = 0.47$) and personal contacts ($M = 0.5$; $SD = 0.35$) as a source of news and political information. News apps ($M = 0.45$; $SD = 0.33$) are also used, but to a much lesser extent than in the other repertoires. It is interesting to note that a large proportion of social media information sources are video formats. While more text-based sources of information, such as news apps, play a lesser role.

Interestingly, the choice of political information sources is only reflected to a limited extent in the perceived relevance of forming one's own opinion. People with this information repertoire rate the relevance of search engines ($M = 4.38$, $SD = 0.53$) for forming their own opinions as very high. While heavily used social media ($M = 3.5$, $SD = 0.71$) as well as video platforms ($M = 3.63$, $SD = 0.53$), and traditional television ($M = 3.75$, $SD = 0.9$) are considered relevant. Traditional radio ($M = 2.5$, $SD = 1.06$), which is one of the two main sources of political information, is perceived as less relevant. It is interesting to note that the very likely intentional use of search engines is considered to have a greater influence on the formation of personal opinions than more passively received sources of information, such as traditional radio.

In addition to information usage behavior, social media can also be described in more detail by demographic, socio-economic, and political constructs. A look at the demographics shows that the *Social mediast* are on average only slightly older than the *Omnivore* ($M = 21$; $SD = 1.41$). Furthermore, the gender distribution is very balanced. In terms of educational qualifications, the *Social mediast* have a high proportion of students (40%) and people with a high school diploma (40%) as well as one person with a secondary school diploma (20%). With regard to the socio-economic consideration of the self-assessment of one's own social status, the *Social mediast* has the highest value of the three information repertoires ($M = 7.4$; $SD = 1.34$; $\min = 1$, $\max = 10$). Against this background, it is reasonable to assume that this is a young, well-educated, and economically well-off group of supporters of Fridays for Future.

In addition to demographic and socio-economic characteristics, political characteristics are also important. Here, the *Social mediast* show high values in the areas of *opinion leadership* and have a high level of *opinion certainty* on climate change ($M = 4.5$; $SD = 0.94$) as well as a high level of interest in politics ($M = 4.13$; $SD = 0.21$), all of which are slightly and not significantly below the values of the other two repertoires. The *political orientation* is comparable to that of the *Omnivores* and accordingly also shows a clear left-wing political orientation ($M = 2.05$; $SD = 1.64$).

In summary, *Social mediast* is the smallest repertoire, which is made up of a group of well-educated, relatively young, and socially well-off people who excel in the use of social media. Furthermore, the *Social mediast* use their smartphones to a large extent, whereby they mainly use social media and video platforms. In addition to social media, this group also obtains its

political information from traditional channels such as television or radio. The political orientation of this group is very similar to that of the *Omnivores*, with both groups showing a high degree of *opinion leadership*, *opinion certainty*, and high *political interest*.

5.3 RQ 3: Mobile political exposure & talk - Results

In the previous chapters, we have already looked at the information behavior on the smartphone as well as the more comprehensive information repertoires of the supporters of Fridays for Future. The nature and extent of political exposure and political conversation and how they fit into the information repertoires already described are still unclear. In particular, the ability to exchange ideas and discuss opinions with others is a central building block for political participation in a democratic society. With this understanding as a basis, this chapter is dedicated to identifying political exposure and political talk on smartphones among supporters of the Friday for Future movement.

Mobile communication via smartphones has increased exponentially in recent years and has had a significant influence on the exchange of information in society. Answering the question of the extent to which political discussions and interactions in the digital space, especially on mobile devices, influence political opinion formation and activity is an ongoing field of research.

In order to understand this connection in more detail, two approaches are pursued in the remainder of the chapter. Both approaches are intended to provide information about the extent of political exposure on smartphones and thus to be able to make a statement about the time that supporters of Friday for Future devote to political discussion on their mobile devices every day. Furthermore, the focus is on the various forms of exchange, be it through social media, messenger apps, or other platforms. This study aims to illustrate how actively Friday for Future supporters participate in the political discourse and how mobile technologies contribute to this.

To this end, two innovative and, to the author's knowledge, untested approaches are used. On the one hand, the so-called screen recording of the duration of the keywords displayed on the screen is used, on the basis of which conclusions can be drawn about the political or climate change-relevant content. On the other hand, the self-assessment of the extent of the political exposure on the respective mobile apps is used as a weighting of the tracked usage time. Both approaches have different advantages and disadvantages, which are discussed and weighed up in more detail in the discussion section of this thesis.

We begin with the presentation of the results of the screen recording approach and first describe the scope of (1) *mobile political exposure* for the entire sample (2) as well as for the respective information repertoires. We then go on to analyze the more specific concept of *mobile political talk*, also for the (3) entire sample and (4) per-information repertoire. We then

repeat this procedure for the second approach, which is a combination of self-reports on the proportion of political exposure on the respective apps and the weighting of the app tracking data.

Overall, this chapter aims to create a deeper understanding of the role of the smartphone in relation to *mobile political exposure* among supporters of the Friday for Future movement. By analyzing the scope and the various forms of interaction, the aim is to show the extent to which mobile technologies shape political discourse and influence opinion formation.

5.3.1 Mobile political exposure and talk captured by screen recordings

We first look at the proportion of political exposure of Fridays for Future supporters, which was captured using the screen recording approach. This approach provides us with information about the duration of visibility of the previously defined keywords on the participants' smartphone displays. The basic idea is that screen recordings identify political keywords on the smartphone screen and record the duration for which these keywords are visible. With the help of app tracking and the sessions approach, it is possible to assign the logged keywords to sessions. These keywords include terms relating to development projects and sustainability, damage to the ecosystem, pollution and decarbonization, and local climate. Furthermore, keywords for related topics such as politics, foreign affairs, climate research, protests, and politics were also included. We should keep in mind that, compared to the second approach, this is a much narrower operationalization of political exposure.

The proportion of political exposures per active day and participant ($M = 3.93$; $SD = 2.23$) in our overall sample of Fridays for Future supporters is relatively low compared to the total daily smartphone usage time. The figures indicate that politically relevant terms are displayed on the smartphone screens of the Fridays for Future supporters surveyed for just under four minutes per person per day. In other words, politically or climate-relevant terms can be seen on a participant's display for an average of four minutes per day. Due to the lack of comparative values from other studies, it is difficult to estimate whether this is a comparably high or low value.

Despite the lack of a comparative value for the overall sample, we can look at the extent of political exposure per day between the different information repertoires. Here, the supporters with the information repertoire of the *Mobilist* show the lowest proportion of political exposure ($M = 3.59$; $SD = 2.87$), whereby the comparatively high standard deviation suggests a greater spread of values within the group. Accordingly, it can be assumed that the supporters of Fridays for Future with this information repertoire differ more in terms of the duration of political exposure via smartphone than the participants of the other information repertoires. This is particularly interesting because, for individuals with this information repertoire, the smartphone is the most important device for accessing news and has the highest proportion of news app

usage. Accordingly, we would expect a much higher value for *mobile political exposure*. Furthermore, the information repertoire shows a high proportion of use of political audio formats, which cannot be adequately captured by the screen recording approach. Nevertheless, the low duration of visibility of political terms on the group's smartphone display captured by the screen recording is surprising in light of the other results from the survey.

The group of *Omnivores* shows a slightly higher duration of *mobile political exposure* ($M = 3.98$; $SD = 1.71$), which almost corresponds to the average of the overall sample. In view of the fact that people with this information repertoire use a wide range of different devices and information sources for the reception of political information, the duration of the political exposure on the smartphone seems reasonable in comparison to the other information repertoires.

The highest value of political exposure on the smartphone is recorded by supporters with *the Social mediast* information repertoire ($M = 4.96$; $SD = 1.7$). The participants with this information repertoire recorded an average of almost five minutes of politically relevant terms per day on their smartphones, which corresponds to around one minute longer than the average of the sample. The comparatively high duration is not particularly surprising given the generally high usage time of smartphones among supporters of this information repertoire. In addition to the use of traditional TV, this information repertoire is characterized above all by the high use of social media and video platforms on the smartphone, which also occur more frequently in relatively long sessions. Accordingly, it can be assumed that the participants in the *Social mediast* information repertoire have seen the most political and climate-related content on their smartphones compared to the other supporters in the sample.

The overall view shows that, on the one hand, the methodological approach of screen recording can be successfully implemented. Furthermore, the average duration of political exposure per day and person was determined for the entire sample as well as for the different information repertoires. This clearly shows that the supporters of Fridays for Future use their smartphones for political exposure and that the duration of this varies between the different repertoires. This can at least partly be attributed to the different informational behaviors.

A look at Table 14 shows the extent to which the observed differences in the scope of political exposure are also reflected in the duration of *mobile political talk* among Fridays for Future supporters. The values show the political talk behavior recorded by screen recordings. *Mobile political talk* is understood as the simultaneous usage of the keyboard and the occurrence of political or climate-related terms on the smartphone, recorded by means of tracking and screen recording. In summary, it can be deduced from the overall sample that the average daily duration of political talk is 1.13 minutes, with a standard deviation of 1.55 minutes. This indicates that there is considerable variation in political conversation behavior within the overall sample of supporters of the Fridays for Future movement. It is important to note that the differences

between the identified information profiles may indicate individual preferences and habits in dealing with political topics, as well as a different use of the smartphone.

Compared to the other information repertoires, the *Mobilist* shows a lower level of political discussion engagement ($M = 0.77$; $SD = 0.7$). This group appears to be more selective with regard to political discussions via smartphone and shows less variation in the daily duration of conversations. Given that supporters with this information repertoire have a high level of *political interest*, *opinion certainty*, and *opinion leadership*, and that contact with others is a relevant source of information for political information, it can be assumed that people with this information repertoire tend to have discussions in person and use their smartphones less.

A closer look at the *Omnivore* group shows that these participants have the highest proportion of *mobile political talk* compared to the other two information repertoires ($M = 2.06$; $SD = 2.41$). This could indicate that the *Omnivore* communicates a wide range of political and climate-related topics via smartphone, with the basis of the conversation probably ranging from current events to more in-depth political discussions. However, the high standard deviation also indicates that the duration of these conversations can vary greatly. It is possible that some *Omnivores* may engage in longer and more in-depth political discussions, while others may prefer shorter and more superficial conversations. This diversity in conversation duration could indicate different interests, levels of engagement, discussion styles, or tendencies in the use of smartphones for political exposure within the group of *Omnivores*.

In contrast, the *Social mediast* shows the lowest average daily political discussion duration ($M = 0.2$; $SD = 0.04$). This group tends to have only short-term political discussions, indicating limited involvement in political issues. The low standard deviation indicates that the duration of political discussions in this group tends to be constant. It is interesting to note that this information repertoire has the highest duration of *mobile political exposure* and, at the same time, engages in the least *mobile political talk*. At first glance, this seems unusual, but it could be an indication of a different way of using the smartphone with regard to political information and how to deal with or engage with political information. At this point, however, I would like to point out the small number of people in this information repertoire for whom the screen recording provided data. Accordingly, the values in this information repertoire should be treated with caution, especially with regard to political talk.

The use of screen recording as a methodological approach has proven successful in identifying *mobile political exposures* and *mobile political talk* and recording their duration. First of all, I was able to show that the supporters of Fridays for Future also use their smartphones for political exposure and talk. Additionally, there are clear differences between the various information repertoires, both in the total duration of the political exposure and in the average dura-

tion of the mobile political conversation. These differences are probably explained by the respondents' different usage behaviors and practices. Furthermore, it becomes clear that a high level of political exposure does not automatically mean that the information repertoire of Fridays for Future supporters also includes frequent and long political conversations via smartphones.

The overall analysis provides a better understanding of the political information behavior of the Fridays for Future supporters studied. The results offer insights into the diversity of political exposure and talk between different information repertoires. It is clear that the smartphone is the device for accessing political information for all information repertoires, but there are differences in the way it is used, which are reflected in the duration of political exposure or engagement in *mobile political talk*. This contributes to gaining more nuanced insights into the use of smartphones for political exposure in this specific group.

Table 14: Keywordlogger - mobile political exposure & talk

	The Mobilist	The Omnivore	The Social mediast	Total sample
Size of the repertoire	12	8	5	25
Mobile political exposure per day in minutes M (SD)	3.59 (2.87)	3.98 (1.71)	4.96 (1.7)	3.93 (2.23)
Mobile political talk per day in minutes M (SD)	0.77 (0.7)	2.06 (2.41)	0.2 (0.04)	1.13 (1.55)
Tested for significant differences between repertoires with Kruskal-Wallis				

5.3.2 Mobile political exposure and talk captured by app tracking and self-reports

The second approach to recording the political exposure of Fridays for Future supporters is based on combining the respondents' self-assessment with the duration of use of the applications measured using app tracking. The self-report is used as a weight for the duration of use in order to identify the proportion of political use in overall use. Accordingly, the self-reported weights of the surveyed supporters of Fridays for Future have a major influence on the scope of the *mobile political exposure*. This approach is a more open and broader operationalization of political exposure compared to the first screen recording approach.

Before we turn our attention to the shares of political exposure, we will first look at the self-assessment of the various apps for political use. The data based on the self-reported experiences of the participants gives us an insight into the different forms of use of individual mobile applications. There are clear differences in values as to whether an application tends to be used for politically-oriented purposes or not. To this end, (1) we first look at the estimated share of political exposure of the apps for the entire sample of Fridays for Future supporters (2) before examining the shares of the most relevant apps in relation to the different information repertoires.

(1) Let's first look at the share of political use for the respective apps in the total sample, starting with the communication app category, then focusing on the social media category, and finally looking at video platforms. The apps in the communication category, which in this case consist of WhatsApp, Discord, Signal, Telegram, Trello, and Slack, show clear differences in the extent of political exposure in the respective apps. When looking at the individual apps, it becomes clear that WhatsApp ($M = 26.14$; $SD = 22.53$, range 1 to 100) has the lowest proportion of self-assessed political exposures. The proportion is considerably higher for the communication platform Discord ($M = 42.08$; $SD = 34.62$), although the standard deviation indicates a high variance in the values. The communication-only app Signal ($M = 56.15$; $SD = 31.00$) also has a higher proportion of political exposure compared to the very similar WhatsApp application. This also applies to the messenger app Telegram ($M = 64.56$; $SD = 21.62$). The political exposure is highest for the two groups and team organization tools Trello ($M = 70.00$; $SD = 33.54$) and Slack ($M = 77.29$; $SD = 27.11$). The different proportions of political exposure in the communication apps examined indicate possible differences in the user group, thematic exchange, and/or communication behavior. Accordingly, it can be assumed that different apps are used for different purposes and associated information behaviors. A more detailed discussion is provided in the discussion section of the thesis.

Differences in the proportion of political exposure can also be seen in the apps in the social media category, which in this case consists of Snapchat, Instagram, Facebook, and Twitter. Almost no information is available on the use of Snapchat for political exposure, so no more precise conclusions can be drawn here. This is different for Instagram ($M = 35.28$; $SD = 21.06$), where the values indicate a relatively low proportion of overall use for political exposure. For the second social media application of the meta-group Facebook ($M = 43.00$; $SD = 24.58$), the share of political use in overall use is somewhat higher. However, the platform Twitter (now renamed X) is most clearly used for political exposure ($M = 62.42$; $SD = 20.88$). When looking at the social media applications and their share for political exposure, it becomes clear that, similar to the communication applications, the supporters of Fridays for Future associate different usage behaviors and very likely usage aims with the respective apps, which leads to different levels of political exposure between the applications.

This pattern is only partially reflected for the apps in the video platforms category, which in this case consists of YouTube and TikTok. Here it can be seen that both YouTube ($M = 40.28$; $SD = 16.13$) and TikTok ($M = 53.75$; $SD = 30.05$) have a medium to higher share of political exposures, with TikTok accounting for a larger share. It is interesting to note that YouTube shows a relatively low variance, which indicates a relatively constant use of the platform for the corresponding level of political exposure, while TikTok shows a considerably higher variance and thus also greater differences between the supporters surveyed.

(2) In the next step, we look at the characteristics of the share of political exposure in relation to the various information repertoires. Here we first look at the communication apps, followed by the social media applications and the video platforms. For the communication apps, the basic pattern that we have already discussed for the entire sample remains, with WhatsApp having the lowest proportion of political exposure for both the information repertoire of the *Mobilist* ($M = 21.3$; $SD = 20.5$) and the *Omnivore* ($M = 33.33$; $SD = 29.65$) as well as the *Social mediast* ($M = 26.25$; $SD = 16.89$). This shows that WhatsApp plays a somewhat more pronounced role for the repertoire of the *Omnivore* in relation to political exposure than for the other information repertoires. This relationship is reversed in relation to the two other messenger applications, Telegram and Signal, both of which have the lowest proportion of political exposure for the *Omnivore* repertoire compared to the other two repertoires. However, the highest values for the shares of total usage of political exposure fall on the organization tool Trello, which has very high usage shares for the *Mobilist* ($M = 90.00$; $SD = 0$), the *Omnivore* ($M = 48.33$; $SD = 45.37$) and the *Social mediast* ($M = 82.5$; $SD = 10.61$). For the two information repertoires, *Omnivore* ($M = 58.06$; $SD = 20.62$) and *Social mediast* ($M = 84.17$; $SD = 6.29$), the high percentages of Trello are only exceeded by Telegram. Accordingly, within the information repertoire of *Omnivore*, Telegram is a relevant app for political exposure, although its share is lower than that of the other two repertoires. The overall view shows that there is a basic pattern of behavior of the individual mobile applications with regard to political exposure within the apps, which, however, differs to some extent between the various information repertoires.

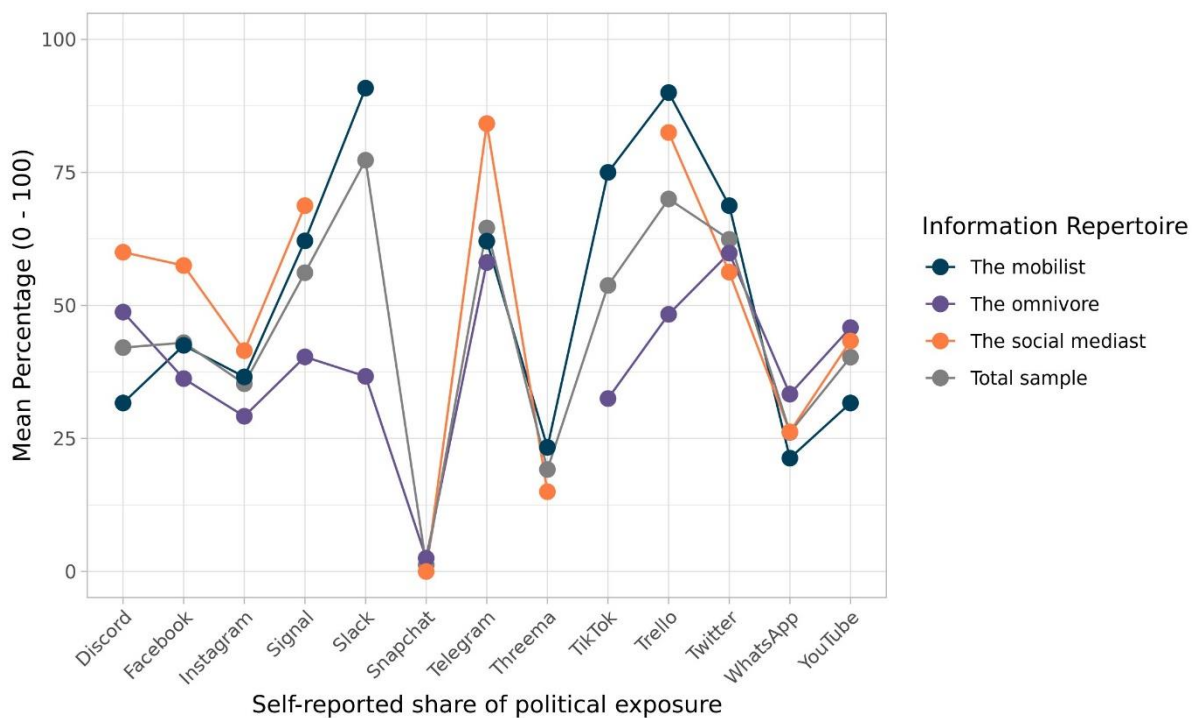
This basic observation also applies to the distribution of the shares of political exposure in social media applications. Here on Facebook, the *Mobilist* ($M = 42.5$; $SD = 45.96$), the *Omnivore* ($M = 36.25$; $SD = 1.77$) and the *Social mediast* ($M = 57.5$; $SD = NA$) show a very similar distribution to Instagram, with the shares of political exposure rising from the *Omnivore* ($M = 29.17$; $SD = 25.71$), via the *Mobilist* ($M = 36.57$; $SD = 22.85$) to the *Social mediast* ($M = 41.5$; $SD = 8.02$). This clearly shows the social media focus of the information repertoire of the *Social mediast*, which has the highest proportion of political exposure for these two social media applications compared to the other two repertoires. However, the relationship is reversed with regard to Twitter. Here, the proportion of political exposure is lowest for the *Social mediast* ($M = 56.25$; $SD = 26.52$), the share of the *Omnivore* ($M = 59.83$; $SD = 28.36$) is slightly higher,

while the *Mobilist* ($M = 68.75$; $SD = 7.5$) has by far the highest proportion of political exposure on the app. Accordingly, there are also differences between the information repertoires in the usage behavior of the individual social media applications for the political exposure of the supporters of Fridays for Future.

This pattern also applies to the proportion of political exposure on the YouTube video platform. Here, the *Mobilist* ($M = 31.67$; $SD = 1.44$) uses the video platform the least for political exposure compared to the other two repertoires. Here, both the *Omnivore* ($M = 45.83$; $SD = 27.54$) and the *Social mediast* ($M = 43.33$; $SD = 10.41$) use the platform considerably more for political exposure, which makes sense in light of the already established stronger video preferences of these two repertoires.

The overall view of the self-assessed usage shares for political exposure of the apps under consideration shows that a basic pattern can be identified at the level of the total sample, which is partly reflected but also reversed in a more differentiated view and comparison between the information repertoires. It can be seen here that individual mobile applications are used to varying degrees for political exposure, even within an app category. This observation is an indicator of the relevance of individual preferences, usage purposes, and behaviors of the Fridays for Future supporters studied in relation to individual apps. A more detailed analysis and discussion of this observation and its possible implications for research into mobile political communication can be found in the discussion section of this thesis.

Figure 20: Self-reported share of political exposure per app



Having looked at the proportion of political exposure per recorded app, we turn to the duration of *mobile political exposure* for the overall sample. The proportion of political exposures per active day and participant ($M = 9.86$; $SD = 31.49$) in our overall sample of Fridays for Future followers is relatively low compared to the total daily smartphone usage time. The average duration of *mobile political exposure* among the Fridays for Future followers surveyed is slightly less than ten minutes per person per day. It is difficult to estimate whether this is a comparatively high or low value due to the lack of comparative values from other studies. The very high standard deviation is also striking, which indicates a strong variance of values and is very likely due to an uneven distribution of the values.

Despite the problem of the lack of a comparative value for the overall sample, the duration of political exposure per day between the different information repertoires can be considered. Here, the supporters with the *Mobilist* information repertoire show the lowest proportion of *mobile political exposure* ($M = 3.6$; $SD = 5.3$). The proportion of *mobile political exposure* for the *Mobilist* is very low, both in comparison to the other two information repertoires and to the overall average of the sample. This is initially surprising, as the *Mobilist's* information behavior is strongly smartphone-oriented. Accordingly, we would expect a higher value for political exposure than for the other information repertoires, some of which still rely on other sources of information and devices, such as radio or TV. One possible explanation for the low value of political exposure, despite the actual focus of the *Mobilist* on the smartphone as a source of information, could be the operationalization of political exposure. The problem could be the lack of questioning of the self-reported share of political exposure within audio and music applications and news apps, both of which play an important role in the *Mobilist's* information repertoire. The *Mobilist* is characterized by a high proportion of audio app usage, which is used to receive political podcasts as well as the use of news apps. A more detailed discussion of the problem and possible explanations for the low level of *mobile political exposure* can be found in the discussion section and the limitations.

When looking at the *Omnivores*, it is noticeable that they have a significantly higher duration of *mobile political exposure* ($M = 12.71$; $SD = 47.26$), which is slightly above the average of the overall sample. In view of the fact that the supporters of Fridays for Future use a variety of different devices and information sources for the reception of political information with this information repertoire, the duration of the political exposure on the smartphone seems adequate in comparison to the other information repertoires.

The *Social mediast* shows the highest value of political exposure on the smartphone ($M = 17.32$; $SD = 33.3$). Supporters of Fridays for Future with this information repertoire record just over 17 minutes per person per day of political exposure on their smartphone, which includes sharing, forwarding, and receiving politically relevant topics. The comparatively high duration

is not particularly surprising given the generally high usage of smartphones and social media in particular among followers of this information repertoire. The high use of social media and video platforms on smartphones is a characteristic of this repertoire, which also takes place in relatively long sessions and could therefore also explain the relatively high standard deviation. Accordingly, it can be assumed that the participants with this repertoire received the most political and climate-relevant content on their smartphones compared to the other information repertoires.

In summary, it can be seen that the methodological approach of combining self-reports and tracking app usage can be successfully implemented. Furthermore, the average daily and per-person duration of *mobile political exposure* was determined both for the overall sample and for the various information repertoires. This makes it clear that supporters of Fridays for Future actively use their smartphones for political exposure and that the duration of this exchange varies depending on the repertoire. These differences can be attributed, at least in part, to divergent information behavior.

With regard to *mobile political talk*, it can be seen that the observed differences in the duration of *mobile political exposure* are also partly reflected in the duration of *mobile political talk* among Fridays for Future supporters. The recorded political conversation refers to the simultaneous use of the keyboard and app usage, which is calculated by the self-reported weighting of political exposure. In summary, it can be deduced from the overall sample that the average daily duration of political conversations is 0.89 minutes, with a standard deviation of 2.80 minutes. The high standard deviation suggests that there are considerable differences in political conversation behavior within the overall sample of supporters of the Fridays for Future movement. The differences between the supporters could indicate individual preferences and habits in dealing with political topics, as well as different uses of the smartphone.

The *Mobilist* has the lowest proportion of *mobile political talk* compared to the other information repertoires ($M = 0.52$; $SD = 0.8$). Supporters of Fridays for Future with this information repertoire seem to engage in fewer political talks on their smartphones and/or are more selective, and they also show less variation in daily conversation duration. People with the *Mobilist* information repertoire show a high level of *political interest*, *opinion certainty*, and *opinion leadership*. Furthermore, contact with others is a relevant source of political information. These indications could suggest that people with this information repertoire tend to have personal political conversations face-to-face and conduct a small number of political conversations using smartphones.

Unlike the *Mobilist*, the *Omnivore* group has the highest proportion of *mobile political talk* ($M = 1.35$; $SD = 4.69$). This is interesting in light of the fact that the *Omnivores* use a broad spectrum of information sources for receiving political information, whereby the smartphone is used more

than other information repertoires for political talk and thus places a stronger focus on mobile-mediated active exchange. The high standard deviation suggests that the duration of these conversations can vary greatly. It is possible that some *Omnivores* have longer and more in-depth political discussions, while others prefer shorter conversations via smartphone. These differences in conversation length could indicate different interests, engagement, discussion styles, or tendencies in the use of smartphones for political talk within the group of *Omnivores*.

In contrast, the *Social mediast* shows an almost average daily duration of *mobile political talk* ($M = 0.95$; $SD = 1.67$). The duration of *mobile political talk* almost corresponds to the average of the entire sample. It is interesting that this information repertoire shows the highest duration of *mobile political exposure* and, at the same time, a rather average duration of *mobile political talk*. One possible explanation for this could be a different way of using the smartphone in relation to political information and dealing with political information.

The combination of self-reporting on the proportion of political exposure per app and the tracked duration of use of these apps made it possible to identify and record the duration of political exposure and mobile political talk for the supporters of Fridays for Future. It was successfully shown that smartphones are used for political exposure and talk. In addition, the values show clear differences between the various information repertoires, both in the total duration of the *mobile political exposure* and in the average duration of the *mobile political talk*. These differences can presumably be explained by the different usage behaviors and practices of the respondents. Furthermore, it becomes clear that a high level of political exposure does not automatically go hand in hand with frequent and long political talk via smartphones. The analysis enables a better understanding of the political information behavior of the Fridays for Future supporters studied. The results offer insights into the diversity of political exposure and talk between different information repertoires. It is clear that the smartphone is the device for accessing political information for all information repertoires, but there are differences in the way it is used.

Table 15: App tracking & self-reports - mobile political exposure & talk

	The Mobilist	The Omnivore	The Social mediast	Total sample
Size of the repertoire	12	8	5	25
Mobile political exposure per day in minutes M (SD)	3.6 (5.3)	12.71* (47.26)	17.32 (33.3)	9.86 (31.49)
Mobile political talk per day in minutes M (SD)	0.52* (0.8)	1.35* (4.69)	0.95 (1.67)	0.89 (2.8)

Tested for significant differences between repertoires with Kruskal-Wallis and Dunn-Bonferroni post-hoc test,
* $p < 0.05$

5.4 RQ 4: Relationship between political information usage behavior and participation - Results

The previous chapters have laid the foundation for the analysis of the following part of the thesis. We looked at the information behavior on the smartphone and put this in relation to other sources of information, which enabled us to identify political information repertoires. Based on these information repertoires, we were able to determine the different durations of the political exposure and the political talk via smartphone and thus obtain a relatively good overall picture of the different forms of information behavior of the Fridays for Future supporters studied.

In this chapter, I attempt to address the previously unanswered question of the extent to which there is a connection between political information behavior and forms of political participation. Within this chapter, I try to identify patterns or indicators between the political information behavior and the forms of participation of the Fridays for Future supporters studied. In more concrete terms, I would like to explore the question of whether, for example, people who obtain a lot of political information via social media also increasingly choose forms of political participation on social media platforms.

The identification of possible patterns or indicators of a connection between information behavior and political participation is carried out by means of a descriptive analysis in which the political participation captured by means of a survey is examined in relation to the previously identified information repertoires. The aim here is first to analyze the political participation of the surveyed supporters of Fridays for Future and to relate it to the findings already obtained with regard to mobile information behavior, information repertoires, and other socio-economic, political, and demographic variables in order to obtain a more comprehensive picture.

We begin by presenting the results of the political participation survey, (1) whereby the cross-section for the entire sample as well as the information repertoires are considered first, and (2) before taking a deeper look at the individual participation dimension. Once the cross-sectional data has been analyzed in this way, a longitudinal analysis is carried out, which enables a better understanding of the context and the development of political participation over the period of data collection. For this purpose, (3) the political participation of the entire sample as well as the information repertoires over time are also considered, and (4) a closer look is taken at the individual participation dimensions over time. (5) The final step is the analytical consolidation of all the insights gathered to this point.

Overall, this chapter aims to create a deeper understanding of the role of political information behavior in relation to the forms of political participation among supporters of the Fridays for Future movement. By analyzing the scope and different forms of participation, the aim is to show whether and to what extent (mobile) political information behavior can be related to the form of political participation chosen by supporters of Fridays for Future.

5.4.1 Political participation of Fridays for Future supporters

As already explained, (1) we first look at the values for political participation for the entire sample of Fridays for Future supporters examined, as well as the information repertoires in the cross-section. We would first like to gain an overview of the general political participation behavior of the supporters studied, which we can use as a frame of reference later in the analysis.

When looking at the index of political participation, which has a theoretical spectrum of values ranging from never (= 1) to very often (= 7) for the entire sample ($M = 3.27$; $SD = 1.0$), it can be seen that the values for political participation are in the medium range. The value indicates that the supporters of Fridays for Future are politically active, but that their form of engagement is more selective, and not every form of political participation is practiced. The moderate standard deviation also indicates a certain variance in the values within the sample, which points to different degrees of political commitment among the individual supporters.

Having looked at political participation for the whole sample, we turn our attention to the level of political participation of Fridays for Future supporters with the respective information repertoires. This shows that the level of political participation of the *Mobilist* ($M = 3.21$; $SD = 1.02$) does not differ significantly from the value of the entire sample or from the other information repertoires. Accordingly, no difference can be identified here in relation to the frequency of political participation for the group of supporters with this information repertoire.

In contrast to the *Mobilist*, supporters with the *Omnivore* information repertoire have a slightly higher level of political participation ($M = 3.38$; $SD = 1.05$), although this is not reflected in a significant difference. Nevertheless, the information repertoire has the highest value in terms

of political participation compared to the other information repertoires and the overall average of the sample.

The information repertoire of *Social mediast* shows an almost identical level of political participation as the average of the sample ($M = 3.25$; $SD = 0.89$) and also does not differ significantly from the other information repertoires. The *Social mediast* has the lowest standard deviation in terms of political participation compared to the other repertoires, which indicates the lowest variance of values for political participation within this repertoire. It can therefore be assumed that the supporters of the *Social mediast* information repertoire are most similar in terms of their level of political participation.

When looking at the level of political participation in relation to the different information repertoires, it can be seen that the frequency of political engagement does not differ significantly between the different repertoires. Accordingly, this observation can be interpreted as an indicator of the absence of a possible connection between the type of political information behavior and the frequency of political participation. However, the relationship between the type of political information behavior and the form of political participation remains unclear. The following section is intended to provide an insight into this.

(2) We want to gain a better understanding of the different forms of political participation and their occurrence in relation to the information repertoire. The supporters of Fridays for Future have a whole range of opportunities to engage and participate in the political discourse through different forms. The wide range of options is categorized in the literature into four so-called dimensions, which include political forms of participation within the political system, forms targeted at the political system, possibilities of political participation in relation to the surrounding social community, and individual forms of political engagement and expression. As outlined in the theory section of this thesis, individual political participation is a relatively recent phenomenon, occurring primarily among younger generations and protest groups such as Fridays for Future. Before we look at the individual dimension in detail, we first look at the characteristics of the four political participation dimensions for the entire sample as well as for the respective information repertoires.

The overall view of the sample shows moderate political participation in all dimensions: within the political system ($M = 3.77$; $SD = 1.39$), in activities that address the political system ($M = 3.68$; $SD = 1.16$), in community activities ($M = 1.97$; $SD = 1.06$) and in individual political participation ($M = 3.65$; $SD = 1.24$). The values show a general balance of participation across the various dimensions, with forms of participation in relation to the community being the least pronounced. There are no significant differences between the individual dimensions of political participation for the entire sample. Against this background, it can be seen that the Fridays for

Future supporters surveyed have a relatively broad repertoire of forms of political participation, which covers all dimensions apart from the forms of participation aimed at the community.

The results for the *Mobilist* show average participation within the political system ($M = 3.73$; $SD = 1.44$) and comparable participation targeting the political system ($M = 3.62$; $SD = 1.2$). Participation in community activities is slightly below average ($M = 1.99$; $SD = 1.11$), while individual political participation can be considered high ($M = 3.5$; $SD = 1.17$). The test for significant differences in the political participation dimensions between the individual information repertoires did not yield any significant results. Nevertheless, these findings suggest that the *Mobilist* tends to focus more on forms of political participation within or targeted at the political system and individual political action than on participation in community activities.

For the *Omnivore*, there is above-average participation within the political system ($M = 3.88$; $SD = 1.37$) and in activities that address the political system ($M = 3.73$; $SD = 1.21$). This group is also characterized by a higher level of participation in community activities ($M = 2.01$; $SD = 0.88$), although no significant difference was found compared to the other two information repertoires. Individual political participation is also high ($M = 3.9$; $SD = 1.48$). The *Omnivore* thus appears to be a particularly versatile group that is active within the political system as well as in the community and on an individual level.

For the *Social mediast*, the mean values for political participation within the system ($M = 3.71$; $SD = 1.38$) and in activities that address the political system ($M = 3.77$; $SD = 1.03$) are similar. Participation in community activities is slightly lower ($M = 1.86$; $SD = 1.22$). However, individual political participation is average ($M = 3.65$; $SD = 0.98$). These results suggest that the *Social mediast* has an average to above-average level of political participation, with the individual level playing a greater role than community activities.

Overall, the results suggest that Fridays for Future supporters, particularly the *Omnivore*, tend to show diverse political participation. This includes activities within the political system, addressing the political system, community activities, and individual political actions. The focus on individual political action appears to be a defining characteristic, which is consistent with the shift towards more individual political action in the context of Fridays for Future described in the theory section.

Interestingly, the mean values of political participation within individual participation vary the most between the individual information repertoires compared to the other dimensions. Even if no significant difference in the characteristics of individual political participation could be determined between the repertoires, the relatively high standard deviation and the associated variation of the values indicate possible differences in the occurrence of the different forms of individual political participation. The dimension of individual political participation includes different political behaviors with a strong individual reference, including expressing one's own

opinion on social media on a political topic, as well as wearing clothing or other visible objects with a political message (e.g. a badge or a bag). This empirical conspicuousness coincides with the theoretical relevance of individual political participation mentioned above, particularly for younger protest movements, which assumes that the type and forms of participation also change due to the possibilities of the media and information environment, such as mobile and digital media. Accordingly, we focus on the individual forms of participation that form the individual dimension. These include initiating a political discussion or supporting a political issue (e.g. by founding a group, a crowdfunding initiative, association), sharing posts by others on Instagram or similar social media sites about a political or social issue, changing personal information in the social media profile due to a political or social issue (e.g. adjusting the profile picture), expressing your opinion in a post on social media about a political or social issue, buying or boycotting products for political, ethical, or environmental reasons, and wearing clothing or other visible items with a political message (e.g. a badge or bag).

The overall analysis of the sample shows average to above-average values for individual political participation. The highest mean values are found for buying or boycotting products ($M = 5.54$; $SD = 1.34$), sharing posts on social media ($M = 4.04$; $SD = 2.17$) and wearing political symbols ($M = 3.96$; $SD = 2.1$). The own posting of contributions on social media is lower compared to the sharing of contributions by others ($M = 3.38$; $SD = 1.99$), whereby the high standard deviation here indicates greater differences within the supporters of Fridays for Future in the sample. This supports the general tendency for individual political activities related to lifestyle and social media to play a significant role.

The results for the *Mobilist* in relation to individual political participation show lower mean values in almost all categories compared to the other information repertoires. In particular, participation in initiating or supporting political issues ($M = 2.21$; $SD = 1.73$) and sharing posts on social media ($M = 3.91$, $SD = 2.37$) is comparatively low. Participation in wearing political symbols ($M = 3.79$; $SD = 2.15$) is also below average. This suggests that the *Mobilist* may be less involved in individual political activities, especially in relation to social media and visible political symbols.

For the *Omnivore*, the results show above-average participation in almost all categories of individual political participation. Particularly striking is the high level of participation in initiating or supporting political issues ($M = 3.04$; $SD = 1.82$), sharing posts on social media ($M = 4.32$; $SD = 2.23$), changing their own profile information ($M = 3.5$; $SD = 2.08$) and wearing political symbols ($M = 3.89$; $SD = 1.99$). The Kruskal-Wallis rank sum test for changing one's profile information on social media (e.g., changing the profile picture) revealed a statistically significant difference among the groups ($\chi^2(2) = 14.128$, $p = 0.0008555$). Post-hoc comparisons using the Tukey method revealed that the *Mobilist* had significantly lower average scores than

the *Omnivore* (difference = -1.564, SE = 0.407, $t(92) = -3.838$, $p = 0.0007$) and the *Social mediast* (difference = -0.364, SE = 0.456, $t(92) = -0.798$, $p = 0.7049$), while the *Omnivore* had higher average scores than the *Social mediast* (difference = 1.200, SE = 0.500, $t(92) = 2.401$, $p = 0.0477$). This group appears to be active in a variety of individual political activities and participates intensively in both online and offline contexts.

The *Social mediast* shows average values in most categories of individual political participation. Participation in sharing posts on social media ($M = 3.95$; $SD = 1.57$) and wearing political symbols ($M = 4.45$; $SD = 2.16$) is relatively high. The results indicate that this group is, as the name suggests, more involved in social media but is nevertheless also active in other forms of individual political participation.

The analysis of individual political participation in the various information repertoires shows that the *Omnivore* generally has the highest participation, followed by the *Social mediast* and the *Mobilist*. The overall analysis of the sample indicates that individual political activities, especially in social media, play a relevant role in the participation of Fridays for Future supporters. The results suggest that the diversity of individual political participation among the supporters of this movement is pronounced both online and offline. The results show that the supporters of Fridays for Future differ (sometimes significantly) in their forms of individual political participation based on different information repertoires. A more detailed analysis of these initial findings is provided in the summary of all analytical findings at the end of this chapter.

Results

Table 16: Political participation per information repertoire (range: 1-7)

	The Mobilist	The Omni- vore	The Social mediast	Total sample
Size of the repertoire	12	8	5	25
Index political participation M (SD)	3.21 (1.02)	3.38 (1.05)	3.25 (0.89)	3.27 (1)
Participation within the system M (SD)	3.73 (1.44)	3.88 (1.37)	3.71 (1.38)	3.77 (1.39)
Participation targeting the system M (SD)	3.62 (1.21)	3.73 (1.21)	3.77 (1.03)	3.68 (1.16)
Community participation M (SD)	1.99 (1.11)	2.01 (0.88)	1.86 (1.22)	1.97 (1.06)
Individual participation M (SD)	3.5 (1.17)	3.9 (1.48)	3.65 (0.98)	3.65 (1.24)
Tested for significant differences between repertoires with Kruskal-Wallis				

Results

Table 17: Individual political participation per information repertoire (range: 1-7)

	The Mobilist	The Omni- vore	The Social mediast	Total sample
Size of the repertoire	12	8	5	25
Support political topic M (SD)	2.21 (1.73)	3.04 (1.82)	2.45 (1.57)	2.51 (1.74)
Sharing posts on social media M (SD)	3.91 (2.37)	4.32 (2.23)	3.95 (1.57)	4.04 (2.17)
Changing social media profile M (SD)	1.94 (1.58)	3.5*** (2.08)	2.3 (1.38)	2.47 (1.82)
Posting on social media M (SD)	3.32 (2.29)	3.46 (1.79)	3.4 (1.54)	3.38 (1.99)
Buying or boycotting products M (SD)	5.81 (1.28)	5.21 (1.1)	5.35 (1.69)	5.54 (1.34)
Wearing political symbols M (SD)	3.79 (2.15)	3.89 (1.99)	4.45 (2.1)	3.96 (2.1)

Tested for significant differences between repertoires with Kruskal-Wallis and Dunn-Bonferroni post hoc, *** $p < 0.001$

5.4.2 Political participation of Fridays for Future supporters over time

In addition to looking at political participation on a cross-sectional basis, the available data allows us to look at it over time. The observation over the course of time allows us to draw conclusions about the development and possible changes in the participation behavior of the Fridays for Future supporters studied. Accordingly, this gives us a better understanding of the temporal context of political participation, which enables us to derive more robust statements.

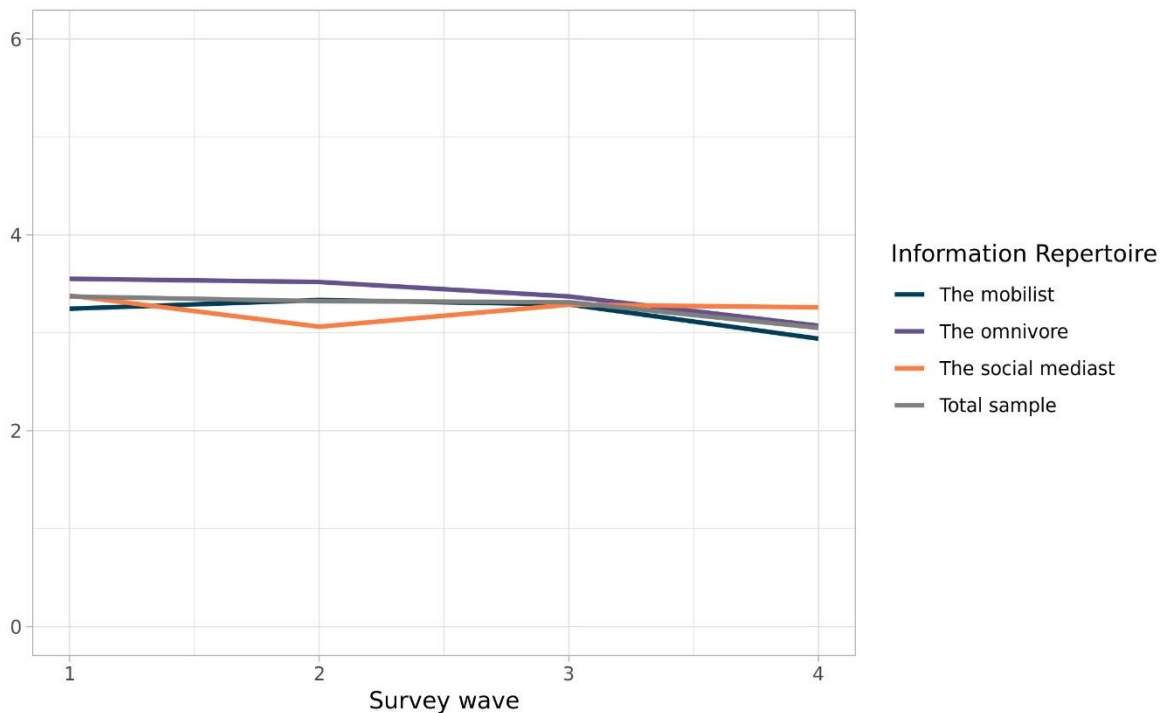
For this purpose, (3) the political participation of the entire sample as well as the information repertoires over time are also considered, and (4) a closer look is taken at the individual participation dimensions over time.

(3) The analysis of political participation for the entire sample over the course of the four survey waves, which cover the period from February to May 2023, shows a relatively stable level of political participation among the movement supporters surveyed. As already shown in the previous section, the level of political participation is in the medium range and remains almost

unchanged over the survey period. There is only a slight drop in political participation at the end of the period studied between waves three and four. Despite this very slight change in political participation towards the end, it can be assumed that the level of political participation can be considered very stable when looking at the entire sample. This could be an indicator that possible influencing factors that lead to a mobilization or demobilization of political action were unchanged during the period or that their impact only affects the Fridays for Future supporters studied over very long periods of time, which is not covered by the research period.

This initial impression seems to be confirmed when looking at political participation in relation to individual information repertoires over time. The time course of political participation for the individual information repertoires differs only slightly from one another. On the one hand, the level of political participation differs only lightly between the repertoires, which also changes only slightly over time for the *Mobilist* and the *Omnivore*. Here, only the information repertoire the *Social mediast* shows the most fluctuations, although these are also minor changes. The only striking thing here is that the level of political participation for the repertoires of the *Mobilist* and the *Omnivore* falls towards the end of the study period, while the *Social mediast* has the lowest level in the second wave and then rises again. A closer look at the change in political participation for the respective information repertoires suggests the assumption already made that the level of political participation is a relatively stable construct over time. Against this background, it can be assumed that either there was no major change in the factors influencing political participation within the period under study or that the level of participation only changed very slowly and over considerably longer periods of time. Nevertheless, minor differences between the information repertoires can be recognized.

Figure 21: Political participation over time

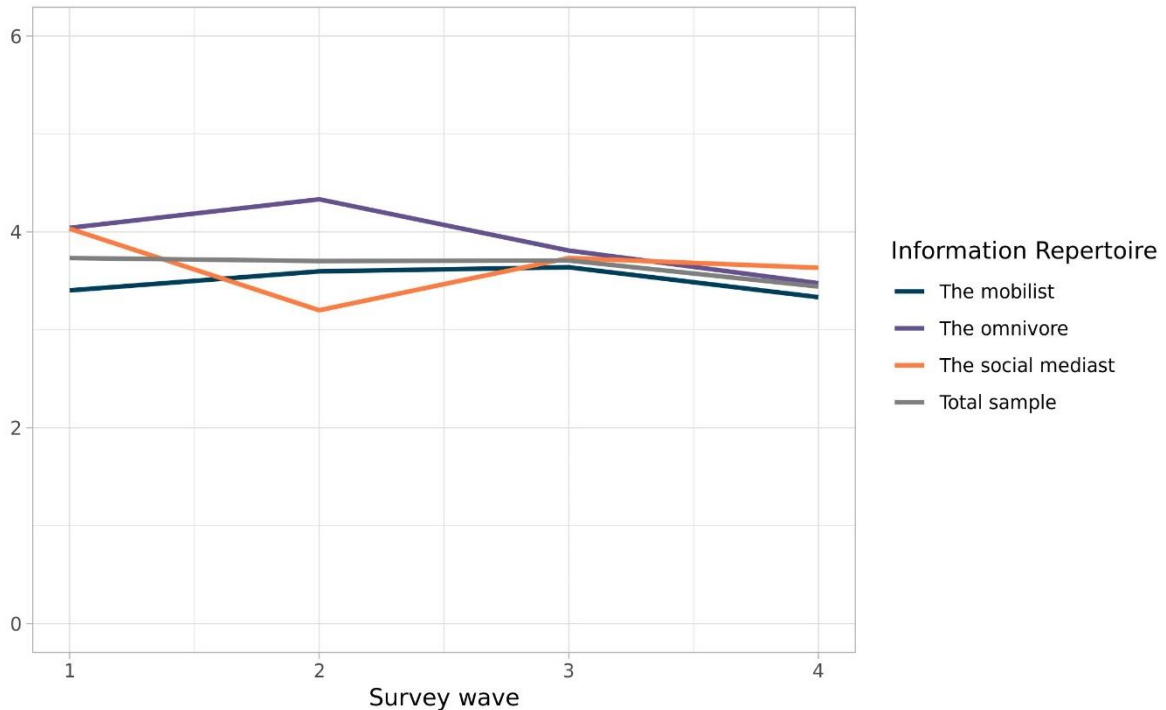


(4) These minor differences in the course of the level of political participation also remain when looking at the individual dimensions of political participation; both participation targeting the political system and participation within the system and the community show slight changes in relation to the information repertoires. However, the level of participation in the mentioned dimensions is also very stable over time for the sample studied.

At first glance, this also appears to apply to the individual participation dimension, as this also remains stable for the entire sample. However, a closer look at the characteristics of individual participation for the respective information repertoires shows that these are subject to considerably greater fluctuations over time. This shows that while the *Mobilist* exhibits very stable individual political participation over time, the level of individual participation fluctuates way more for both the *Omnivore* and the *Social mediast*. Specifically, the individual participation of the *Social mediast* drops significantly in the second wave of the survey, while at the same time the level for the *Omnivore* rises slightly and then drops again. In contrast, the level of individual participation for the *Social mediast* rises again after the sharp drop and settles at a similar level to the other repertoires. It is interesting to note that two of the three information repertoires experience a change in the level of individual participation, while the repertoire of the *Mobilist* remains constant. Accordingly, it can be assumed that the *Mobilist* did not experience any change in the mobilization factors, while this was the case for the other repertoires. Although these have different effects on the level of individual participation, it is possible that the identical effect on the two repertoires was different or that they were influenced by different influencing

factors. This could be an indicator of the (possibly moderating) influence of different media repertoires on individual political participation.

Figure 22: Individual political participation over time

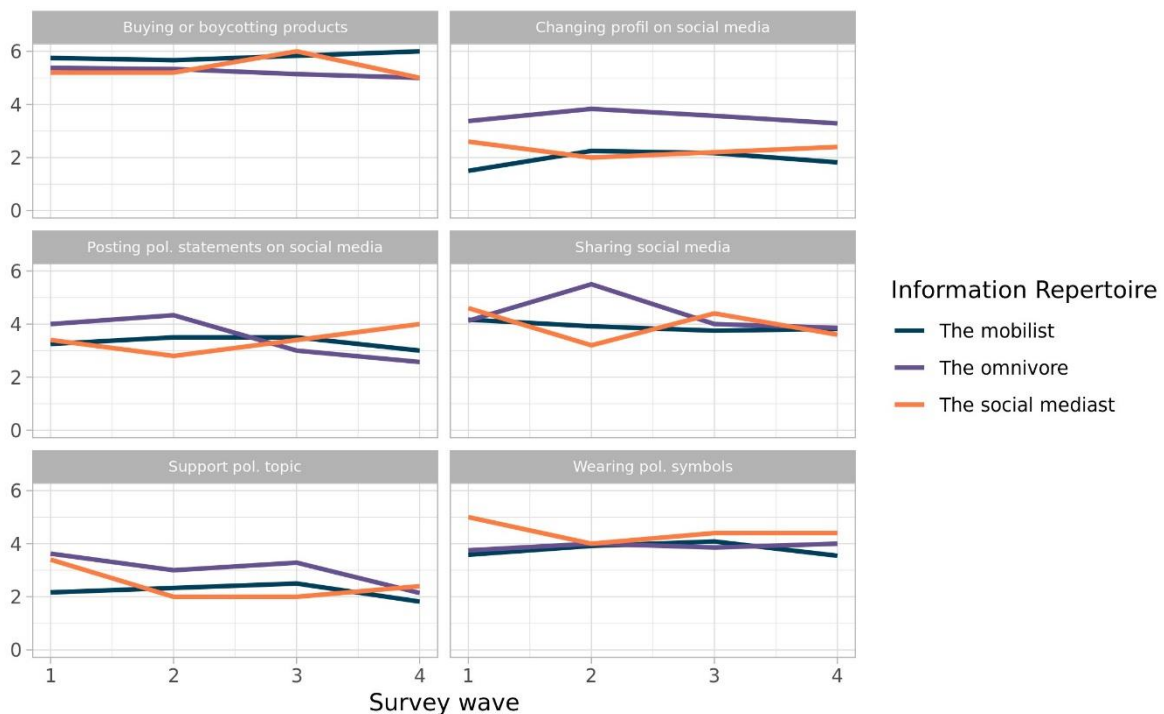


As a final step, we look at the individual behaviors of individual political participation and their change over the period under investigation for the respective information repertoires. Individual participation consists of supporting political issues, sharing other people's posts on social media, adapting profile information on social media (e.g. profile picture), posting your own posts, buying or boycotting products, and wearing political symbols and badges. This shows the division of individual political participation into two types of action, which include practices on social media on the one hand and individual actions away from these on the other. This dichotomy is also reflected in the way in which the level of participation of the respective information repertoires develops over time. Here it can be seen that the actions related to social media show clear fluctuations over time between the information repertoires, while the non-media-related political actions are stable over time, and the level of participation for the repertoires is almost identical. Accordingly, the level of participation with regard to buying or boycotting products and wearing political symbols is similarly high for all three repertoires. At the same time, this high level of participation for these two forms of individual participation hardly changes at all over the observed period.

This picture changes when we turn our attention to the forms of individual participation that are related to social media. Here we can see that both the sharing of posts by others on social media and the changing of profile information, as well as the writing of one's own political

statements on social media, vary in intensity between the repertoires and that the level of participation changes over time. With regard to sharing posts on social media, it can be seen that the level of this political action increases for the *Omnivore* in the second wave of the survey, while it decreases for the repertoire of the *Social mediast*. In the third and fourth waves, the level of the share of social media posts by others approaches a similar level again. At the same time, the sharing of posts for the *Mobilist* remains almost unchanged over the entire study period. This consistency of the *Mobilist* can also be seen in the posting of own political statements on social media, while here the *Omnivore* has the highest value for the first and second survey waves and then falls, the self-assessment of posting own statements for the *Social mediast* increases after the minimum in the second survey and reaches the highest value in the fourth wave. Thus, the *Omnivore* and the *Social mediast* swap in terms of posting posts with political content on social media. In terms of adapting their own profile information on social media for political or social reasons, the *Omnivore* repertoire is the most active over the survey period and shows the highest participation values. In contrast, the level of participation in relation to this form is considerably lower for both the *Mobilist* and the *Social mediast*, with the *Social mediast* showing slightly higher values for the first and fourth survey periods than the *Mobilist*.

Figure 23: Different forms of individual political participation over time



The overall view shows that there are differences between the information repertoires with regard to the forms of individual participation with reference to social media. There are not only differences in the level of participation but also in the changes over time. In summary, the

repertoire of the *Mobilist* is the most stable, showing almost no major changes over time in terms of participation. The situation is different for the repertoires of the *Omnivore* and the *Social mediast*, which show partly opposing developments in the level of participation at the same points in time. This could be an indicator of the influence of different behaviors and compositions of information repertoires on these social media-related forms of political participation. In the following section, we will bring together all the insights we have gained so far to explore this idea further.

5.4.3 The combination of gathered insights on political participation of Fridays for Future supporters

The final step is the analytical consolidation of all the insights gathered to this point. At this point, I bring together the most important insights gained and try to derive a coherent picture from them, which enables a better understanding of the possible connection between the different forms of political participation and political information usage behavior. To this end, we recall the findings that have already been collected and go through them in relation to a possible correlation, particularly with regard to social media-related participation.

We begin by recalling the analysis of Fridays for Future followers' mobile usage behavior by app category, which shows different forms of usage and combinations of apps throughout the day. The high presence of communication apps indicates a strong need for media-mediated information throughout the day. The usage curves indicate that news is mainly consumed in the morning, while usage decreases throughout the day. In contrast, browser usage shows relatively constant activity at a lower level, indicating a frequent need for information. Overall, the frequency of use and screen time vary greatly between individuals and days. The communication apps are characterized by many accesses with short usage times. The distribution of usage patterns is uneven, with the pattern of simple checking accounting for a significant proportion. Although the average app repertoire is relatively small, most users have a wider range of apps in use. Communication apps are often the first to be opened in a session, indicating a strong connection to mobile interaction with others. This is also reflected in the frequency of switching between open apps, with switching from one communication app to another being the most common.

This is also reflected in the mobile usage patterns in various clusters with different characteristics. The *Checking* pattern involves frequent, brief swiping between several applications with a small repertoire and a focus on communication and social media apps. The *Quick look into social media* cluster is characterized by a short use of social media apps, supplemented by a short use of communication apps, which indicates a relatively small repertoire. The *Extensive social media usage* pattern includes longer use of social media apps, a larger app repertoire, and interruptions due to short sequences of communication apps. *Quick browsing* is a short to

average session, mainly filled by browsing apps and often starting with a communication app. The *Browsing & chatting* usage patterns are relatively long, with a high presence of browser apps alongside social media and communication apps. *Short watching & chatting* is characterized by medium-length sessions that focus mainly on video material, with a moderate repertoire and a sequential opening to communication apps. The *Medium watching & chatting* pattern includes longer use of video and streaming services, complemented by shorter use of different app categories. Further, the *Long watching & chatting* shows a long period of use and a large number of apps used. Finally, *News apps, chatting & browsing* patterns are characterized by a medium duration of use, a high number of different apps, and a significant contribution of news and communication apps to the total session duration. Each usage pattern presents a unique combination of app types and usage durations.

These mobile usage patterns are also incorporated into the formation of the three information repertoires: The *Mobilists* are politically interested, well-educated supporters of Fridays for Future, who mainly consume journalistic content via smartphones and maintain a lively exchange with peers using communication applications. This contrasts with the *Omnivores*, who are somewhat younger and more broadly informed and use various sources of information, with search engines and personal contacts being particularly relevant. Although they use their smartphones intensively for information, this is not directly reflected in their usage patterns. The third group, the *Social mediast*, is characterized by its focus on social media and video platforms but uses traditional channels for political information. Despite different sources of information, all groups show a high level of *political interest, opinion leadership, and certainty* with regard to climate change.

The proportion of *mobile political exposure* in these information repertoires varies greatly. It can be seen that the *Mobilist* has a lower participation in political discussions compared to other information repertoires, which indicates a more selective use of political conversations via smartphone and less variation in the daily duration of conversations. Although this group shows a high level of *political interest, opinion certainty, and opinion leadership*, it could be assumed that people with this information repertoire are more likely to have personal conversations and use their smartphones less for political discussions. The *Omnivores*, on the other hand, show the highest proportion of *mobile political talk*, which indicates a broader range of political topics. However, the high standard deviation suggests that the duration of these conversations can vary greatly, which could indicate different interests and levels of engagement within this group. In contrast, the *Social mediast* group shows the lowest average daily duration of *mobile political talk* and tends to engage in short-term discussions, indicating limited involvement in political topics. However, it is important to note that the values for this group should be treated with caution due to the small sample size.

In the overall analysis, differences can be identified in mobile usage patterns, analog and digital information sources, and their frequency of use, as well as in the information repertoires derived from them in relation to political participation. These differences can also be seen in the proportion of political exposure. In summary, the overall view of the sample shows moderate political participation in all dimensions, including within the political system, in activities concerning the political system, in community activities, and in individual political participation. The results indicate that Fridays for Future supporters have a relatively broad repertoire of forms of political participation, with participation in community activities being the least pronounced. With regard to the different information repertoires, the results show that the *Mobilist* tends to focus more on forms of political participation within or targeted at the political system and individual political action than on participation in community activities. The *Omnivore*, on the other hand, shows more diverse participation both within the political system, in the community, and at an individual level. For the *Social mediast*, the results indicate that political participation is at an average to above-average level, with the individual level playing a greater role than community activities. With regard to the forms of individual participation in connection with social media, there are differences between the information repertoires, with the *Mobilist* showing the most stable repertoire, while the *Omnivore* and the *Social mediast* show partly opposing developments in participation. This could indicate the influence of different behaviors and compositions of information repertoires on these forms of political participation associated with social media. A more detailed evaluation of the results is provided in the discussion section of the thesis.

6 Discussion & limitations

The discussion section of this thesis serves to critically classify, synthesize, and interpret the extensive results presented in the previous analysis chapters. Here, the insights gained through the in-depth analysis of the relationship between political information use behavior and forms of political participation among supporters of the Fridays for Future movement are embedded in a broader academic context. Furthermore, the nuanced complexities that emerged during the research process will be addressed.

As we attempt to unravel these layers of complexity in information consumption patterns and political engagement, this section serves to embed and contextualize the broader implications of the findings. By placing these observed behaviors, which include smartphone usage patterns, information repertoires, and the various forms of political participation, into the context of existing literature and theoretical frameworks, we seek to gain meaningful insights that contribute to our understanding of the dynamic interplay between information consumption and political participation.

The discussion is divided into several interconnected sections, each addressing specific facets of the findings. Beginning with a comprehensive examination of smartphone usage patterns, the multiple dimensions of smartphone use among Fridays for Future supporters are discussed in more detail. This will attempt to unravel the nuances of how individuals engage with political information on their smartphones and embed this within the larger research context.

The next section extends the analysis to a broad spectrum of analog and digital information sources and focuses on the identified information repertoires. The information repertoires obtained are integrated into the existing literature on information and media repertoires, thereby expanding the existing knowledge in order to gain a better understanding of information usage behavior in a hybrid media environment.

In addition, the results of the two innovative approaches to capturing political exposure, which include the evaluation of screen recordings and the linking of app tracking with self-reports, are discussed. This section not only highlights the intricacies of political exposure and talk on mobile devices but also attempts to provide a more detailed analysis of the respective advantages and disadvantages of the two approaches.

Furthermore, the discussion summarizes the cumulative results and establishes links between information behavior and the various forms of political participation. There is a differentiated discussion of possible connections and possible mechanisms that influence the political engagement of Fridays for Future supporters in Germany.

The final part of the discussion includes a reflection on the theoretical and methodological limitations of this thesis, which may or may not have an influence on the findings. Among other

things, it addresses the gaps in the theoretical framework as well as methodological limitations with regard to the research design, the sample, the study period, and the data collection methods used.

Essentially, the discussion section allows for a reflective discussion of the findings of this thesis, which provides a comprehensive perspective on the meaning of the study findings within the broader academic discourse. With this synthesis, I hope to contribute valuable insights into the field of political communication and deepen my understanding of the complex dynamics that shape contemporary political participation and information usage.

6.1 RQ 1: Mobile information usage patterns of supporters of Fridays for Future in Germany - Discussion

The analysis of mobile information usage patterns has shown that the smartphone accounts for a relevant proportion of general information usage in everyday life. This section serves to integrate the collected findings into the existing state of knowledge, which is reflected in the existing literature about mobile media (information) usage. The aim here is to compare the findings in this thesis with the literature in terms of similarities and differences and thus develop a broader and more comprehensive understanding of the phenomenon.

In order to achieve this goal, we will look at the various components of mobile information usage behavior in conjunction with the findings from the current state of research. (1) We will begin with a synopsis of the more general and overarching components of mobile media use, which include the app categories used and their use over the course of the day. The focus here is on identifying possible similarities and differences in the way the smartphone is used by the Fridays for Future supporters studied.

After looking in more detail at overall smartphone usage, we turn our attention to the identified usage patterns and their implications for information usage behavior. Here, we first deal with the largest identified usage pattern (2) *Checking* and discuss the special aspects as well as the possible influence of this behavior pattern on information behavior. Especially in relation to existing theoretical concepts such as *permanently online and permanently connected*, *news finds me perception* and *news avoidance*. (3) This is followed by an examination and embedding of *Social media & chatting* usage patterns, which are also discussed in terms of their relevance with regard to information behavior and the theoretical concepts mentioned. (4) Following on from this discussion, we will look at browsing usage patterns and their implications for search behavior on mobile devices. (5) This is continued by a synopsis and detailed discussion of audio, video, and streaming usage patterns and their relevance for the use of information by (young) politically active people. (6) The discussion of mobile usage patterns concludes with an examination of the news app in relation to existing findings in the literature and

existing theoretical approaches, such as the aforementioned *permanently online and permanently connected*, motivations for information use and *personal curation*.

In this way, we are able to obtain a more comprehensive picture by integrating the usage patterns of the Fridays for Future supporters studied into the existing literature. With these new findings, I would like to contribute to an improved understanding and the (further) development of theoretical concepts for information use and its effects in the context of a mobile media environment.

(1) We begin with a more detailed examination of the more general results of mobile information use and smartphone use. The findings from the smartphone behavior of the Fridays for Future fans studied can be generalized relatively well due to the long study period and the high number of measurement points. We first look at the daily smartphone usage, the average daily usage duration, the number of apps used, the use of the various app categories in relation to the usage duration and number of accesses, as well as the use of the app categories over the course of the day and the most frequent transitions and sequence of accessed mobile applications.

The analysis of the frequency of the mobile sessions of the Fridays for Future supporters examined showed that there is a large variation both between the individual participants in the study and between the days examined. This finding that the number of times a person picks up their smartphone and opens one or more apps with it can vary greatly is in line with existing findings in the literature (Hosseini et al., 2010; Vassili et al., 2016). In their study, Hosseini et al. (2010) found a wide range of interactions with the smartphone, which varied from 10 to 200 per day. The number of just over 50 interactions in the Fridays for Future survey lies within this range. At this point, however, I would like to point out once again the different ways of operationalizing interactions with the smartphone. In this thesis, the mobile sessions that include at least one app use are examined. Therefore, simply looking at the smartphone display to read the time will not be recorded as an interaction. Despite these possible differences in operationalization, the findings from this thesis and the literature show that although people use the smartphone frequently, the number of interactions with it can vary greatly both on a daily basis and between individuals.

The finding that smartphone use can vary greatly applies not only to the number of interactions but also to the duration of smartphone use. At more than 3.7 hours, the average daily usage time of the supporters surveyed is almost three quarters of an hour higher than the average in Germany (Howarth, 2023). Although a direct comparison of usage durations is probably difficult, the substantially higher usage duration of the sample examined in this thesis indicates that the Fridays for Future supporters examined have higher smartphone usage than the population average. However, I doubt that this difference is due to the fact that they are supporters

of Fridays for Future. It is much more likely to be an age or generational effect, which has nothing to do with the political activism of the people surveyed.

When looking at the interactions and total smartphone usage time together, it becomes clear that the individual mobile sessions also show a greater range in their usage time. The frequency and duration of mobile sessions vary greatly between the days and people studied, which could indicate that smartphone use is highly context-dependent. At the same time, the average duration of a mobile session in the sample studied ($M = 2.73$ minutes) is considerably longer than the duration of just under one minute found in the literature (Böhmer et al., 2011). On the one hand, this could be due to a different operationalization of the session, which includes very short periods of time, such as looking at the time without using an app, and thus reduces the mean value down. On the other hand, a change in usage behavior since the publication of the study by Böhmer et al. (2011) is possible due to users who now spend longer uninterrupted periods of time on their smartphones, for example, to watch video content, and thus shift the mean session duration upwards.

During the time in which the participants use the smartphone, they use various mobile applications. It is noticeable here that shorter sessions have few apps accessed and that the number of individual, unique apps increases with the duration of use. However, it is interesting to note that a repertoire size of six unique apps is approached, which is then no longer exceeded regardless of the duration of the session. This means, that even a long session usually includes no more than six distinct mobile applications. Accordingly, these findings would indicate a relatively stable use of a smaller number of apps, which are used very regularly and thus form a kind of core repertoire. This assumption is supported by Dohyun et al. (2019)'s study, which found that users tend to use a smaller set of apps over time, and a core set of apps are used stably over time, while other apps, such as games, have a shorter lifespan.

However, time plays a role not only in the duration but also in the time of use during the course of the day. Here, the analysis of the app categories used over the course of the day shows an almost classic pattern, which is referred to in the literature as a diurnal pattern and thus corresponds to the expected form of the increase in the morning, the plateau around noon, and the peak in the late afternoon before usage drops off towards the evening (Tong et al., 2022). Furthermore, similar patterns found in the literature can be confirmed, such as the tendency to use news apps more frequently in the morning (Böhmer et al., 2011). By contrast video applications are increasingly found in the evening.

In addition, apps appear to be determined not only by their position in usage over the course of the day but also in relation to the app or app category used previously or subsequently. Existing literature has already made it clear that app pairs can be identified on the basis of

their downstream use (Tseng & Hsu, 2014). However, existing studies have increasingly focused on e-commerce and found correspondingly frequent combinations of use, such as the use of e-commerce applications and payment apps (Huang et al., 2017; Liu et al., 2018). It is therefore hardly surprising that in this thesis, with a different thematic focus, more app combinations were identified in relation to communication and social media applications.

The synopsis shows that mobile media use varies greatly between and within individuals and days, both in terms of total usage time, the duration of the sessions, and the number of interactions with the smartphone. This could be an indicator of the high context dependency of mobile media use, which is influenced in particular by local, social, and other contextual factors. This observation is in line with existing findings, which have identified the local and social context in particular as influential for the type of smartphone use (Do et al., 2011; Karen & Barry, 2008). Furthermore, it can be assumed that the sample studied spends slightly more time on their smartphones than the population average, which is most likely due to the age of the individuals studied, but that the time spent is typically distributed throughout the day. Against this background, it is clear that the smartphone is a constant and relevant part of everyday life for the supporters of Fridays for Future.

(2) The mobile usage pattern of *Checking* is a frequent but short behavioral pattern in which users swipe back and forth between different applications, whereby they have a limited selection of mobile applications. This pattern of behavior on mobile devices also characterizes the user group of *checkers*, who have very frequent but short mobile sessions and thus distinguish themselves from *waiters* and their long and evenly distributed sessions. However, the usage pattern of checking is not limited to *checkers* but also occurs among so called *responsive* users, who show both variants (Cao et al., 2018; Jones et al., 2015).

The high occurrence of checking patterns indicates that the observation by Costera Meijer and Groot Kormelink (2015) is confirmed, which states that with the advent of the smartphone, the range of existing media usage behavior has been significantly expanded and thus previously relatively rare behavior patterns, such as checking, will be much more pronounced. Before the advent of the smartphone as a source of information, regular checking for news was limited to, for example, turning on the radio on the hour (news broadcast). Accordingly, the pattern of behavior appears to be closely interwoven with the use of mobile devices and, due to its frequency and presence throughout the day, to be a relevant and defining pattern of behavior for supporters of Fridays for Future.

A key aspect of this usage pattern is its close connection to users' information needs. Karen and Barry (2008) show that mobile usage, like checking, is closely intertwined with the satisfaction of informational, geographic, and personal needs that are highly dependent on time and place. This is consistent with the findings of Rahmati and Zhong (2013), who describe

young people's smartphone use as mobile, locally dependent, and closely linked to social contexts.

Accordingly, *Checking* shows clear characteristics of an information need, which assumes that people develop a need for information, especially when existing knowledge is not sufficient to achieve a goal (Hasebrink & Domeyer, 2010). As a result, they consciously search for further information in order to close knowledge gaps. In the context of *Checking*, including non-directional needs and group-related information needs in particular could represent a fundamental motivator for the behavioral pattern, as the people studied have an interest in the continuous monitoring of their own social and political environment.

In relation to this monitoring process, the concept of *personal curation* could play an important role (Thorson & Wells, 2016). The concept of *personal curation* is actually based on information behavior on social media but can also be applied to the smartphone, as users here also curate the content and notifications themselves by specifically selecting apps and their notification rights and thus at least partially determining the flow of information on the smartphone. The *Checking* behavior pattern could be the observable end product of this upstream *personal curation*, as users satisfy their need for information by briefly checking apps and notifications. More or less compulsive behavior, such as the fear of missing out, offers a different perspective or explanation on this specific usage behavior. This selective and partially targeted behavior reflects the conscious selection of content (Thorson & Wells, 2016).

The constant connection with others through mobile devices is another striking feature of smartphone use, which is strongly reflected in the high occurrence of the usage pattern of *Checking* over the course of the day. The permanent availability of online mobile devices such as smartphones and the permanent connection to others, information, and services have created a highly intimate and powerful relationship between many people and communication technology in their daily lives. This permanent connection contributes to the emergence of the *permanently online, permanently connected* (POPC) mindset, which influences the way people think, feel, experience, and act in their social worlds (Vorderer & Klimmt, 2020). Accordingly, the influence also affects the perception and execution of political protests, such as Fridays for Future, and should move it more strongly into the everyday life of the respective person through its constant mobile presence.

Overall, the *Checking* usage pattern enables users to quickly and frequently switch between different applications, satisfy their information needs, and selectively curate content while maintaining an ongoing connection with others. This contributes to a profound change in individual habits and daily social behavior.

(3) Some characteristics of the *Checking* usage pattern can also be transferred to the three usage patterns related to social media, which include the *Quick look into social media*, *Social media & chatting* and *Extensive social media usage*.

The *Quick look into social media* usage pattern can be characterized by the relatively brief use of social media apps, which is supplemented by the brief but frequent use of communication applications. Basically, the usage patterns have a relatively small repertoire size, which is also reflected in the dominance of the frequency of these few applications when transitions occur. Ultimately, this usage pattern can be described as the social media variant of the *Checking* pattern. Due to this high similarity of the behavior pattern with the previous control pattern, it can also be assumed here that direction-independent as well as group-related information needs represent a relevant motivator for the behavior pattern since the people studied have an interest in the continuous observation of their own social, societal, and political environment (Hasebrink & Domeyer, 2010). This usage behavior is particularly likely to occur in everyday situations in which the person is waiting, commuting, or otherwise on the move and focuses their attention on the smartphone during these relatively short periods of time (Böhmer et al., 2011; Do et al., 2011). This behavior is also supported by the design of social media platforms, such as Instagram, which encourages fast scrolling and swiping and thus promotes the prevalence of checking and snacking on information, possibly leading to a more heuristic processing of information (Anter & Kümpel, 2023).

This also applies to the *Social media & chatting* and *Extensive social media usage* patterns, which are characterized by the dominant use of social media applications, accompanied in part by the sporadic use of communication apps. *Extensive social media usage*, in particular, is characterized by a long duration of use and a relatively large app repertoire. Despite the large number of apps used, the majority of usage time is spent using social media applications, interrupted by short sequences of communication applications. The longer usage times of these usage patterns could indicate a further need for information, in addition to the undirected and group-related ones, which bind the interest for a longer period of time. Accordingly, there could also be one or more time-stable, topic-specific information needs as motivators for a longer period of use (Hasebrink & Domeyer, 2010), which can cover entertainment, hobbies, or political topics, among others, depending on the area of interest. There could be a link here to the concept of *personal curation*, in that the supporters surveyed actively choose to follow certain accounts on social media (Merten, 2021; Thorson & Wells, 2016). Due to a lack of data, this remains an assumption at this point. The supporters surveyed show a high level of *political interest*, and it is therefore possible that this interest is also expressed by following political or activist accounts on social media in order to satisfy their need for information in this subject area. However, the composition of the feed is not the only possible source of information on social media. A user's own social media contacts and friends also influence what content they

come across, making “information use on the platform an inherently social experience” (Anter & Kümpel, 2023, p. 14). However, some social media platforms, such as Instagram, do not have a sharing function like Twitter (now X) or Facebook, yet users on Instagram often share posts and other content via messenger applications or the integrated messenger on the social media platform, as Anter and Kümpel (2023) impressively show. This behavior pattern could be a possible explanation for the high proportion of communication applications and messenger apps in social media usage patterns. It is possible that the combined use of social media and messenger apps within a usage pattern indicates the sharing of content between platforms by the Fridays for Future supporters studied. Based on the available data, it is not possible to make a reliable statement about the proportion of shared content within this usage pattern. The sharing of content and the associated incidental exposure of the content by the receiving person could represent a part of the information behavior of supporters on social media. This influence of social contacts is also reflected in the surveys on mobilization for movement protests, in which respondents stated that social contacts were a relevant factor in their own mobilization for the protest (Wahlström et al., 2019).

The results of this study are consistent with the findings of other studies that social media is an integral part of the information repertoire of young adults (Anter & Kümpel, 2023; Hasebrink et al., 2021; Hölig et al., 2020), where the flow of (political) information is characterized by *personal curation* and incidental exposure by peers. Differences can be seen in the type of usage pattern over the course of the day. The use of social media on a mobile device is a widespread behavior that shapes daily life in various ways.

(4) In addition to the usage patterns related to social media, the Fridays for Future supporters surveyed exhibit two usage patterns, with a high prevalence of browsing apps. These mobile usage patterns are, on the one hand, *Quick browsing* characterized by a short to average-length usage session, which is mainly filled by the use of browsing apps (Web browser application), while the *Browsing & chatting* usage pattern has a longer usage time and social media and communication applications. Both usage patterns often start with the use of a communication app, which is also reflected in the frequency of transitions in this app category.

These patterns of behavior on the smartphone suggest that users have certain information needs, which they fulfill by using browser apps and the search functions they contain. Accordingly, it can be assumed that the information needs of users associated with the browsing usage pattern can be divided into different categories. On the one hand, there are concrete problem-oriented information needs that result from specific situations and require certain information, such as looking up an address (Hasebrink & Domeyer, 2010). Whereby these rather short and probably smaller missing information in everyday situations owed search behavior

can rather be mapped to the *Quick browsing* usage pattern. On the other hand, thematic interests play a role, which describe an active, conscious, and time-stable orientation towards a specific area of knowledge, for the satisfaction of which a longer period of use is also used (Hasebrink & Domeyer, 2010).

We know from existing literature that the use of web apps, i.e., browser applications, occurs more frequently while waiting or using public transportation (Böhmer et al., 2011; Do et al., 2011). The idea is that people use this available time, especially during these waiting and driving times, to carry out specific problem-oriented searches relevant to the daytime situation or to deal with an area of knowledge of their interest (Dan & Shaobo, 2018).

The aforementioned combination of browsing with communication and social media apps shows that this pattern is not only aimed at searching for information but also at interacting with others and sharing content (Dan & Shaobo, 2018). Clear evidence cannot be provided with the available data, but both the longer usage sessions and the high presence of browser and communication applications during these sessions may be an indicator of content sharing (Dan & Shaobo, 2018).

Following Dan and Shaobo (2018) reasoning about mobile search behavior, the many app transitions may reflect users' follow-up actions after searching on their mobile devices. The switching between different apps may be triggered by feedback from search results, interruptions during the search, and follow-up actions after the search. This illustrates that browsing usage patterns are not limited to searching for information but also include interacting with different apps and continuing actions after searching (Dan & Shaobo, 2018).

The overall view from the findings of this thesis and the literature consulted shows that the two usage patterns with browsing behavior are more likely to be due to problem-oriented and thematic information needs, which occur in particular in waiting and commuting situations and are embedded in a broader context of social media and communication apps, which can be represented both by sharing content and interrupting or follow-up behavior.

(5) Besides the usage patterns already mentioned, there are a number of usage patterns that mainly serve the reception of audio and video content. These include the *Music & audio only* usage pattern, which reflects interaction with audio applications when the screen is active. This usage pattern has a comparatively short duration, which is characterized by the strong dominance of music & audio applications. This is also reflected in the order in which the mobile applications are opened and the transition between the individual apps, with the music and audio applications playing the biggest role. The short usage time of this usage pattern contrasts with the findings from the literature, which assume a longer usage time for multimedia applications (Silva et al., 2018). However, it is very likely that the short duration of use of the *Music & audio only* usage pattern is due to limitations in data collection with the tracking app, which

only records apps that are running in the foreground. With most music and audio applications, these are moved back to the background after active interaction with the app, such as starting or pausing music, where the app continues to play the audio content but is no longer recorded by the tracking app. Accordingly, it can be assumed that the duration of the *Music & audio only* pattern is strongly underestimated in this work and that, in reality, the supporters of Fridays for Future surveyed consume a significantly higher proportion of audio formats. This assessment is also supported by the findings from the survey, in which a relevant number of supporters stated that they regularly consume political, social, and entertainment podcasts and that these are (in some cases) a relevant source of political information. Against this background, it can be assumed that the *Music & audio only* usage pattern plays a relevant role for the Fridays for Future supporters surveyed, at least in part, with regard to their political information behavior, although the duration of this usage pattern is greatly underestimated due to the limitations of the data collection.

The correct recording of the duration of use does not play a role in video and streaming applications, but it does concern a conceptual problem. In this work, three video and streaming usage patterns were identified, which include *Short, Medium and Long watching & chatting*. These usage patterns are mainly used for a medium- to long-term period of time, probably for watching video content. The length of the sessions is also reflected in the size of the repertoire, which ranges from moderate to large. In addition, the usage pattern is characterized by the high presence of video and streaming applications, which are often opened after using communication applications. The longer duration of these usage patterns is in line with current research, which assumes a longer duration of use for multimedia applications such as video apps (Silva et al., 2018). According to the literature, these multimedia applications, similar to social media apps, are preferably used during waiting times or while commuting (Böhmer et al., 2011).

The high presence of communication applications in combination with video & streaming apps can be interpreted in two ways. On the one hand, there is the possibility that opening the video & streaming application is a direct consequence of receiving a communication app, for example, by clicking on a link to a video platform. In this case, there would be a direct connection in usage behavior between communication and video applications, with the communication app providing the initial trigger for the downstream behavior. The other option is to string together two independent behavioral sequences, one of which involves checking the communication applications for news and then engaging in a new behavioral sequence that involves opening video & streaming applications. In the second case, there would be two independent and randomly occurring sequences of behavior that are not directly related to each other.

However, the high functionality of multimedia applications posed a conceptual problem. The conceptual separation of social media applications such as Instagram and more video-oriented applications such as YouTube has become difficult due to the introduction of new features such as reels on Instagram and shorts on YouTube. Both applications have video content and the ability to follow accounts and interact with them using different functions. This convergence and the adoption of successful functions of large digital platforms make it more difficult to classify these applications or digital platforms into existing categories. It should be emphasized here that in recent years, features relating to videos have mainly been added to the digital platforms or enhanced with functions. This development not only affects the well-known top dogs, such as Instagram, but also continues with streaming platforms and video-on-demand providers. Against this background, the categorization of mobile apps within this thesis can be discussed and criticized. In my opinion, however, it is difficult to define a time-stable categorization against the background of the constantly changing functionality of the applications.

The high level of functionality is also reflected in the way video applications are used, some of which offer a highly differentiated range of content. Due to this high functionality and the broad spectrum of content, it is possible that the use of video & streaming apps can be attributed to different information needs, ranging from thematic interests to group-related information needs (Hasebrink & Domeyer, 2010). Existing studies with young people in Germany show that video platforms, such as YouTube, are a preferred media platform for their own information behavior (Hasebrink et al., 2021). Against this background, it is reasonable to assume that the reception of content on video platforms also satisfies thematic information needs that are more stable over time. The findings of Hasebrink et al. (2021) support this assumption. In their study, they identify differences in terms of topic preferences for news as well as the high relevance of social media and video platforms and the influencers and stars represented on them for information behavior and opinion formation (Hasebrink et al., 2021). The following of social personalities and influencers is also reflected in the responses of the supporters of Fridays for Future surveyed in this thesis. The influence of video platforms on opinion formation could be closely linked to group-related information needs, which include the exchange of information and experiences within the group as well as agreement on common interests, goals, and values in order to build a *group identity* and trust. Here, ethnographic research shows that Fridays for Future activists consciously rely on the use of TikTok to mobilize younger people for their own protest movement (Belotti et al., 2022). This is particularly interesting in light of the fact that video platforms may have a greater impact on political learning and participation than social media platforms such as Twitter and Facebook (Sangwon et al., 2022). It is difficult to say to what extent this really applies to the supporters of Fridays for Future examined here, but it is certain that audio and video platforms are a relevant part of mobile information behavior.

The synopsis of this convincing research result with the findings on the high presence of video & streaming applications among the Fridays for Future supporters studied could indicate both a high relevance of the audio, video, & streaming usage patterns for the political information behavior of the group and a potentially impactful behavior in terms of political participation. Regardless of this, it is clear that the use of audio & video platforms is an integral part of mobile media use.

(6) The use of news apps also accounts for a relevant but small proportion of the usage patterns. Specifically, this involves two usage patterns, firstly that of *News apps only*, which can be summarized as a relatively short to medium-length use of news apps, which can also be characterized by the occurrence of communication apps and a rather small number of distinct used apps. In addition, sessions of this usage pattern often start directly with the opening of a news app or, in rarer cases, with a communication app. On the other hand, *News apps, chatting & browsing*, are characterized by a relatively medium duration of use and a correspondingly high number of apps used in different ways, with news apps and communication apps accounting for a large proportion of the total session duration and the transitions between applications. The analysis of the use of news apps during the course of the day by the Fridays for Future supporters surveyed support the finding in the literature that news apps are often used at the beginning of the day (Böhmer et al., 2011). However, the data in this thesis shows that the level of news app usage is highest in the morning but remains present throughout the day, which could be due to a different daily routine.

One interesting aspect is the relatively short duration of use of the *News apps only* usage pattern, which is more indicative of a scanning or scrolling behavior of the current news situation in the respective news apps. Groot and Costera (2020) describe a similar behavioral pattern in their study, in which they state that experienced and skilled users tend to read the news quickly because they are skilled in navigating the device, use digital environments efficiently, and are good at separating relevant and non-relevant information. Interestingly enough, this quick and overview-like grasp of political information did not necessarily lead to a lack of attention (Groot & Costera, 2020). Accordingly, it is difficult to assess the usage pattern identified in this thesis of *News apps only*, which points to this brief overview of news.

Although the second usage pattern—*News apps, chatting & browsing* has a longer duration of use, it brings another interesting aspect more into focus. This usage pattern illustrates the combined use of news apps, browser applications, and communication applications in one usage session. Against this background, this pattern can be interpreted in different ways. On the one hand, there is the already discussed possibility that this is a coherent pattern of behavior in which the communication application provides triggering content, for example, a shared link to a news page. In this case, the applications opened one after the other and in

combination would actually have an interdependent effect, providing the respective trigger for the subsequently opened application. The second possibility would assume that there is no direct connection between the use of the different app applications and their subsequent use, but that their subsequent use is a purely random combination. However, the results of the survey of Fridays for Future supporters allow the conclusion that although the sharing of political information is a common practice, it is not extremely frequent. This finding is also reflected in the survey of young German news users (Hasebrink et al., 2021). Against this background, it is reasonable to assume that some of the sessions in this usage pattern are the result of receiving shared political content, although the extent cannot be determined. Nevertheless, the findings from this thesis suggest that the use of mobile news apps is a common behavior among some supporters of the Fridays for Future movement, but not shared by all participants studied.

Key findings of RQ1

RQ 1: How can different forms of mobile political information used by supporters of Fridays for Future be identified and characterized?

Empirical key findings: The young and politically active supporters of Fridays for Future have a higher smartphone usage time than the average in Germany with clearly distinguishable mobile usage patterns. Furthermore, the data show that both the total smartphone usage time (M = 3.7 hours) and the duration of the usage sessions (M = 2.73 minutes) and the number of interactions vary greatly between the individuals and the active days. The usage patterns illustrate a close interweaving of cross-platform and cross-app behavior on the smartphone, which shows the almost constant communication with others, as well as the high relevance of social media and video and streaming applications in media and information use. The use of news apps also accounts for a relevant but small proportion of usage behavior. News apps are used more frequently in the morning, while video and streaming apps are increasingly found in the evening.

Methodological key findings: The use of tracking data makes it possible to carry out a detailed analysis of user behavior on the smartphone that would not have been possible using conventional forms of data collection, such as surveys. In addition, the operationalization of the mobile tracking data with the session approach enabled the detailed identification of small-scale and cross-app or cross-platform user behavior.

6.2 RQ 2: Information repertoires of supporters of Fridays for Future in Germany - Discussion

The analysis of mobile and analog information usage behavior showed that the smartphone plays a relevant role in the overall information repertoire, but that this is supplemented by other behaviors and sources of information. This section serves to classify the findings in the current scientific discussion regarding information repertoires. I would like to compare the results of this work with the literature in terms of similarities and differences in order to develop a broader and more comprehensive understanding of the phenomenon.

In order to come closer to this goal, I will consider the findings obtained and the information repertoires identified in conjunction with the findings of the current state of research. (1) I will begin with a more general consideration of the broader and overarching components of information repertoires. In particular, I will focus on the similarities and differences in terms of the number and composition of the information repertoires in this thesis compared to the repertoires described in the literature.

After we have taken a closer look at the overarching elements of the information repertoires, we turn to the characterization and discussion of the respective repertoires. (2) We start with the information repertoire of the *Mobilist*, before taking a closer look at (3) the *Omnivore* and finally focusing on (4) the *Social mediast*. (5) We conclude with a brief summary of the most important findings.

In this way, we hope to gain a more comprehensive picture by integrating the information repertoires of the Fridays for Future fans studied into the existing literature. The insights gained in this way should improve the understanding of information use and contribute to the further development of theoretical concepts of information use.

(1) Before we discuss the individual information repertoires identified in more detail, I would first like to address some more general observations, which give us a better understanding of the validity of the repertoires identified. These include the number of repertoires identified, the absence of the minimalist repertoire, the relatively good fit between the repertoires identified in this work and the findings from the literature, and the new form of repertoire, the *Mobilist* as a strongly mobile device-focused information repertoire.

With the three information repertoires (the *Mobilist*, the *Omnivore*, and the *Social mediast*, the number of information repertoires identified in this study is slightly lower than the number found in other studies. Most of the studies were able to identify four to five information repertoires, with some studies examining younger people and others referring to the general population (e.g. Edgerly, Vraga, et al., 2018; Geers, 2020; Strömbäck et al., 2018). Against the background that this thesis refers to the supporters of Fridays for Future and thus to a group of

young and politically active people in Germany, I believe that the number of identified information repertoires is plausible.

One possibility for the slightly low number of information repertoires lies in the absence of the minimalist repertoire (sometimes also referred to as news avoiders, non-news users), which describes a group of people who consume little to no political information and news and are not very interested in political topics or news (Geers, 2020; Hasebrink et al., 2021). The absence of this user group is a possible explanation for the slightly different number of information repertoires identified among the Fridays for Future supporters surveyed. On the other hand, it allows interesting conclusions to be drawn about the news usage of the sample studied. This shows that all of the supporters of Fridays for Future studied have a high to very high level of news usage or use of political information and that, despite the comparatively high intensity of use, differences among the participants can be identified in the way of usage behavior and the composition of the repertoires. Accordingly, the findings indicate that the level of *political interest* has an influence on the frequency with which political information is used. In view of the fact that a very high level of *political interest* was found among all supporters of Fridays for Future in the sample studied, this high level of *political interest* could explain the absence of common repertoires such as the news avoiders. This indicates the successful implementation of the underlying research design of this thesis, which aims to keep the influence of usage frequency as constant as possible across the Fridays for Future supporters studied in order to gain a better understanding of the relationship between specific usage behaviors and political participation.

Furthermore, the good fit between the identified information repertoires and the repertoires taken from the literature is striking. This shows that in multiple cases there is a large overlap in the characteristics of the repertoires (Dinnar & Nossek, 2019; Edgerly, Vraga, et al., 2018; Geers, 2020; Hasebrink et al., 2021), which on the one hand speaks for relatively stable and recurring behaviors and repertoire compositions and on the other hand for the robustness of the information repertoires identified in this thesis. The recurring characteristics relate in particular to the information repertoires of the *Omnivore* and the *Social mediast*, which are examined in more detail below. These two information repertoires are joined by the *Mobilist* as a new information repertoire not previously found in the literature, which is characterized above all by its strong focus on mobile information use and thus complements the existing literature. The existence and size of this information repertoire speak to the high relevance of the smartphone in terms of everyday practices related to the consumption of news and other political information.

Accordingly, we will first dedicate ourselves to the contextualization, characterization, and discussion of the findings of this thesis on the *Mobilist* in relation to existing insights from the literature before we turn our attention to the *Omnivore* and the *Social mediast*.

(2) The results of this thesis show that the *Mobilist* can be seen as a politically interested, well-educated news user who consumes journalistic or civic content via smartphone and has a strong political point of view. These Fridays for Future supporters are interested in keeping up to date with the latest news and events. A closer look at the content received shows that the *Mobilist* prefer journalistic and professional, politically informative content, for which they mainly use news apps and podcasts. When selecting the podcasts, the *Mobilist* uses formats that are of journalistic origin or content from civil society actors, such as activists. On average, the *Mobilist* uses traditional news sources such as television, radio, and print magazines, as well as social media to a lesser extent. Due to their use of information and their *opinion leadership*, it can be assumed that they engage in regular political conversations.

What is interesting here is the strong focus on the smartphone as the device used to access politically informative content and news. The existence of the information repertoire of the *Mobilist*, who heavily uses the smartphone as a device for information use, represents an addition to the existing knowledge of the literature (e.g. Edgerly, Vraga, et al., 2018; Geers, 2020) and thus supplements the range of possible information repertoires. Given that almost everyone in Germany owns a smartphone (Tenzer, 2024), which offers a wide range of functions and allows flexible and mobile use throughout the day, the relevance of the smartphone in information repertoires is not surprising. To what extent the information repertoire is based exclusively on the use of smartphones cannot be said with conclusive certainty due to the lack of data for PC use. Nevertheless, it seems that for some users, the smartphone is replacing other devices with which information can be accessed.

The content accessed via smartphone on the *Mobilist* is mainly of a journalistic, professionally civic, or political activist's nature. The supporters of Fridays for Future, with this information repertoire, make greater use of news apps and thus journalistic content as a source of information compared to the other supporters. With regard to news apps and institutionalized forms of news use, the *Mobilists* identified in this thesis are similar to the information repertoire of the traditionalists in the study by Geers (2020). Against the backdrop of the high use of smartphones as a source of information, the term traditionalist no longer seems appropriate. Accordingly, I use the term *Mobilist* in this thesis. The use of news apps as a direct access route to journalistic content indicates that this group gives high priority to this type of content. The high prioritization of journalistic content is reflected in the findings of the information repertoire study of young Germans, which identified the two repertoires of the journalistic information-oriented and the comprehensive information-oriented (Hasebrink et al., 2021). These

information repertoires have a high interest in news and consider it relevant to be informed about current events (Hasebrink et al., 2021). Accordingly, they frequently use journalistic sources and, in the case of the comprehensively information-oriented, also resort to non-journalistic sources (Hasebrink et al., 2021). The *Mobilist* seems to lie between these two information repertoires, as he or she uses both journalistic and, in some cases, non-journalistic content. Nevertheless, the findings indicate that the *Mobilist* also shows a high prioritization of journalistic content. One possible explanation for the use of journalistic content on the smartphone could lie in previously developed routines that have been transferred to the smartphone. This argument builds on Trilling and Schoenbach (2015b), who assume that once people have decided to read a certain newspaper or watch a certain television program and thus benefit from the functions that these offers fulfill, they do not stop using them just because there are now some online offers that fulfill similar functions. I would modify this argument in relation to younger user groups and argue that it could be that the routines mentioned in relation to the media outlet are retained, but that these are transferred to a device that is used more by this group, in this case the smartphone. This argument could be supported by the findings that some younger people have traditional news-oriented repertoires (Edgerly, Vraga, et al., 2018) and that the news repertoires of older people are also reflected in the group of younger people (Geers, 2020). It is assumed that this phenomenon is explained by the socialization of younger people by their parents (Vaala & Bleakley, 2015). The supporters of Fridays for Future with the *Mobilist* repertoire are a somewhat older group than the one addressed in the aforementioned literature. Nonetheless, it is possible that this group has retained the relevance of journalistic sources and the associated routines imparted by their parents through socialization in their use of information and has transferred this to the smartphone. This prioritization of journalistic content could also be reflected in a *personal curation* of the smartphone. According to the concept of curation, which assumes that the fundamental action of our media environment is curation, the studied supporters of Fridays for Future are at the center of the respective individual information networks, which comprise several overlapping content streams and are curated by different actors, including themselves (Thorson & Wells, 2016). Against this backdrop, supporters can intervene in these content streams in a partially curatorial way by being able to select news apps and manage their notifications.

The possibility of independent and individual selection of content is reflected in the use of podcasts, which are characterized by a wide range of podcasting actors (Hasebrink et al., 2021), where the supporters of Fridays for Future examined decide independently whose content they consume. The results of this work show that when selecting podcasts, the *Mobilist* draws on a mix of entertaining non-journalistic content as well as content from journalistic, activist, and political actors. This pattern is also reflected in the existing literature. In the litera-

ture on young people's use of news in Germany, podcasts are mainly listened to by comprehensively and non-journalistically information-oriented people, with influencers and topic-oriented content being the most widespread offerings (Hasebrink et al., 2021). In addition to these actors, comprehensively information-oriented people in particular also select content from news media and journalists, as well as activists and NGOs (Hasebrink et al., 2021). Given that podcasts are enjoying increasing popularity, especially among younger age groups, it is not surprising that podcasts occupy a relevant position in the identified information repertoires (Hölig et al., 2020). The reasons for this growing popularity include a wide range of topics and perspectives, a better understanding of the topics conveyed, and their practical and flexible use (Hölig et al., 2020). The *Mobilist* is the only information repertoire that uses podcasts to any significant extent and differs accordingly from the other identified repertoires both in the use of news apps and the use of podcasts.

One possible explanation for the different usage could be the slightly different age structure between the *Mobilist*, the *Omnivore*, and the *Social mediast*. On average, the *Mobilist* is the oldest group of Fridays for Future supporters surveyed, and it can therefore be assumed that their life situation differs at least in part from the other groups. This assumption is supported by the study by Dinnar and Nossek (2019), which found differences between very young, middle-aged, and slightly older young adults in terms of their news usage preferences over the course of the day. However, the differences could be due not only to age, but also to education or social status. This seems rather unlikely, due to the lack of significant differences in terms of social status and level of education. This is in line with the findings from the literature, which indicate that the level of education does not have a strong influence on the composition of the information repertoires (Geers, 2020).

Geers (2020) was able to show that the users of the information repertoires differed most in terms of their *political interests* and political knowledge. This distinction is not found in the data of this thesis, which is most likely due to the relatively specific population and the corresponding sample of supporters of Fridays for Future. The observation that both information behavior and the corresponding composition of information repertoires differ despite a very similar level of *political interest* and other political predispositions, such as *opinion leadership* and *opinion certainty*, suggests that there are other factors influencing the composition of information repertoires.

Overall, the findings of this thesis in relation to the *Mobilist* can show that news media repertoires are personal (Elaine, 2011). Whereby the *Mobilist* differs from the other information repertoires in particular through his strong focus on the smartphone as an information device and the use of news apps and podcasts. Against this background, there is much to suggest that

the *Mobilist* makes a conscious selection of information sources. It also shows that the preference for journalistic content is in line with existing findings on the news behavior of younger people in Germany.

(3) In contrast to the *Mobilist*, the *Omnivore* presents a different picture. This identified group of Fridays for Future supporters is characterized by a wide range of digital and analogue information sources, which, however, are only perceived as relevant to a limited extent for forming their own opinions. This does not apply to the use of search engines and personal contacts, which are perceived as very relevant for forming opinions. Interestingly, the *Omnivore* stated in the survey that he or she uses his or her smartphone a lot as a source of information, although this is only partially reflected in the mobile usage behavior. Furthermore, the *Omnivore* is somewhat younger, politically interested, opinionated, and certain in regard to climate change.

The *Omnivore* has a very broad information repertoire, which consists of a combination of analog and digital information sources that he or she accesses via smartphone as well as non-mobile devices. Information users with such a wide range of different information sources are often referred to in the literature as news omnivores (Edgerly, Vraga, et al., 2018; Yuan, 2011). The news omnivore behavior is also found among younger news users, who are characterized by high to moderate attention to all types of news content (Geers, 2020; Van Rees & Van Eijck, 2003). Social media and other digital platforms have a relevant but not exclusive place in these repertoires (Schmidt et al., 2019). The information consumption behavior of *Omnivores* is interesting in light of the numerous ways in which they consume news, as they continue to rely in part on traditional devices and information sources. This information behavior is consistent with the findings from the literature relating to young people (Edgerly, Vraga, et al., 2018). These include the use of analog devices, such as the television, as well as the reception of established news outlets and public broadcasting (Edgerly, Vraga, et al., 2018), which is also reflected in the results of this work on the *Omnivore*. The use of the smartphone as a device for receiving political information and news by the supporters of Fridays for Future is also reflected in the information repertoire of the *Omnivore* (Edgerly, Vraga, et al., 2018). However, Edgerly, Vraga, et al. (2018) found in their study that only the information repertoire of the omnivores uses the smartphone for political information behavior. This is a clear difference from the findings from this thesis, in which all identified information repertoires make strong to very strong use of the smartphone to obtain political information.

In the literature, there are a number of explanatory approaches that discuss the possible background of the news omnivore information repertoire, which, to a large extent, can also be transferred to the *Omnivores* in this thesis. On the one hand, there is the assumption that young people with limited access to mobile devices and a high interest in news initially resort to the

available analog devices, such as TV and radio, and thus develop certain behaviors and routines, which are then maintained in older years even when using the smartphone (Edgerly, Vraga, et al., 2018). Furthermore, several studies assume that young people adopt their parents' news consumption due to socialization and thus use similar devices and information sources as their parents (Vaala & Bleakley, 2015). The housing situation could play a greater role here, as it is possible that some of the participants still live with their parents and take over their media consumption accordingly. Regardless of the housing situation, it is possible that this imprint is partly transferred to the smartphone as a newer form of information use, but that the learned routines and behaviors nevertheless remain, resulting in a broad spectrum of different information sources and devices. The transfer of consumption routines to the smartphone could be facilitated by the lack of other devices in the new living situation. Another explanation is based on the findings that news omnivores have a strong interest in political topics and tend to perceive the media as biased, which means that they try to capture as good and broad a range of opinions as possible through the widest possible range of information from a wide variety of sources (Edgerly, Vraga, et al., 2018). The high *political interest* of this group is also reflected in the high level of political participation (Edgerly, Vraga, et al., 2018). To what extent one or more of these explanatory approaches apply to the supporters of Fridays for Future with the information repertoire the *Omnivore* examined in this thesis cannot be said with conclusive certainty.

Among the wide range of information sources used by the *Omnivore*, direct personal contact is an important source of political information and news. The high relevance of personal contacts for obtaining political information is a distinguishing feature from the *Mobilist* and the *Social mediast*, for whom personal contacts also play a role but to a lesser extent. Accordingly, direct personal and face-to-face contact still appears to be an important source of political news for younger people, despite the wide range of digital and mediated communication channels. This assessment is in line with the literature, which also found a consistent relevance of peers, friends, and colleagues as a source of political information and conversation partners across all surveyed age groups (Dinnar & Nossek, 2019). Personal contacts are also of particular interest in view of the fact that for many young adults friends, family and acquaintances exert a strong influence on the formation of political opinion (Hasebrink et al., 2021)

For the *Omnivore*, traditional and online television as well as radio are another important source of political information and news in addition to personal contacts. The use of television as an information medium is also reflected in surveys of young people in Germany, in which 17% stated that television is the most important source of news for them (Hölig et al., 2020). Hasebrink et al. (2021) came to similar conclusions in their study, in which they showed that linear television and radio are relevant sources of information for people with a comprehensive or journalistically oriented information repertoire. Against this background, it is reasonable to

assume that some of the characteristics of the *Omnivore* are also found in representative samples and that these are not characteristics of the Fridays for Future supporters studied but rather correspond to the general nature of young people and their use of information in Germany.

In summary, the *Omnivore* can be described as the equivalent of the news omnivore among the Fridays for Future supporters studied, who is characterized by a broad spectrum of devices and information sources. This broad spectrum includes more traditional and analog information sources as well as digital and mobile information channels. The reasons for this broad repertoire derived from the literature range from acquired routines and behaviors, socialization by parents, and the attempt of news omnivores to cover as balanced a spectrum of opinions as possible. The *Omnivores* are on average significantly younger than the *Mobilists* but do not differ from the other identified repertoires in terms of educational background and social status, as well as *political interest*, *opinion leadership*, and *opinion certainty* on climate change.

(4) The *Social mediast* represents the smallest repertoire, which is made up of well-educated, relatively young, and socially well-off supporters of Fridays for Future who use a high level of social media and video platforms on their smartphones. In addition to social media, this group also obtains its political information from traditional channels such as television or radio. The political orientation of this group is very similar to that of the *Omnivores*, with both groups showing a high degree of *opinion leadership*, *opinion certainty*, and a high level of political interest.

The frequent use of social media as a relevant source of information can be found in a whole series of studies, which have identified a high level of interest in these non-institutionalized forms of information usage, particularly among younger people (Dinnar & Nossek, 2019; Edgerly, Vraga, et al., 2018; Geers, 2020; Nossek & Adoni, 2017). What is interesting here is the focus on the platform as a source of information; it is unclear whether the use of the platform is detached from the access device. Clarification of this question is not possible in this thesis due to the methodological focus on recording mobile information use, and there are also few indicators in the literature of the use of a specific device for the use of social media. There is only one indication that the repertoire of online news users, which is very similar to that of *Social mediast*, also increasingly uses apps and therefore mobile devices (Geers, 2020). Nevertheless, the question remains to what extent social media use takes place mainly on one device or on several.

Irrespective of the open question of the smartphone in relation to the social media use of the *Social mediast* in the sample studied, this interactive and non-institutionalized form of information behavior is a relevant part of the repertoire. According to the literature, social media repertoires can unite two types of users. On the one hand, active social media users who

actively curate their feed and online activity by following or blocking (Thorson & Wells, 2016), ensure content related to their areas of interest and topics is displayed (Edgerly, Vraga, et al., 2018). On the other hand, the users whose displayed content is based on the curation of peers and algorithms and who have not made their own conscious decision to compile the feed (Valenzuela et al., 2012). Whether and to what extent these two behavioral patterns are reflected in the *Social mediast* repertoire cannot be said on the basis of the available data.

In addition to social media, the use of video platforms plays a dominant role in the composition of the information repertoire. Representative data for Germany shows that 14% of all adult internet users used the video platform YouTube as a source of information in 2020 (Hölig et al., 2020). In younger groups, video platforms, and YouTube in particular, as one of the most prominent representatives, are an important source of news and political information (Hasebrink et al., 2021). However, video platforms are used in particular by young people who are not interested in journalism and who are interested in comprehensive information (Hasebrink et al., 2021). That said, video platforms are not only used exclusively for audiovisual content but sometimes also for playing podcasts, for which YouTube, for example, is the second most frequently used platform in the 18–24 age group (Hölig et al., 2020).

The *Social mediast* does not only appear to be interested in audiovisual content from mobile and digital information sources, as this group also uses traditional TV and radio as a source of information. This observation is consistent with the findings of existing studies, which also found an overlap between the combination of social media and TV and radio use among the repertoires of younger people (Nossek & Adoni, 2017). I have already discussed the reasons discussed in the literature for the perpetuation of traditional media when digital options are available in the previous section. At this point, I would once again like to briefly point out the possible socialization of young people by their parents with regard to media use and the potential influence of their living situation as reasons for the use of traditional media types.

The *Social mediast* is potentially exposed to content that cannot be clearly categorized as news or political due to the high use of social media and video platforms. The functionalities of these platforms enable the production and sharing of a wide range of content, which increasingly blurs the boundaries between content that is clearly journalistic and can be declared as news and content created by other non-journalistic users (Dinnar & Nossek, 2019). This unclear distinction also changes the recipients' perception of what is considered news (Anter & Kümpel, 2023; Swart et al., 2017). This blurring of boundaries between potentially political and news-relevant content leads to a softening of the understanding of news and makes it more difficult to operationalize, measure, and record it. For example, the changing perception of what news is, is reflected in measurement inaccuracy in self-reported surveys

With regard to socio-demographic differences, it has already been shown in the previous sections that there is a significant age difference between the *Mobilist* and the *Omnivore*, although this does not include the *Social mediast*. However, the *Omnivore* group differs from the *Social mediast* group in terms of gender composition, in which the *Omnivore* is male-dominated and the *Social mediast* shows a more balanced gender distribution. This pattern reflects the findings of the study on the information behavior of young people by Geers (2020), which also found more female-dominated social media and stronger male-dominated news omnivore repertoires. The extent to which the data presented in this thesis can be generalized with regard to gender is doubtful.

Overall, the results of this study with regard to *Social mediast* show that social media and audio & video platforms represent a relevant part of media usage behavior as well as political information behavior. In the course of this repertoire, the increasing blurring of the boundaries between political and non-political exposure in a digital media environment becomes clear. This shows that the *Social mediast* not only uses video formats for digital media but also for more traditional media in the form of TV and radio.

(5) At a higher level, the comprehensive analysis of the information repertoire shows that the methodological approach used, which involves a combination of automated mobile tracking and survey data, is intriguing because this approach enables a holistic view of the broader context. From a theoretical perspective, it becomes clear that even within a group of politically active and politically interested individuals, significant differences in information behavior can be seen through the lens of repertoires. The prevailing idea in the literature that the formation of information repertoires is primarily due to different levels of political and news interest proves to be an inadequate explanatory framework.

In this study, three different information repertoires were identified in a cohort of politically engaged and active young supporters of Fridays for Future. It is noteworthy that all of these repertoires show a pronounced tendency to consume political information, albeit in different ways. Interestingly, in contrast to the literature, no minimalist repertoire, which is often attributed to different levels of political or news interest, could be identified. Furthermore, the study underlines the importance of mobile devices for everyday information consumption, as they account for a significant proportion of the identified repertoires. However, given the research design, which focuses on the survey of mobile information use, the risk that the relevance of smartphones could be overestimated must be pointed out.

Key findings of RQ2

RQ 2: How can different types of information repertoires of supporters of Fridays for Future be identified and characterized?

Empirical key findings: The analysis shows that all three identified information repertoires - the *Mobilist*, the *Omnivore* and the *Social mediast*, make strong to very strong use of the smartphone to obtain political information. The participants' exceptionally high level of *political interest* may account for the absence of common repertoires such as news avoiders. The *Mobilist* is characterized by a strong focus on the smartphone as an information device and the use of news apps and podcasts, with a preference for journalistic or civic content. The *Omnivore* is characterized by a broad spectrum of digital and analogue information sources. The smallest repertoire is the *Social mediast*, which is made up of relatively young and socially well-off Fridays for Future supporters who make intensive use of social media and video platforms on their smartphones. The politically active, engaged, and news-consuming supporters of Fridays for Future exhibit significant variations in their information behavior, suggesting that relying solely on *political interest* and news consumption as an explanatory framework is insufficient for understanding the formation of information repertoires in this thesis.

Methodological key findings: The operationalization of RQ2 shows the useful combination of mobile tracking and survey data. This combination is made possible by further aggregation at the user level of the previously identified usage patterns, which ensures the comparability of mobile tracking and survey data.

6.3 RQ 3: Mobile political exposure & talk - Discussion

Mobile and digital media in particular not only enable the reception of information content but also offer the opportunity to disseminate it via various functions and to exchange information with others. Interaction with news via social media platforms and messengers has become an integral part of the dissemination and consumption of online political information (Kümpel et al., 2015).

Information about political developments, protests, proposed legislation, and other social developments is not only absorbed silently but often leads to conversations with colleagues, friends, and family (Mcclurg, 2003). Thinking and talking about political issues leads to a better understanding and consolidates both the knowledge and the categorization of the information

received (Cho et al., 2009), which can happen both digitally and face-to-face. The exposure of political information in (semi-)public digital spaces such as Telegram groups or Twitter, as well as the forwarding of news in private conversations on messenger apps, is a precursor and entry point for (media-mediated) interpersonal exchange on political topics.

In digital media environments, both the production and consumption of news are becoming increasingly blurred (Dinnar & Nossek, 2019). The supporters of Fridays for Future examined in this thesis consume their news via cross-media platforms, disseminate and share news via social media and messenger apps, and express their opinions on social media. The blurring of boundaries in the reception and production of political informative content due to the diverse possibilities of the mobile and digital media environment is a well-known phenomenon within this thesis and is consistent with the findings of other studies (Anter & Kümpel, 2023).

Despite this difficult distinction between reception and subsequent engagement with this content, in this thesis I first seek to address the elements of political exposure and the associated reception of political content on the smartphone by the supporters of Fridays for Future studied. To this end, we bring together the insights gained from the two different methodological approaches within this study and relate them to the existing literature. (1) This begins with an examination of the *mobile political exposure* and thus the political information received in different ways for the entire sample of supporters, and then in relation to the identified information repertoires. (2) Before we turn our attention in the second step to the phenomenon of *mobile political talk* as a particularly relevant form of engagement with political content for the supporters of Fridays for Future and their information repertoires.

In this way, I attempt to integrate the insights gained in this thesis on the *mobile political exposure* and *talk* of Fridays for Future supporters in the present sample into the findings of existing research and thus gain a better understanding of the phenomenon.

(1) The comparison with existing studies suggests that the duration of news usage among the Fridays for Future supporters surveyed may be slightly above the population average. The proportion of political exposure per active day and participant differs depending on the data collection method. While the collection using screen recording averages just under 4 minutes ($M = 3.93$) per day, the value of the combination of self-reports and app-tracking is slightly under 10 minutes per day ($M = 9.86$). The reasons for the different measurement results will be discussed in more detail in the later section, reflecting on the two data collection methods and their advantages and disadvantages. At this point, we would first like to look at the implications of the political exposure, the possible range of which lies between four and ten minutes on the smartphone per active day and participant. The proportion of political exposures per active day and participant in the overall sample of Fridays for Future supporters is relatively low compared to the total daily smartphone usage time and varies between 1.79% and 4.46%

of the total average screen time per day, depending on the data collection (screen recording or combination of self-report and app-tracking). This range of values corresponds relatively well with the automated tracking study by Merten et al. (2022) who investigated the proportion of news in the Facebook feed using automated tracking. The lower value, which is based on screen recording, corresponds relatively exactly to the proportion of news domains visited from the tracking study by Wojcieszak et al. (2023). However, this study looks at the number of views and not the duration of news usage. This is also the case in the study by Stier et al. (2021), who found that on average, people visit slightly more than two news sites per day. Both studies refer to representative samples and therefore reflect the average of society. Against the background that politically active and interested supporters of Fridays for Future were examined in this thesis, the somewhat higher values for the use of political information are realistic. The extent to which the values of the two studies are comparable with the results of this thesis also remains unclear in view of whether the duration of use corresponds to the number of visits. Nonetheless, comparing the results with those of other studies allows us to assess the Fridays for Future supporters surveyed, which suggests that the group's duration of use may be slightly above the population average.

The overall analysis of the self-assessed usage shares for political exposure of the apps examined shows that a basic pattern can be identified at the level of the overall sample. This shows that individual mobile applications are used for political exposure to varying degrees, even within an app category. This observation is an indicator of the relevance of individual preferences, usage purposes, and behaviors of the Fridays for Future supporters studied in relation to individual apps. The communication apps, which in this case consist of WhatsApp, Discord, Signal, Telegram, Trello, and Slack, are used to varying degrees for political exposure. WhatsApp shows the lowest proportion of political use, which contradicts the findings from Belotti et al. (2022) ethnography, for which WhatsApp represents a relevant organizational and political platform for exchange in the Fridays for Future Rome group she studied. This could be due to cultural or national differences, but also to possible random differences in the two small samples. The low threshold of WhatsApp as a means of communication and for exchanging ideas with like-minded people is also reflected in the coordination processes and in the founding phases of local groups (Döninghaus et al., 2020; Rucht & Rink, 2020). The data from this thesis suggests, with its low use of WhatsApp for political purposes, that the supporters surveyed used WhatsApp less to coordinate political support groups and instead relied more on organizational tools such as Trello and Slack. The data shows that these organizational tools were used almost exclusively for political exposure, which, in combination with their functionalities as organizational and coordination tools, suggests a corresponding use within the Fridays for Future groups. The two messenger apps Signal and Telegram lie between WhatsApp and the organizational tools in terms of their political usage share, which

suggests a more politically oriented use but not an exclusively organizational one. The different proportions of political exposure in the communication apps examined indicate possible differences in the user group or the thematic exchange or communication behavior. Accordingly, it can be assumed that different apps are used for different purposes and associated information behaviors.

The social media apps also differ in their share of political exposure, with Instagram being used to a lesser extent for political purposes and Twitter (now X) being used much more for political exposure. These findings are only partially reflected in the existing literature, from which it is clear that for the Fridays for Future groups, social media, and Instagram in particular, is an important tool for disseminating information, representation, and mobilizing for political action (Belotti et al., 2022; Sommer et al., 2019). The discrepancy between the low political exposure among the individual supporters of Fridays for Future examined and the findings from the literature, which focus on the level of political groups or the movement, could lie in the diversity of the individual Instagram feed, which contains political content but is supplemented by other topics. Accordingly, from the group's perspective, there could be a high relevance for posting content on Instagram, although this is only reflected to a much lesser extent in the recipients' individual feeds. Furthermore, the difference in the degree of political exposure between Instagram and Twitter shows that there is also a tendency towards more topic- or issue-specific use of social media in social networks, with Twitter being used more for political exposure and Instagram fulfilling a less specific or more undirected information-driven purpose (Anter & Kümpel, 2023).

This pattern is only partially reflected in the apps in the video platform category, which in this case consists of YouTube and TikTok. Here, it can be seen that both TikTok and YouTube are used for political purposes. Although TikTok has higher average values for political exposure on the platform among the Fridays for Future supporters surveyed, these also fluctuate greatly between the individual supporters, indicating that TikTok can be strongly geared towards individual information needs. This is also reflected in the Belotti et al. (2022) study, which was able to identify the deliberate use of TikTok by the Fridays for Future group Rome to mobilize younger supporters. This does not apply to YouTube, which is used to a lesser extent for political content but is used much more consistently and to a similar extent by the supporters surveyed.

Supporters with the information repertoire of the *Mobilist* show the lowest proportion of *mobile political exposure* in both methodological approaches (screen recording and the combination of self-reports and app-tracking). The *Mobilist* uses the smartphone mainly for journalistic and professional, politically informative content, for which they use news apps and podcasts to a high degree. They also have a high level of *political interest*. Accordingly, we would initially

assume that the *Mobilist* group shows a higher degree of political exposure via smartphone. However, this is not reflected in the data. There are two possible reasons for this: First, there is the possibility that both methodological approaches for data collection are inadequate for this group, as these supporters of Fridays for Future increasingly rely on audio content for political exposure, which cannot be adequately captured by either approach. We will discuss this possibility in more detail in the section on the methodological reflection of the approach. Secondly, there is the possibility that the values reflect the actual duration of the political exposure. However, this does not necessarily indicate for a lower use of information but, following the argument of Groot and Costera (2020), instead speaks for very experienced news users who are able to quickly grasp the relevant information in a very short time due to their high knowledge of the news structure and their practice. Whether this is really the case in this instance cannot be said on the basis of the available data.

The group of *Omnivores* shows an average level of political exposure on the smartphone using both the screen recording method and self-report in combination with app tracking. In view of the fact that people with this information repertoire use a variety of different devices and information sources for the reception of political information, the duration of the political exposure on the smartphone seems appropriate in comparison to the other information repertoires. The already discussed high similarity of this repertoire with the news omnivore known in the literature (Edgerly, Vraga, et al., 2018; Geers, 2020) as well as the result from the survey, which indicates a high relevance of personal contacts as a source of information, could strengthen the assumption that this group of supporters of Fridays for Future does not conduct a relevant proportion of political exposure via smartphone. Accordingly, it can be assumed that part of the political exposure of the *Omnivore* was not captured by the two measurement methods and is therefore underestimated in this thesis.

Both screen recording and the combination of self-reports and app-tracking lead to the highest value of political exposure on the smartphone for supporters of Fridays for Future with the *Social mediast* information repertoire. This group of supporters has the highest duration of smartphone use of all the repertoires examined. Correspondingly, the high duration of use also appears to be reflected in a high proportion of *mobile political exposure* or political content received. In addition to the use of traditional television, this information repertoire is characterized above all by the high use of social media and video platforms on the smartphone, which also frequently takes place in relatively long sessions. Accordingly, it can be assumed that the participants in the *Social mediast* information repertoire have seen the most political and climate-related content on their smartphones compared to the other supporters in the sample, which illustrates the relevance of social media platforms such as Instagram for younger people's use of information (Anter & Kümpel, 2023).

(2) With regard to the duration of *mobile political talk*, it can be seen that the observed differences in the duration of the political exposure are also partly reflected in the duration of the *mobile political talk* among Fridays for Future supporters, which ranges from 1.13 minutes to 0.89 minutes per participant per day. On the one hand, *mobile political talk* refers to the simultaneous use of the keyboard and the occurrence of political or climate-related terms on the smartphone, which are recorded using automated tracking and screen recording. On the other hand, in the second measurement method, political talk is understood as the simultaneous use of the keyboard and the use of the recorded app usage, which results from the self-reported weighting of the political exposure. Despite the different forms of operationalization and data collection, both methods produce comparatively similar results in terms of the duration of political talk per day on the participants' smartphones. This suggests that the results of the surveyed sample of Fridays for Future supporters are (mostly) reliable. The methodological advantages and disadvantages of the two data collection methods in relation to political talk are discussed in more detail in the section on methodological reflection on the two methods. With regard to the interpretation of the values for the duration of the *mobile political talk* of the Fridays for Future supporters examined, the author is unfortunately not aware of any studies that have recorded the duration of political talk in an everyday situation on mobile, digital, or face-to-face. Accordingly, there is a lack of comparative values for the evaluation of the present findings. Nevertheless, it is possible to address the different information repertoires according to their scope of political talk.

The *Mobilist* has one of the lowest proportions of *mobile political talk* in both measurement instruments compared to the other information repertoires. This is initially surprising in view of the fact that smartphone use is the most relevant component of this information repertoire. There are a few possible explanations for this: on the one hand, it is possible that the *Mobilist* group seeks and engages in political conversations to a lesser extent and therefore does not talk about politics in face-to-face situations or in digitally mediated conversations. However, this possibility seems rather unlikely due to the high *opinion leadership* and the high *political interest* of the individuals. Another possibility is that people with this information repertoire are very selective in their choice of interlocutors for political conversations and therefore have them less often, but they are still a relevant part of their behavior. The selectivity of interlocutors could also be supported by the findings that show that politically like-minded peers and familiar people are often chosen as interlocutors for political topics (Ekström, 2016; Hirndorf, 2020). There is also the option that the *Mobilist* conducts political conversations face-to-face to a large extent and does not use a smartphone or other digital platforms. This could be explained by the reluctance of many young people to express their own political opinions on social media (Ekström, 2016), although this reluctance could also extend to larger (private) groups on messenger apps.

In contrast, the *Omnivores* show the highest duration of *mobile political talk* in the values of both measurement instruments. This could indicate that the *Omnivores* communicate a wide range of political and climate-related topics via smartphone. However, the strongly varying duration indicates that some *Omnivores* have longer and more in-depth political discussions, while others prefer shorter and more superficial conversations. These differences in conversation length could indicate different interests, engagement, discussion styles, or tendencies in the use of smartphones for political exposure within the group of *Omnivores*. The long duration of the mobile political conversation is also reflected in the high relevance of personal contacts as a source of information. This digital political exposure and talk appear to be a relevant influencing factor of media use on young people's political engagement (Boulianne & Theocharis, 2020). This seems to be particularly the case for political talk via social media and messenger groups (Vaccari & Valeriani, 2018; Vermeer et al., 2021). Based on the available data, it is unclear in which digital environment, e.g., a private messenger group or a semi-public information channel on Telegram, the political talk takes place, and accordingly, it is not possible to make a statement about the relevance of the personal connection of the interlocutors and their trust, which are relevant factors for the impact of political talk (Sterrett et al., 2019; Swart et al., 2019). Against this background, it is very likely that the long duration of political talk among *Omnivores* will have an impact on their political participation.

This effect is not to be expected for the *Social mediast* repertoire, as they have the lowest average daily duration of *mobile political talk* according to the screen recording approach, as well as an average duration for the combination of self-report and app-tracking. Accordingly, this group tends to have only short to no political discussions on the smartphone. It is interesting to note that this information repertoire has the highest duration of *mobile political exposures* and, at the same time, has the least *mobile political talk*. This seems unusual at first glance, but could be an indication of a different way of using the smartphone in relation to political information and dealing with political information. Possible reasons for this could be the almost exclusive conduct of political conversations in face-to-face situations, whereby mobile-mediated political conversations are avoided. On the other hand, this group could generally have little to no political talk, although this is not to be expected given the high level of *opinion leadership* and *political interest*. Furthermore, this group could have an aversion to expressing their own political opinion on social media, which is more common among younger people (Ekström, 2016) and suggests a more passive use of social media, especially in light of the high social media usage of this group.

In summary, the analysis shows that mobile and digital media play a relevant role in terms of political exposure and mobile and digitally mediated political talk. This shows that there are differences in the use of individual mobile applications and their individual use for political information, as well as differences between the identified information repertoires both in terms

of the duration of political exposure and political talk. Furthermore, it became clear that a high duration of political exposure does not equate to a high volume of political talk. Here, the literature offers possible further explanatory factors that address the level of political talk among young people.

Key findings of RQ3

RQ 3: How do the share and the manner of mobile political exposure and talk differ within the information repertoires of supporters of Fridays for Future?

Empirical key findings: Mobile and digital media play a relevant role in terms of political exposure, which varies between 1.79% and 4.46% of the total average screen time per day, depending on the data collection (screen recording or combination of self-report and app-tracking), as well as for *mobile political talk*. It shows that there are differences in the use of individual mobile applications for political information, as well as differences between the identified information repertoires both in terms of duration of political exposure and political talk. Moreover, it became evident that the length of political exposure does not directly correspond to the duration of *mobile political talk*, as evidenced by the *Social mediast* repertoire, which exhibits the longest duration of *mobile political exposures* yet the least amount of *mobile political talk*.

Methodological key findings: The use of screen recording and the combination of self-report and app tracking to capture *mobile political talk* allows a look into the black box of in-app content while protecting the privacy of the study participants. The two different operationalizations make it possible to record the duration of *mobile political exposure* and *talk* across different mobile applications/platforms.

6.4 RQ 4: Relationship between political information usage behavior and participation - Discussion

With the findings from this thesis, I was able to show that the Fridays for Future supporters studied keep up to date with new political and social events and developments in relation to climate change and how their news consumption can be related to their engagement in political and civic activities. Although the results cannot be generalized to all supporters of Fridays for Future due to the limitations of the sample, the insights I gained are nevertheless relevant for understanding the media consumption and political behavior of other politically active young people who have a similarly high level of education and social status.

In order to gain a better understanding of the phenomenon, I will consider the insights gained on the various forms of political participation with the findings of the current state of research. (1) I will start with a more general and overarching view. (2) I will then discuss the possible impact of the frequency of political information use and the level of political exposure. (3) This will be followed by a discussion of the possible relationship between patterns of information use behavior and forms of political participation. (4) Before we take a look at the temporal development of political participation among the Fridays for Future supporters studied, (5) conclude with a summary of the most important findings.

(1) The findings from this thesis show that digital and mobile political information behavior is related to different forms of political participation among the Fridays for Future supporters studied. This finding is in line with the findings of other studies that examined the influence of the internet (Hao et al., 2014), social media (Boulianne, 2015) or mobile devices (Kim et al., 2016) on the level of political participation and found positive relationships. This close link between political information behavior in digital media environments and political participation is also reflected in the results of this thesis.

However, studies clearly show that the impact mechanism of digital media and information use on the frequency of political participation is of an indirect nature and increases civic awareness (Boulianne, 2016), mobile political discussion (Kim et al., 2016) or knowledge (Ohme, 2020), which then have an influence on the degree of political participation. Against this background, the limitations of the sample mean that no conclusive findings can be made about the impact of the individual factors. Nevertheless, this thesis enables us to gain a better understanding of the phenomenon and to identify possible mechanisms.

Another challenge is the different level of detail of the measurement, which provides very small-scale and detailed information about the behavior of Fridays for Future supporters for mobile media use, whereas the recording of political participation by means of a survey has significantly fewer measurement points and less granularity. This imbalance in the measurement of different behaviors can lead to possible blind spots or bias, whereby behaviors that are perceived as political by the participants studied may not be adequately or accurately captured. Accordingly, this could mean that links between the smaller-scale use of political information and participation cannot be mapped.

In this thesis, the focus is on identifying possible connections between media usage patterns and forms of political participation; accordingly, the overarching frequency of political participation is not the main interest of the work. The idea of the research design is to keep the predictors for political participation as constant as possible in order to be able to observe the connection between the usage patterns of political information behavior and the forms of participation as well as possible. Accordingly, the supporters of Fridays for Future studied differ

mainly in their usage behavior, which is reflected in the different information repertoires. Other predictors, such as *political interest*, *opinion leadership*, *opinion certainty* about climate change, level of education, and social status, do not differ significantly between the repertoires.

(2) With regard to the duration of *mobile political exposure* and the associated frequency of political information use, there are only slight and non-significant differences between the repertoires identified in this thesis. The results of this thesis show that political participation in the various information repertoires is generally highest for the *Omnivore*, followed by the *Social mediast* and the *Mobilist*. Increased political participation is also found in the literature for news omnivores (Dvir-Gvirsman, 2020; Edgerly, Thorson, et al., 2018), which are comparable to the *Omnivore* identified in this thesis. While the results for the repertoire of the *Omnivore* fit seamlessly into the findings of previous studies, the picture for the *Social mediast* is much less clear. Dvir-Gvirsman (2020)'s study found a significantly lower level of political participation in the group of social media users, which at least partially contradicts the findings of Ohme (2019), who found a participation-promoting relationship between social media use and campaign participation among voters. Other studies also found a positive influence of social media use on the level of political participation (Boulianne, 2015). Furthermore, there is a possibility that, due to the specific sample of this thesis, a politically interested group of social media users was identified in the repertoire of the *Social mediast*, which represents a special sub-group of the overall social media users.

A similar picture emerges when looking at *mobile political talk*. The *Omnivore* has the highest duration of political talk, while the *Social mediast* repertoire has the lowest to average and the *Mobilist* the lowest daily duration of political talk on the smartphone. Accordingly, the proportion of *mobile political talk* seems to be reflected in the degree of political participation per information repertoire. This observation is in line with existing research, which assumes that political talk serves to consolidate and better understand the political information received (Chen, 2019; Cho et al., 2009). This information is thematized, contextualized, and classified in political talk, through which both *group identity* and *emotions* can be conveyed and *agency* can be strengthened or weakened (Alberici & Milesi, 2016; Ekström, 2016; Graham, 2010).

The high similarity in the level of political participation of the Fridays for Future supporters surveyed is not surprising given that the sample consists of a politically active and interested group of young people. *Political interest* is a factor that positively influences the degree of political participation and can also vary between different repertoires (Dvir-Gvirsman, 2020). Accordingly, the findings indicate that the level of *political interest* has an influence on the frequency with which political information is used (Dvir-Gvirsman, 2020). Considering that a very high level of *political interest* was found among all Fridays for Future supporters in the

sample studied, this high level of *political interest* could explain both the lack of the news avoider's repertoire and thus the low variance in the level of political participation, which will be discussed in more detail in a later section. Basically, the results of this thesis are in line with findings from studies on young politically active people, in which the consumption of political content through digital media led to higher political participation (Dinnar & Nossek, 2019). Only the group of politically active people is considered in this thesis.

(3) In contrast to the general level of political participation, differences can be identified in the forms of political participation according to the information repertoire, which suggests an influence of information behavior on the form of political engagement. The findings from this thesis suggest that individual political activity, particularly on social media, plays an important role in the participation of Fridays for Future supporters across all identified information repertoires. These differences in the form of participation can be seen in particular in the individual and social media-related types of political participation, which can be attributed to the work of Theocharis et al. (2021). The results show that the diversity of individual political participation among the supporters of this movement is pronounced both online and offline, whereby the supporters of Fridays for Future differ (sometimes significantly) in their forms of individual political participation based on different information repertoires. Against this background, it could be that common predictors such as *political interest*, social status, and level of education explain the degree and thus the frequency of political participation very well (e.g. Cho et al., 2009; Gil de Zúñiga et al., 2014; Van Zomeren, 2016), but that the characteristics of the individual forms of political participation are (partly) affected by the type of media use and information behavior.

A broad repertoire of information, which includes many different sources of information on different devices, seems to go hand in hand with a broad repertoire of forms of political participation. This thesis can show that the group of supporters of Fridays for Future with the *Omnivore* information repertoire appears to be a particularly diverse group, active both within the political system and targeting the political system, as well as in the community and at an individual level. Accordingly, these supporters have a very broad spectrum of political activities. This also applies to the forms of individual political participation in which the *Omnivore* takes part in a range of political activities, including initiating or supporting political issues, sharing posts on social media, changing their own profile information, and wearing political symbols. The high relevance of these forms of political activity is in line with the argumentation of Theocharis et al. (2021), who argued for the inclusion of social media-related and more individual forms of activities in political participation.

There are several possible reasons for the joint appearance of a broad information and participation repertoire. The first possibility is that information behavior has a direct impact on the

range of forms of political participation. In this case, comprehensive information behavior could include exposure to a broader spectrum of information, opinions, and possible mobilizations for different forms of political action, which then has an impact on political participation. The second possibility is that there is an indirect relationship between the broad repertoire of information and the forms of political participation. It is conceivable that the supporters of Fridays for Future studied received mobilizing content that strengthened their belief in the efficacy of a particular form of action or the *group identity* of the political group calling for it. Whereby I would assume that a more comprehensive political information behavior based on a variety of different sources increases the likelihood of exposure. The third possibility is that the co-occurrence of a broad information and participation repertoire is due to an underlying construct or whether the type of information behavior has an influence on the size of the political repertoire.

Interestingly, the supporters of Fridays for Future with the information repertoire of the *Mobilist*, which is characterized among other things by the use of news apps, show an average level of general political participation as well as individual and social media-related forms of political participation. In particular, participation in initiating or supporting political issues and sharing posts on social media is comparatively low. Participation in wearing political symbols is also below average. This result is in line with the findings of the Ohme (2020) study, which found no mobilizing effect of news app usage in election campaigns. Against this background, Ohme (2020) raises the question of why users of *News apps only* benefit to a limited extent from their engaged use of mobile news apps, although other studies indicate that this group in particular is more politically interested and spends a greater amount of time consuming news (Hölig & Hasebrink, 2018; Nelson & Lei, 2018). In addition, previous studies show a positive correlation between the use of news apps and participation (Martin, 2015; Yamamoto et al., 2015; Yamamoto & Nah, 2018). Ohme (2020) argues that there is a possibility that the self-contained structure of news apps serves to keep people informed, but that this structure does not have a particularly motivating effect. In particular, the lack of social networking and social support from others (Swart et al., 2019; Wojcieszak, 2010) could be associated with a low proportion of political talk and the associated emotional, moral, and group identity positioning of the received content. This proportion of exchange with like-minded peers could be higher on social media applications and thus be the reason why the Fridays for Future supporters studied did not participate to a greater extent in individual and social media-related forms of participation when relying on news apps as a source of political information.

In contrast, the main use of social media, which plays a key role in the repertoire of the *Social mediast*, seems to be characterized by an average level of political participation with much more pronounced individual and social media-related forms of participation. The *Social mediast* shows average values in most categories of individual political participation. Participation

in sharing posts on social media and wearing political symbols is relatively high. This is particularly interesting in that a high level of social media use does not necessarily go hand in hand with a high level of political participation on these platforms, even if it is a politically active and interested group of young people. This is also consistent with the data on the proportion of *mobile political talk* in the *Social mediast*, which is very low compared to the other repertoires. Accordingly, the results of this thesis indicate that the supporters of Fridays for Future with the *Social mediast* repertoire examined use social media platforms for information purposes and/or entertainment, which is in line with other studies (Anter & Kümpel, 2023), but do not see them as a political field of activity.

(4) With regard to the development of the degree of political participation of the Fridays for Future supporters surveyed, the stability of the overall construct and most of the dimensions over time is remarkable. On the other hand, the fluctuation of the social media-related forms of individual political participation stands out, which, in contrast to the other dimensions, show changes over time.

The analysis of political participation for the *Mobilist*, the *Omnivore*, and the *Social mediast* information repertoires shows that the level of political participation is a relatively stable construct over time. Most of the forms or political actions that comprise political participation are relatively costly in terms of commitment, time, and effort. Accordingly, it is possible that this relatively high hurdle in terms of effort leads to a certain stability of these actions over time. The relevance of effort for political participation became particularly clear during the scientific debate on the phenomenon of slacktivism (e.g. Christensen, 2011). On the other hand, it can be assumed that the factors influencing political participation have either not changed significantly during the period under study or that the level of participation has only changed very slowly and over significantly longer periods of time. It is quite possible that the two presumed mechanisms are intertwined, in that the relatively high cost of political activities requires a comparatively strong change in the influencing factors, which was probably not the case in the period under study.

Following the aforementioned line of reasoning, there could be a change in the factors impacting the individual forms of political participation associated with social media that require less effort, as claimed by various scholars (see for an overview: Madison & Klang, 2020). Nonetheless, these forms of political participation are relevant actions (Madison & Klang, 2020; Theocharis et al., 2021). This argument can partly explain the observed differences, since the results of this thesis show that actions related to social media exhibit considerable temporal fluctuations between information repertoires, while non-media-related individual forms of political participation, such as buying or boycotting products and wearing political symbols, are stable over time. This raises the question of why social media-related forms of participation

change over time while other forms of individual participation, which also require little effort, remain constant. One possible explanation is that social media is characterized by the constant flow of the latest news and the almost real-time nature associated with it. This raises the suggestion that there is another underlying construct that specifically affects social media-related forms of participation, such as platform design and its associated advertising-financed business model.

This assumption becomes even more unclear when one considers the information repertoires identified, which show different changes over time. The repertoire of the *Mobilist* is the most stable, showing almost no major changes over time in terms of participation. The situation is different for the repertoires of the *Omnivore* and the *Social mediast*, which show partly opposing developments in the level of participation at the same points in time. This could be an indicator of the influence of different behaviors and compositions of information repertoires on these social media-related forms of political participation. However, this assumption cannot be confirmed with absolute certainty.

(5) The discussion of the results of this study shows that the digital and mobile political information behavior of the Fridays for Future supporters studied is related to different forms of political participation. With regard to the duration of *mobile political exposure* and the associated frequency of political information use, there are only minor and non-significant differences between the identified repertoires of the *Mobilist*, the *Omnivore*, and the *Social mediast*. In contrast to the general level of political participation, there are differences in the forms of political participation according to the information repertoire, which suggests an influence of information behavior on the form of political engagement. This suggests that individual political activity, especially on social media, plays an important role in the participation of Fridays for Future supporters. This shows that a broad repertoire of information, which includes many different sources of information on different devices, goes hand in hand with a broad repertoire of forms of political participation. Interestingly, Fridays for Future supporters with the *Mobilist's* information repertoire, which is characterized by the use of news apps, show a low to average level of general political participation as well as individual and social media-related forms of political participation. In contrast, the main use of social media, which plays a central role in the repertoire of *Social mediast*, appears to be characterized by a much more pronounced individual and social media-related form of participation. These social media-related forms of political participation are also characterized by fluctuation, which, in contrast to the other dimensions, shows changes over time.

Key findings of RQ4

RQ 4: How do the forms of political participation differ between the information repertoires of supporters of Fridays for Future?

Empirical key findings: The digital and mobile political information behavior of the Fridays for Future supporters studied is related to different forms of political participation. With regard to the duration of *mobile political exposure* and the associated frequency of political information use, there are only minor and non-significant differences between the identified repertoires of *Mobilists*, *Omnivores* and *Social mediast*. In contrast to the general level of political participation, there are differences in the forms of political participation depending on the information repertoire, which suggests an influence of information behavior on the form of political participation. A broad information repertoire, which includes many different sources of information on different devices, goes hand in hand with a broad repertoire of forms of political participation. Interestingly, the *Mobilist's* information repertoire, which is characterized by the use of news apps, show a low to average level of general political participation as well as individual and social media-related forms of political participation. In contrast, the main use of social media, which plays a central role in the repertoire of the *Social mediast*, appears to be characterized by a much more pronounced individual and social media-related participation. These social media-related forms of political participation are also characterized by a fluctuation that, in contrast to the other dimensions, shows changes over time.

6.5 Theoretical & methodological limitations

As in every thesis, there are a number of limitations, which are addressed self-critically. To begin with, I would like to point out the limitations with regard to the theoretical framework of the work. First of all, it should be noted that the topic of the reception of media and political information is an examination of the phenomenon from a communication science perspective. It is therefore not intended to claim a complete theoretical treatment of the subject area, as this phenomenon can also be examined from a psychological, sociological, or political science perspective. Rather, a selection of different theoretical perspectives was made in the context of this thesis, which appeared relevant for the description of media and information use in the course of this work.

A central theoretical approach in this thesis is the media and information repertoire. This approach is designed to be comprehensive and broad, encompassing all conceivable media and

information behaviors as well as addressing possible differences in usage behavior. Nevertheless, the assessment and theoretical contextualization of cultural differences in dealing with media and information is complex, which the approach can only partially achieve and which could lead to limited applicability in different cultural contexts. This could include not only cultural differences in terms of geography or nationality but also between age groups (e.g. youth culture). Furthermore, the approach might oversimplify and neglect individual differences in information processing and media preferences, which could lead to insufficient coverage of the diversity of individual media use patterns. In addition, the theoretical assumptions of the approach with regard to social influences are not particularly clearly defined. The focus on individual media repertoires could neglect the social contexts in which media consumption takes place and thus ignore important social influences on media behavior. The lack of theoretical assumptions regarding the combined effect of media and information repertoires on other constructs, such as political participation, is particularly important with regard to the research question of this thesis. This shows that the effect of individual variables or usage behavior on a relationship with other constructs is usually investigated, whereby theoretical assumptions about jointly occurring variables and their combined effect are usually unclear.

The concept of political participation is a second central building block in the theoretical framework of this thesis. The concept can be criticized in particular with regard to its definitional vagueness, which can include or exclude various forms of participation. In this thesis, I have decided to follow the argumentation of Theocharis et al. (2021) and to understand individual and social-media-related forms of participation as components of the concept. However, there are good arguments for distinguishing between political and social media engagement, such as sharing and posting content. In particular, it leads to a blurred distinction between forms of political talk and follow-up communication. For example, is the sharing of a political social media post in a private messenger group a form of political talk or an attempt at mobilization that can be considered an act of political participation? Accordingly, this work also suffers from this definitional blurring, as the distinction between participatory and discursive behavior in digital media environments is difficult to separate on a theoretical and operational level. This definitional blurring is also related to the context-dependent nature of political participation. The meaning and forms of political participation can depend heavily on the political and social context, which could limit the generalizability of results based on a particular context. Furthermore, there are differences in people's individual understanding of what is meant by political action. The possible forms of political action are correspondingly diverse, which leads to difficulties in defining and operationalizing them.

In addition to the limitations of the theoretical framework already discussed, there are also limitations at the level of research design and methodological approaches, which we critically reflect on here. In terms of research design, the mixed-method design entails a number of

limitations and problems. In general, it can first of all be stated that achieving the goal of successful method triangulation is simply more complex than a regular research project (Flick, 2011). In addition, the differences in the survey methods make it difficult to compare the individual results. In order to ensure comparability, there is the possibility of a dialectic approach to method triangulation in which the different methods investigate the same phenomenon in parallel and simultaneously, and the interim results each influence the further implementation of the other method (Döring, 2016). This approach could be partially implemented, as the same phenomenon was investigated at the same time. However, it was not possible to obtain interim results during the survey phase and adapt the design to them during the process. Furthermore, it was difficult to obtain a common sample for all the data collection methods used, which was only partially successful. Here, a consistent common sample as a basis for comparison would possibly be a more suitable alternative. Another problem is that the chosen research design does not allow attitudes and feelings to be recorded in the respective usage situations. It would have been beneficial to expand the mixed-method design to include an experience sampling module. Furthermore, the selected research design leads to a strong imbalance in the collected measurement times in favor of the mobile automated tracking data, which can lead to a corresponding focus in the evaluation process. This point is only partially a problem in the course of this thesis, as the recording of mobile information usage behavior is an explicit objective of the work.

In addition to the limitations of the mixed-method design, there are also limitations with regard to the sample and the study period. Firstly, there is the relatively small sample, which does not allow the results to be generalized. At this point, conducting the research design with a larger sample would have been beneficial for the resilience and generalizability of the findings. With regard to the survey period, the measures taken at the time to contain the COVID pandemic, which dominated public and political life and restricted collective gatherings, can be mentioned in particular. The emergence of the COVID pandemic posed a challenge and restriction for the Fridays for Future protest movement in terms of both public press reporting and the organization of protest actions (Haßler et al., 2021). Accordingly, it can be assumed that the results of this thesis were at least partially influenced by the social situation at the time. Another possible limitation is the duration of the study phase, which at four months is long compared to other studies but possibly not long enough to observe changes in relatively time-stable constructs such as political participation. In particular, when collective gatherings in person were restricted or subject to conditions during parts of the research period.

Further limitations relate to the survey carried out, which, in retrospect, does not contain a sufficient separation between mobile and desktop use in relation to the information sources surveyed. Although the survey asks about the devices used to access information, the subsequent sources of information cannot be clearly assigned to these. Furthermore, some relevant

mobile applications are missing from the measurement tool for classifying political exposure on smartphones. This means that relevant apps cannot be included in the subsequent calculation of *mobile political exposure*. In this context, the self-report on information and media use should also be mentioned, which has proven to be inadequate, particularly in digital media environments, and leads to bias (Christner et al., 2021).

Furthermore, it is possible that the participants studied consumed more political content during the study phase for reasons of social desirability, as they were informed about the focus of the research for reasons of data protection and privacy.

We then take a closer look at the critical reflection of mobile automated tracking as a method of data collection in communication science, which follows in the next section.

6.6 Reflection on the methodological contribution and mobile automated tracking

In the course of this thesis, mobile automated tracking in the form of app tracking and screen recording was successfully used and combined with the results of an online survey. This section summarizes the advantages and disadvantages of these methodological innovations as well as the challenges overcome during the research process. In this way, the strengths and weaknesses of the methods used and the associated data processing approaches are highlighted. This section includes (1) general and more meta-level thoughts on possible (mis-)interpretations of automated tracking data, (2) reflection on the practical implementation of a tracking study, as well as (3) reflection on app tracking and processing in the form of mobile sessions, as well as (4) the presentation and consideration of the advantages and disadvantages of the combination of self-reports and app tracking as well as the screen recording approach for capturing *mobile political exposure*.

(1) Mobile automated tracking data represents a form of digital trace, which is often described as a more accurate and therefore supposedly better reflection of social reality. However, mobile automated tracking data is initially a relatively superficial recording of human interaction with a smartphone. Using this form of data as the sole basis for the reconstruction of complex social and societal reality harbors the danger of an oversimplified and superficial view of the social world (Breiter & Hepp, 2018). Furthermore, this form of digital observation of human behavior opens up the misconception that only measurable human interaction or behavior that can be recorded by mobile automated tracking is relevant. Accordingly, there is a danger of sacrificing the actual complexity of human nature on the altar of what can be measured by automated tracking, as these are supposedly accurate and comprehensive observations of human behavior. With this in mind, I argue for a realistic assessment of what mobile automated

tracking can measure in terms of human behavior and the use of mixed-methods designs to better capture the complexity of human nature.

This idea of the supposed (comprehensive) validity of mobile automated tracking data is followed by the supposed neutrality of this form of data. However, mobile automated tracking data, like any form of digital trace data, is not a neutral phenomenon but is based on the technical procedures of powerful institutions (companies, administrations, etc.) that produce and collect this data on the basis of an existing interest (Breiter & Hepp, 2018). These institutions are thus able to define the character, structure, and often also access to this data and metadata. Accordingly, when analyzing mobile automated tracking data, we access data that is controlled by such institutions, produced for a specific purpose, and is not neutral. Against this background, it is important to critically question digital traces as indicators of human behavior and social reality (Breiter & Hepp, 2018).

Another issue is the extent to which the automated tracking data collected reflects real human behavior. Two aspects are particularly relevant here: the distinction between data points based on human behavior and data points that represent technical artefacts. In mobile automated tracking data, it can be difficult to identify data that is due to human interaction with the smartphone, such as checking the time and turning on the smartphone screen, as opposed to data that is a technical artifact, such as turning on the screen due to the automatic launch of a notification. Both situations are reflected in the mobile automated tracking data, with the difference that one represents actual human behavior and the other is the result of an automated process that we do not know if the smartphone user is even paying attention to. On the basis of the mobile automated tracking data alone, we cannot make any statements about the degree of user attention to the content visible on the smartphone display. Accordingly, we cannot be sure that the user is using the smartphone attentively for the entire recorded period of use. For example, our mobile automated tracking data could show that the user spent the whole night watching YouTube without interruption. This could indicate an actual YouTube marathon, or the user may have turned on white noise to fall asleep and slept soundly all night. Both options are possible, and we cannot exclude one of these options based on mobile automated tracking data alone. To summarize, mobile automated tracking data raises two questions: is the data collected representative of human interaction with the smartphone? And: Can we assume that the user has paid a certain level of attention?

The high granularity of mobile automated tracking data also makes data preprocessing more relevant. As part of this data preprocessing, aspects of protecting the privacy of the participants must be ensured. On the other hand, relevant and non-relevant data points must be separated; e.g., technical artifacts must be filtered out. And a suitable aggregation level of the collected data for analysis and the associated answering of the research question must be found. In

each of these sub-areas, a large number of decisions can and must be made that have at least a potential impact on the database that serves as the basis for the analysis. The development of consistent standards in the pre-processing of mobile automated tracking data and the transparency and comprehensive reporting of the steps taken in data processing in the research project are correspondingly relevant.

Taking the previously mentioned points together, which include the supposed representation of social reality through automated tracking data, the differentiation of data points based on human behavior from non-human ones, and the decisions regarding the pre-processing of mobile automated tracking data, can increase the likelihood of incorrect conclusions from the data. By interpreting either too much meaningfulness or the false representation of supposed human behavior in mobile data or by transforming the data incorrectly in preprocessing, a false data basis can be unintentionally created for the subsequent analyses, which has a negative impact on the validity of the findings obtained. As a researcher, it is therefore important to keep these thoughts constantly present in the research process and to reflect on your own approach to avoid possible wrong conclusions.

(2) In addition to the thoughts discussed in relation to mobile automated tracking data, conducting a mobile automated tracking study has other more practical implications. Recruiting suitable study participants is a key challenge when conducting a mobile automated tracking study. Here, either a panel provided by a professional panel-provider can be used or independent recruitment can be carried out. In the course of this thesis, independent recruitment was carried out, as no panel provider was able to provide the specific target group of Fridays for Future supporters. Against the background of the recruitment process, a possible bias in the sample of study participants is conceivable (Pak et al., 2022). This is intensified in particular by the relatively specific technical requirements with regard to the smartphone used to participate in the study. The participants' smartphone had to be an Android device. Accordingly, there is a risk of technology-related distortion of the automated tracking data (Stier, Breuer, et al., 2020), although Android and iOS users differ only slightly in terms of demographic characteristics in other studies (Keusch et al., 2020; Kreuter et al., 2020). However, the small sample of Fridays for Future supporters studied does not allow any conclusions to be drawn about the overall population anyway. With regard to the recruitment process, the high degree of transparency with regard to the type of data collected and the various measures to protect the privacy of the participants proved to be advantageous, which were communicated via an Instagram account and a project website.

Independent recruitment also enables a higher degree of control over the self-assembled panel and opens up a wider range of intervention options in the event of problems and missing data, which is not available to the same extent with a professional panel provider. This control was

particularly beneficial during installation, and the associated support in the event of technical problems with the two tracking apps used enabled more comprehensive support for the study participants as well as possible interventions in the event of missing data. Technical obstacles posed a particular challenge here. Firstly, the AWARE app tracking application used did not work reliably on all of the participants' smartphones, which meant that some people dropped out of the panel and could not be included in the data basis for this thesis. On the other hand, the keyword logger app experienced increased failures and crashes after several smooth weeks. Possible reasons for this could be the participants' smartphone usage time, which was longer than anticipated and meant that the screen recordings could not be evaluated during the charging period of the smartphones, and the internal memory of the smartphones ran full. Due to the high degree of control of the panel, it was possible to identify these participants and ask them to charge the smartphone regularly and for longer periods of time after the end of the study period so that the remaining screen recordings on the smartphone could be analyzed and the results transferred. Nevertheless, there are still gaps in the mobile automated tracking data for some participants, which can be attributed to technical failures or the deliberate and legitimate deactivation of the tracking apps by study participants.

In the course of data collection, continuous monitoring of the incoming tracking data is recommended, which can be regularly checked by the researchers for the scope of the data and possible failures using a dashboard or an analysis script. Furthermore, I can recommend the parallel use of a test device during the ongoing data collection. This allows you to test the data pipeline yourself as well as the possible reverse engineering of unknown data patterns.

(3) Mobile automated tracking data itself comes with a few challenges and limitations. Tracking data is perceived as a more reliable option when recording digital information and media usage (Parry et al., 2021). Additionally, mobile automated tracking data provides a high granularity of recorded information and multiple points of measurement, and it is characterized by a high information density. The AWARE client, which was used for the app data collection in this thesis, is able to make digital real-life observations of the smartphone and app-usage on the device for the participants (Ferreira et al., 2015), which enables the research to get an almost direct and unprocessed view of smartphone usage in an everyday situation. However, the use of the AWARE app-tracking client also has some limitations. First, the automated tracking app only records app launches that come to the so-called foreground, which means that the app is visible on the display. Accordingly, app applications that switch to the background after a while or directly are not recorded sufficiently. This is a limitation for this work, especially in the context of audio and music applications, as these applications switch in the background when the user is not interacting with them but continue to play audio. Therefore, there should be less coverage of the duration of audio usage on the smartphone. In addition, the AWARE client records system apps and other background processes that are not relevant to the questions posed in

this paper and are therefore labeled as system apps and excluded from the analysis. The labeling process is a potential source of error in this respect, as the sample contains a number of different smartphones with different Android versions, some of which have different names for system apps and background processes. The correct and, above all, comprehensive labeling of all applications can be correspondingly difficult. A similar problem applies to the categorization of mobile applications. For this purpose, the app categorization of the Play Store was adapted to the research interest and based on the literature. Nevertheless, it is possible that the coding of the apps was not carried out sufficiently and comprehensively enough and that relevant applications were not coded or were coded incorrectly, thus possibly influencing the results. Furthermore, app tracking data is not able to provide information about the user's level of attention. Accordingly, no statement can be made about the extent to which the user has used the smartphone attentively or not attentively. The degree of attention given to smartphone and media use can have an influence on the possible effect of the content received (Groot & Costera, 2020).

The processing of the app tracking data in the form of mobile sessions aggregates the usage behavior of the participants on the smartphone between switching the display on and off and thus enables the inclusion of the direct usage context (Peng & Zhu, 2020). The advantage of the mobile session lies, among other things, in the inclusion of this direct usage context, which captures the previous and subsequent actions on the smartphone. Furthermore, a session is a relatively intuitive unit of investigation that is easy to grasp and understand due to the clear distinction between switching the screen on and off. However, in addition to the advantages mentioned, the use of mobile sessions also has some limitations. The biggest current limitation is the absence of overarching standards in the calculation of the sessions mentioned and the resulting difficulty in comparing the results between several studies. A further problem in this thesis lies in the definition of minimum requirements for the sessions included in the analysis. In the course of the data analysis for this thesis, sessions that did not include an app launch were excluded. This means that switching on the smartphone without opening an app, for example, when looking at the lock screen, was not included in the analysis. This can lead to the exposure of political content not being recorded by notifications or previews on the lock screen and therefore being underestimated (messenger or news apps sometimes have preview panels on the lock screen in which (parts of) the content can already be seen).

In addition to app tracking and the associated processing in sessions, the combination of this data with survey data poses a number of challenges and limitations. Here, Stier, Breuer, et al. (2020) point to the need for informed consent from the respondents to link the data, as well as the methodological and ethical issues and the need for conceptual and theoretical frameworks that consider the multidimensionality of this data. A more detailed discussion of the combination of digital trace and survey data can be found in the article by Stier, Breuer, et al. (2020).

In the context of this study, there is a possibility of bias in the combination of automated tracking and survey data with regard to the formation of information repertoires. Here, information and media use variables are combined at the level of the individual, in which the variables generated by automated tracking data could have a greater impact due to the higher number of measurement points.

In addition to the challenges in relation to app tracking, there are also limitations for screen recording, which are discussed in more detail below. Particular reference is made here to the operationalization and measurement of the duration of *mobile political exposure*.

(4) In the course of this thesis, both screen recording and the combination of self-reports and app tracking were used to record political exposure. Accordingly, I would first like to discuss the advantages and disadvantages of screen-recording when recording *mobile political exposure* before moving on to the second method.

The advantages of screen recording lie in particular in the precise observation of the content displayed on the smartphone by the participants in an everyday situation. With this method, it is possible to log the previously defined terms when they appear on the smartphone display. The participant can go about their normal daily routine and is only minimally disturbed, as no interviews or observations in a laboratory situation are necessary. At the same time, the privacy of the participants is protected by the functionality of the screen recorder app (Krieter, 2020). The terms that are to be recognized by the keyword logger app must be defined beforehand and included in the app through minor programming. The selection and number of possible terms are relatively high, which allows the app to be used flexibly and widely. A further advantage lies in the basic functionality of the app, which can record all previously defined terms shown on the display and thus enables cross-platform data recording from the outset. It is possible to align the terms with thematic knowledge interests, as in this work in relation to climate change-relevant terms, as well as with functional terms such as “share”, “forward”, “copy”. In this way, it is possible to record thematic exposure and its duration, as well as recognize engagement with the content. In this way, a data set with a very high information density is created, which, in combination with app tracking data, enables the matching of content terms determined by the keyword logger and the apps accessed, thus allowing conclusions to be drawn about political exposure within individual apps, such as Instagram or TikTok.

The disadvantages of the approach lie in the high potential relevance of the selected terms. The composition of the terms to be determined, which we refer to here as the dictionary, has a considerable influence on the results. On the one hand, the dictionary can strongly influence the duration of political or other thematic exposure by including more frequent or distinct terms in the dictionary. There is also the possibility that the political or thematic exposure is provided with an unintended bias in relation to the structure of the received content. For example, it is

conceivable that by including a political buzz-word term in the dictionary, the results obtained do not reflect the general political exposure actually intended but instead show a distortion in relation to the subject matter surrounding the buzz-word. Accordingly, a balanced composition of the dictionary could be highly relevant. However, the dictionary should not only be composed in a balanced way but should also contain terms that are as clear as possible in order to minimize the probability of false positives. In principle, there is a certain risk of receiving false positives when using the keyword logger. For example, the German term “Klima” (climate) is used in the context of air-conditioning (“Kannst du bitte die Klima runterdrehen?”: what would be everyday language for “Could you turn down the air con?”) and is incorrectly evaluated as climate-related exposure. The problem of possible false positives is particularly relevant because the researcher does not receive the actual content due to the privacy protection measures and therefore has no way of recognizing these false positives afterwards. A similar problem arises in the calculation of the duration of political exposure, which tends to be slightly underestimated, as only the duration of individual terms is aggregated and not all words of political content are included in the dictionary. It could therefore be that a politically relevant text was read in its entirety, but the recorded terms were only included in the first part of the text, and the duration of political exposure is therefore slightly too short. Another disadvantage of screen recording is that audio content cannot be captured correctly, neither in terms of content nor duration. This means that both syntactic and audio-visual contexts can only be captured to a very limited extent and are therefore not available for analysis. This includes, for example, certain forms of representation of politicians in videos, which means that certain visually relevant indicators cannot be captured (body language, clothing, location, context). Another hurdle is the technical functionality, as longer usage times and thus a higher number of screen recordings, which have to be automatically evaluated on the participants' smartphones, can lead to slowdowns of the devices and sometimes crashes of the Keywordlogger app. Despite the disadvantages listed, the screen recording method is a versatile and useful approach to data collection.

The advantages of the second approach, which combines app tracking with weighting by means of self-reports, are similar to those of screen recording. This approach also involves (partial) observation of a real-life situation, which means that a laboratory situation can be dispensed with. With this approach, it is also possible to determine political exposure across several platforms and to obtain the relevance of individual mobile applications for political exposure as perceived by the participants.

However, the major difference is the need to survey the participants in order to obtain their assessment of the proportion of political exposure in the respective mobile applications. This is accompanied by several limitations. Firstly, this approach is largely based on self-reports, which have proven to be inaccurate with regard to digital media consumption (Araujo et al.,

2017). This problem is only partially avoided with this approach because the actual duration of exposure is not determined by self-report. Nevertheless, it remains questionable how well participants can indicate the proportion of exposure per app. Secondly, no actual political exposure is recorded, which means that it cannot be analyzed over time. Thirdly, it is not possible to make a statement about the content of the political exposure. Fourthly, there are different perceptions of what is meant by political content, especially among younger people (Anter & Kümpel, 2023). Accordingly, there may be differences in the perception and the stated proportions of political exposure among the participants, which distorts the accuracy of the measurement. Another disadvantage is the already-mentioned inaccurate recording of the duration of use of audio applications, which also has an impact on the proportion of political exposure via audio formats. This is particularly relevant as younger people often use podcasts as a source of political information (Hölig et al., 2020) and the supporters of Fridays for Future in this thesis also indicated the use of political and societal-oriented podcasts. Despite the limitations mentioned, the approach represents an exciting extension of the methodological toolbox, which in particular enables the recording of the perceived shares of mobile apps in relation to political exposure.

In the course of this thesis, both the screen recording approach and the combination of self-reports and app-tracking were used. The use of both approaches made it possible to compare and contextualize the results with regard to the duration of *mobile political exposure*. The disadvantages of the two approaches offset each other to some extent, which is why a joint application within this work seemed reasonable.

Overall, this thesis provides a case study on the successful implementation and execution of automated mobile app tracking and screen recording, their operationalization and successful analysis in relation to communication science issues. In this work, the mobile sessions approach is applied in an insightful way, whereby detailed results on mobile information behavior could be obtained. The advantages and disadvantages in terms of implementation and the importance of pre-processing as well as general considerations for working with mobile automated trace data are discussed. In this way, the thesis enriches the methodological toolbox of communication science with relevant findings in relation to automated mobile tracking.

7 Conclusion

This thesis deals with the question of the extent to which the manner of use in the form of routines and habitualized behaviors and their context relate to the forms of political participation of young supporters of the Fridays for Future protests. At a theoretical level, this thesis argues that the digital transformation of the media landscape is leading to an increasing fragmentation of political information behavior (Chadwick, 2017), which is reinforced by the spread of the smartphone (Karnowski, 2020). This change in the information and media landscape also affects the way in which people inform themselves politically and also get involved and participate. Accordingly, established forms of political participation are being supplemented by newer practices that also relate to digital media (Theocharis et al., 2021). This leads to an interweaving of media and information behavior and political participation, which also affects protest movements such as Fridays for Future. Against the background of the fragmentation of information behavior mentioned above, more comprehensive and holistic perspectives on media behavior are becoming more relevant, for which the media and information repertoire approach is a suitable framework on the basis of which different types of use can be identified (Hasebrink & Hepp, 2017). Accordingly, this thesis extends the repertoire approach to information behavior on the smartphone and relates it to different forms of political participation. To answer the question, to which the manner of use relate to the forms of political participation, the use of political information on the smartphone was analyzed, on the basis of which information repertoires were formed in combination with other recorded information use, and these were studied with regard to differences in the degree of political exposure and talk as well as political participation. In this final chapter of the thesis, the results are first briefly summarized in order to formulate an answer to the above-mentioned central research question. Finally, the research approach and the conceptual framework of the thesis will be evaluated once again, and an outlook for future research will be given.

In the first step of the thesis, the smartphone was examined as a relevant source of information, and the different forms of mobile political information use of the Fridays for Future supporters studied were identified. Different usage patterns were identified, which enabled a better understanding of the political information behavior of the young and politically active supporters of Fridays for Future. An examination of mobile information behavior shows that mobile media use varies greatly from person to person and from day to day, both in terms of total usage time, the duration of sessions, and the number of interactions with the smartphone. This could be an indicator of the high context dependency of mobile media use, which is influenced in particular by local, social, and other contextual factors. Based on the data analysis, I identified twelve usage patterns, including the *Checking* pattern. The *Checking* usage pattern allows users to quickly and frequently switch between different applications, satisfy their information

needs, selectively curate content, and at the same time maintain a constant connection with others. Furthermore, the use of social media on a mobile device is a widespread behavior that shapes daily life in various ways. In addition to the usage patterns related to social media, the Fridays for Future supporters surveyed exhibit two usage patterns, with a high prevalence of browsing apps. Furthermore, to the usage patterns already mentioned, there are a number of usage patterns that mainly serve the reception of audio and video content. The results show the high presence of video and streaming applications among the Fridays for Future supporters studied, which could indicate the high relevance of these usage patterns for mobile political information behavior. Regardless of this assumption, it is clear that the use of audio and video platforms is an integral part of mobile media use. The use of news apps also accounts for a relevant but small proportion of usage behavior. Nevertheless, the results of this study indicate that the use of mobile news apps is a common behavior among some supporters of the Fridays for Future movement, but not shared by all participants studied.

The second step was to identify similarities and differences in the information repertoires of the Fridays for Future supporters studied. In this study, the three different information repertoires—the *Mobilist*, the *Omnivore*, and the *Social mediast* - are identified, although the number of information repertoires identified in this study is somewhat lower than in other studies. What is also striking is the good correspondence between the information repertoires identified and the repertoires taken from the literature. This shows that in many cases there is a large overlap in the characteristics of the repertoires identified in the literature and this thesis, which speaks on the one hand for relatively stable and recurring behaviors and repertoire compositions and on the other hand for the robustness of the information repertoires identified in this work.

The results of this work show that the *Mobilist* can be seen as a politically interested, well-educated news user who consumes journalistic or civic content via smartphone and has a strong political point of view. The *Mobilist* differs from the other information repertoires in particular through their strong focus on the smartphone as an information device and the use of news apps and podcasts. Against this background, there is much to suggest that the *Mobilist* makes a conscious selection of information sources. The *Omnivore* shows a different picture. This identified group of Fridays for Future supporters is characterized by a broad spectrum of digital and analogue information sources, which are only perceived as relevant for forming their own opinions to a limited extent. However, this does not apply to the use of search engines and personal contacts, which are perceived as very relevant for forming opinions. In summary, it can be said that the *Omnivore* among the Fridays for Future followers surveyed is the equivalent of the news omnivore from the information repertoire literature. The smallest repertoire is the *Social mediast*, which is made up of well-educated, relatively young, and socially well-off Fridays for Future supporters who make extensive use of social media and video platforms

on their smartphones. In addition to social media, this group also obtains its political information from traditional channels such as television or radio.

From a theoretical perspective, it is clear that even within a group of politically active and politically interested people, considerable differences in information behavior can be seen through the lens of the repertoire. The prevailing idea in the literature that the formation of information repertoires is primarily due to different levels of interest in politics and news proves to be an inadequate explanatory framework for the supporters of Fridays for Future studied in this thesis.

In this thesis, three different information repertoires were identified in a cohort of politically engaged and active young supporters of Fridays for Future. It is noteworthy that all of these repertoires show a pronounced tendency to consume political information, albeit in different ways. Interestingly, in contrast to the literature, no minimalist repertoire could be identified, which is often associated with varying degrees of political or news interest. Furthermore, the study underlines the importance of mobile devices for everyday information consumption, as they account for a significant proportion of the repertoires identified.

The third step of the thesis is to identify the proportion of *mobile political exposure* and *political talk* of the Fridays for Future supporters examined. The overall analysis of the self-assessed usage shares for political engagement of the apps examined shows that a basic pattern can be identified at the level of the overall sample. This overall pattern shows that individual mobile applications are used for political exposure to varying degrees, even within an app category (e.g. communication apps, social media apps). This observation is an indicator of the relevance of individual preferences, usage purposes, and behaviors of the Fridays for Future supporters studied in relation to individual apps. With regard to the duration of political talk, it can be seen that the observed differences in the duration of political exposure are also partially reflected in the duration of *mobile political talk* among Fridays for Future supporters.

Supporters with the *Mobilist's* information repertoire have the lowest proportion of *mobile political exposure*. The *Mobilist* uses the smartphone primarily for journalistic and professional, politically informative content, for which they use news apps and podcasts to a high degree. They also have a high level of political interest. Accordingly, one would initially assume that the group of *Mobilists* has a higher level of political exposure via smartphone. However, this is not reflected in the data in this thesis. The group of *Mobilists* also has the lowest proportion of political talk compared to the other information repertoires.

The group of *Omnivores* shows an average level of political exposure on the smartphone with both the screen recording method and the self-report in combination with app tracking. In view of the fact that people with this information repertoire use a variety of different devices and information sources for the reception of political information, the duration of political exposure

on the smartphone appears appropriate in comparison to the other information repertoires. In contrast, *Omnivores* have the longest duration of political conversation.

Both screen recording and the combination of self-reports and app tracking as data collection methods lead to the highest value of political exposure on the smartphone among Fridays for Future followers with the *Social mediast* information repertoire. This group of supporters has the highest duration of smartphone use of all the repertoires studied. Accordingly, the high duration of use also appears to be reflected in a high proportion of political exposure. The repertoire of *Social mediast* shows the lowest to medium-average daily duration of political talk, based on the two measurement methods. Accordingly, this group tends to have only short to no political discussions via their smartphones.

Thus, the thesis shows that mobile and digital media play a relevant role in terms of political exposure and digitally mediated political talk. It highlights that there are differences in the use of individual mobile applications and their individual use for political information, as well as differences between the identified information repertoires both in terms of the duration of political exposure and political talk. Furthermore, it became clear that a high duration of political exposure is not synonymous with a high degree of political talk.

In the final step of the thesis, it can be shown that the digital and mobile political information behavior of the Fridays for Future supporters studied is related to different forms of political participation. With regard to the duration of political exposure and the associated frequency of political information use, there are only minor and non-significant differences between the identified repertoires of *Mobilists*, *Omnivores*, and *Social mediast*. In contrast to the general level of political participation, there are differences in the forms of political participation depending on the information repertoire, which suggests an influence of information behavior on the form of political participation. The findings of this thesis show that a broad information repertoire, which includes many different sources of information on different devices, goes hand in hand with a broad repertoire of forms of political participation. Interestingly, Fridays for Future supporters with the *Mobilist's* information repertoire, which is characterized by the use of news apps, show a low to average level of general political participation as well as individual and social media-related forms of political participation. In contrast, the main use of social media, which plays a central role in the repertoire of the *Social mediast*, appears to be characterized by much more pronounced individual and social media-related participation. These social media-related forms of political participation are also characterized by a fluctuation that, in contrast to the other dimensions, shows changes over time.

Overall, the results of this thesis, despite the small and non-generalizable sample, contribute to a better understanding of the mobile and political information use of young, politically interested, and active people. The results empirically show that for the supporters of Fridays for

Future studied, the smartphone is a relevant access channel for political information, which is accompanied by different and differentiable usage patterns when using the smartphone. Furthermore, the supporters could be assigned to three information repertoires, which differ in terms of the focus of use of the information sources and the number of sources used. Based on these identified information repertoires, it was shown that the duration of *mobile political exposure* and *mobile political talk* differed between the repertoires. However, a high duration of *mobile political exposure* does not automatically go hand in hand with a high duration of *mobile political talk*. It was also possible to identify differences in the forms of political participation used by the Fridays for Future supporters studied, although they differ in terms of the use of social media-related forms of participation despite the high level of *political interest* across the entire group and strong similarities in other socio-demographic variables.

These empirical results contribute to a better theoretical understanding of the relationship between information and media use and the extent and forms of political participation. The thesis shows that even in a politically interested and information-consuming group, the form of participation can vary depending on the type of information use behavior. Accordingly, the established explanatory factors, such as socio-demographic variables and interest in politics, with regard to political participation among politically active groups of young people are only partially sufficient. Furthermore, this thesis can show that the use of social media-related forms of political participation does not automatically go hand in hand with a high use of social media but is rather used by a group with a broad information repertoire.

The findings of this thesis underscore a heightened relevance of political talk in shaping political participation within society. It reveals that mere exposure to political content does not inherently translate into digital forms of expressing opinions on social media. What holds more weight is the duration of political conversations conducted via smartphones. This observation holds particular interest for two key reasons. Firstly, it emphasizes the importance of interpersonal exchanges where political information is assessed and contextualized by peers, family or colleagues. Hence, it's not just the act of consuming political information that matters; rather, how this information is interpreted and discussed within the social sphere significantly influences an individual's mode of participation. In light of this, political talk, whether digital or face-to-face, emerges as a relevant component of a vibrant participatory democracy. Secondly, these findings also bolster the notion that individuals who engage online in political discourse, thereby participating in the political process, represent a distinct subgroup within the broader spectrum of politically active individuals. Consequently, the assessment of public discourse on social media by political stakeholders or journalists becomes crucial, especially if these discussions lead to media coverage or elicit reactions.

On a methodological level, the work was able to show that mobile tracking data can be used to answer questions in communication science. To this end, the sessions' approach to operationalizing mobile tracking data was expanded, and new measurement tools were operationalized and applied in the field to record *mobile political exposure* and *talk*. Here, the successful implementation of app tracking and screen recording speaks for the applicability of the approach with regard to the recording of information behavior on the smartphone. At this point, the great advantage of screen recording as a form of data collection that protects privacy and at the same time provides information for research should be mentioned positively, as it enables a good balance between protecting the privacy of participants and providing an insight into the black box of in-app content. In the processing of the mobile automated tracking data collected, the session approach proved to be suitable and promising, enabling the combination of app tracking and screen recording data in an analyzable and (easily) interpretable form. The successful combination of the two automated tracking approaches made it possible to successfully analyze political exposure and talk in the course of this thesis, thereby generating valuable insights. In the course of this, the operationalization and methodological implementation of the two approaches for recording *mobile political exposure* and *talk* proved to be a good fit, although there is room for improvement in some areas of operationalization.

Future theoretical work could be devoted to expanding the media and information repertoire approach with regard to the possible effects and impacts of the respective repertoires on other variables and constructs. There is a theoretical gap between the strongly descriptive approach of the repertoire and the associated possible effects on the individual, political and social groups and institutions, as well as society as a whole. Promising theoretical approaches already exist here, but they need to be integrated into a common theoretical framework. This also applies to the theoretical embedding of mobile usage patterns, of which the author is not currently aware of any theoretical framework that embeds the usage behavior of the smartphone more strongly in communication science. Furthermore, future studies could focus on controlling for possible third variables that explain both media and information use and the forms of political participation. In this way, reliable statements could be made about the relationship between political information behavior and forms of political participation. In this context, an examination of information repertoires over time could also be of interest.

With regard to further methodological development, future work could focus on the development of overarching standards for the collection and processing of automated tracking data and the establishment of quality standards. In addition, the screen recording approach can be pursued further, for which the further development of the app with simplified operation and the development and validation of thematic dictionaries would represent an important step forward.

From an empirical point of view, the further investigation of mobile usage patterns with greater inclusion of the social context is an interesting area. In general, the link between direct human social interaction and *mobile political exposure* raises interesting questions that can be explored further. To what extent, for example, is political content that is received on TikTok or Instagram discussed in direct face-to-face situations with the social environment? Furthermore, the issue of *personal curation* on the smartphone is a promising subject area, where common curation practices are expanded to include the selection of apps and their use. For example, a number of questions arise here: Is Instagram just for entertainment and TikTok for political content or vice versa? Do I write on WhatsApp with my family and with my political peer group via Telegram or Signal? What are the reasons and motivations behind these behaviors? Answering these or similar questions would contribute to a better understanding of information and media use on the smartphone in a digital age.

This thesis has advanced our comprehension of the intertwining of mobile political information use, reception behavior and its relationship to the various forms of political participation. Nevertheless, these insights also unveil a series of follow-up questions awaiting exploration in future research endeavors. Utilizing data privacy-compliant methods for capturing in-app content on smartphones could prove instrumental in providing deeper insights into mobile usage behaviors, thereby aiding in the ongoing scientific research and advancing our understanding of this complex puzzle.

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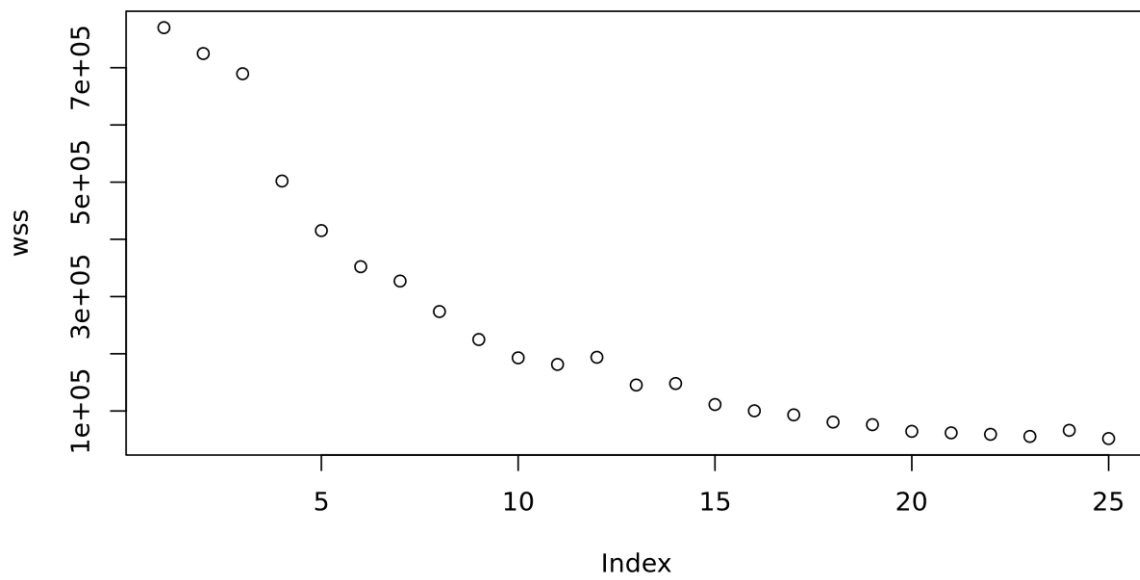
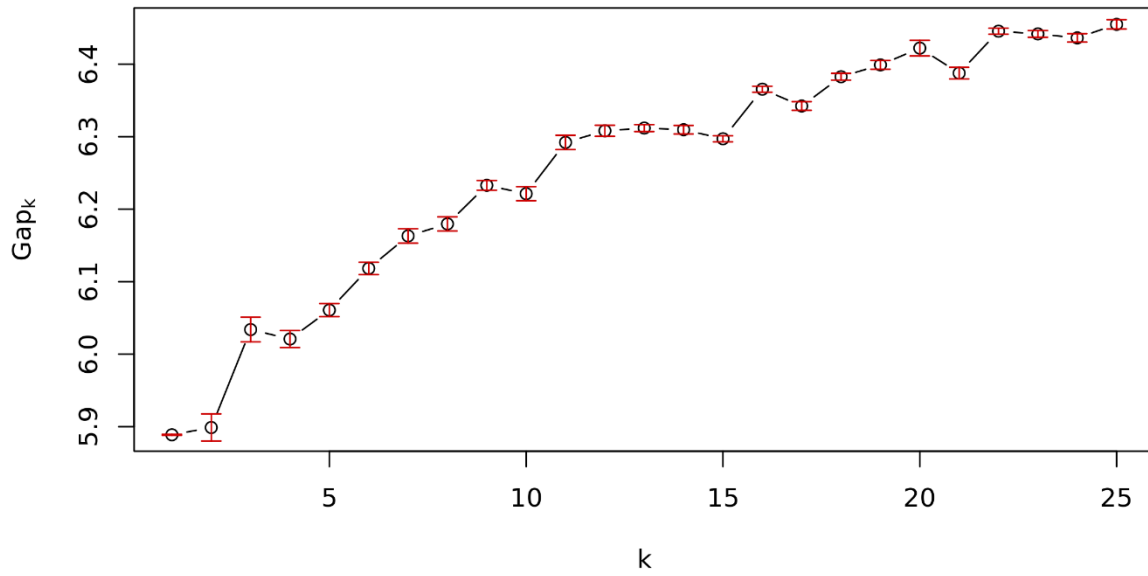
Appendix

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Appendix 1

RQ 1: Usage pattern

Optimal number of clusters – GAP & WSS



Validation of cluster analysis – discriminant analysis (LDA)

		ACTUAL											
		<i>browsing & chatting</i>	<i>checking</i>	<i>extensive social media usage</i>	<i>long watching & chatting</i>	<i>medium watching & chatting</i>	<i>music & audio only</i>	<i>news apps chatting & browsing</i>	<i>news apps only</i>	<i>quick browsing</i>	<i>quick look into social media</i>	<i>short watching & chatting</i>	<i>social media & chatting</i>
Predicted by LDA	<i>browsing & chatting</i>	138	0	0	0	0	0	0	0	0	0	0	0
	<i>checking</i>	110	23864	0	0	0	109	54	228	792	2071	0	280
	<i>extensive social media usage</i>	0	0	111	0	0	0	0	0	0	0	0	0
	<i>long watching & chatting</i>	0	0	1	60	0	0	0	0	0	0	0	0
	<i>medium watching & chatting</i>	0	0	4	8	120	0	5	0	0	0	16	0
	<i>music & audio only</i>	0	0	0	0	0	56	0	0	0	0	0	0
	<i>news apps chatting & browsing</i>	0	0	0	0	0	0	52	0	0	0	0	0
	<i>news apps only</i>	0	0	0	0	0	0	0	0	0	0	0	0
	<i>quick browsing</i>	0	0	0	0	0	0	0	0	0	0	0	0

Appendix

ACTUAL

	<i>browsing & chatting</i>	<i>checking</i>	<i>extensive social media usage</i>	<i>long watching & chatting</i>	<i>medium watching & chatting</i>	<i>music & audio only</i>	<i>news apps chatting & browsing</i>	<i>news apps only</i>	<i>quick browsing</i>	<i>quick look into social media</i>	<i>short watching & chatting</i>	<i>social media & chatting</i>
<i>quick look into social media</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>short watching & chatting</i>	3	2	2	2	18	1	3	1	1	1	236	11
<i>social media & chatting</i>	29	0	37	0	0	0	2	1	0	0	0	498

87,5% of the originally grouped cases were correctly classified.

Validation of cluster analysis – F-Scores

No.	Usage pattern	Session du- ration	Communica- tion	Social	News Apps	Video & Streaming	Music & Au- dio	Browser	Others
1	Checking	1.21	0.02	0	0	0.01	0	0	0.01
2	Social media & chat- ting	0	0.08	0.73	0.03	0.1	0.03	0.08	0.71
3	Quick look into social media	0	0.04	0.1	0	0.03	0.01	0.01	0.01
4	Extensive social media usage	0.02	0.47	61.71	0.04	1.47	0.49	0.87	0.06
5	Quick browsing	0	0.03	0.03	0.01	0.02	0.01	0.2	0.02
6	Browsing & chatting	0.01	34.59	1.1	0.25	0.1	0.22	12.52	0.06
7	Music & audio only	0.01	0.07	0.07	0.02	0.06	163.35	0.06	0.07
8	Short watching & chat- ting	0	0.05	0.14	0.09	0.51	0.05	0.14	0.03
9	Medium watching & chatting	0	0.15	1.96	0.08	1.52	0.15	0.03	0.08
10	Long watching & chat- ting	0.02	247.93	25.64	2.76	165.03	0.16	243.67	365.3
11	News apps only	0	0.03	0.05	0.23	0.05	0	0.04	0
12	News apps chatting & browsing	0.01	0.08	0.12	185.97	1.42	0.01	0.5	0.02

Appendix

Usage pattern overview (Median, M, SD)

No.	Usage pattern	Session duration			Communication			Social			News Apps		
		<i>Median</i>	<i>M</i>	<i>SD</i>	<i>Median</i>	<i>M</i>	<i>SD</i>	<i>Median</i>	<i>M</i>	<i>SD</i>	<i>Median</i>	<i>M</i>	<i>SD</i>
1	Checking	0.6	0.1	402.1	0	0.5	2.6	0	0.1	0.2	0	0	0.1
2	Social media & chatting	13.9	18.2	22.1	0.3	1.6	5.3	9.3	10.4	3.7	0	0.1	0.5
3	Quick look into social media	4.5	6.7	12.7	0.1	0.9	3.8	2.6	2.9	1.3	0	0	0.2
4	Extensive social media usage	41	53.6	48.1	0.9	3.9	12.4	28.9	36	33.7	0	0.1	0.6
5	Quick browsing	4.7	7.7	10.3	0.1	1	3	0	0.3	0.7	0	0.1	0.3
6	Browsing & chatting	21.3	29.1	31	0.4	6.9	106.3	0	2.8	4.5	0	0.3	1.4
7	Music & audio only	7.6	13.9	35	0	1.5	4.9	0	0.3	1.1	0	0	0.3
8	Short watching & chatting	19.5	23.3	16	0.2	1.6	4	0	0.7	1.6	0	0.1	0.8
9	Medium watching & chatting	38	42.5	22.6	0.5	2.2	6.9	0.2	4	6	0	0.1	0.8
10	Long watching & chatting	76.2	90.8	55.8	0.8	21.9	284.7	0	4.9	21.7	0	1.3	4.5
11	News apps only	5.9	8.2	7.9	0	1	2.9	0	0.4	1	3.3	3.6	1.3
12	News apps chatting & browsing	18.5	26.2	26.2	0.1	1.4	5	0	0.5	1.5	11.1	17.2	37.1

Appendix

No.	Usage pattern	Video & Streaming			Music & audio			Browser			Others		
		<i>Median</i>	<i>M</i>	<i>SD</i>	<i>Median</i>	<i>M</i>	<i>SD</i>	<i>Median</i>	<i>M</i>	<i>SD</i>	<i>Median</i>	<i>M</i>	<i>SD</i>
1	Checking	0	0.1	0.6	0	0	0.2	0	0	0.1	0	0.3	3
2	Social media & chatting	0	0.5	1.8	0	0.1	0.5	0	0.3	0.7	0	1.5	31.6
3	Quick look into social media	0	0.2	0.9	0	0	0.2	0	0.1	0.3	0	0.4	3.1
4	Extensive social media usage	0	2.1	7	0	0.2	2	0	0.9	2.4	0	1.7	8.9
5	Quick browsing	0	0.1	0.7	0	0.1	0.2	2	2.3	1.1	0	0.8	5.3
6	Browsing & chatting	0	0.4	1.8	0	0.2	1.3	8.5	11.6	9	0	2.6	9.4
7	Music & audio only	0	0.2	1.4	4.9	10.5	35.8	0	0.2	0.6	0	0.8	10.2
8	Short watching & chatting	14.1	14.7	4.1	0	0.1	0.6	0	0.3	0.9	0	1.3	6.6
9	Medium watching & chatting	27.7	28.6	7.1	0	0.3	1.1	0	0.2	0.5	0	1.1	10.5
10	Long watching & chatting	54.9	67.4	74	0	0.3	1.1	0.1	7.1	39.8	0	46.7	714.7
11	News apps only	0	0.3	1.2	0	0	0.1	0	0.2	0.5	0	0.4	2.1
12	News apps chatting & browsing	0	2	6.9	0	0.1	0.3	0	0.9	1.8	0	0.7	4.9

Ranks per usage pattern

No.	Usage pattern	Rank	App category	Frequency	Share in %
1	Checking	1	Communication	27450	46.59
1	Checking	1	Social	6541	11.1
1	Checking	1	Music and Audio	5486	9.31
1	Checking	2	Communication	21168	52.37
1	Checking	2	Social	3994	9.88
1	Checking	2	Music and Audio	2851	7.05
1	Checking	3	Communication	13381	50.31
1	Checking	3	Social	2457	9.24
1	Checking	3	Music and Audio	1578	5.93
1	Checking	4	Communication	9717	52.8
1	Checking	4	Social	1795	9.75
1	Checking	4	Music and Audio	1097	5.96
2	Social media & chatting	1	Social	1026	40.59
2	Social media & chatting	1	Communication	824	32.59
2	Social media & chatting	1	Music and Audio	134	5.3
2	Social media & chatting	2	Social	1074	46.45
2	Social media & chatting	2	Communication	795	34.39
2	Social media & chatting	2	Browser	69	2.98
2	Social media & chatting	3	Social	1022	48.95
2	Social media & chatting	3	Communication	602	28.83
2	Social media & chatting	3	Browser	49	2.35
2	Social media & chatting	4	Social	988	52.05
2	Social media & chatting	4	Communication	569	29.98
2	Social media & chatting	4	Browser	47	2.48

Appendix

No.	Usage pattern	Rank	App category	Frequency	Share in %
3	Quick look into social media	1	Social	2964	43.94
3	Quick look into social media	1	Communication	2243	33.25
3	Quick look into social media	1	Music and Audio	288	4.27
3	Quick look into social media	2	Social	2951	50.26
3	Quick look into social media	2	Communication	1921	32.72
3	Quick look into social media	2	Video and Streaming	134	2.28
3	Quick look into social media	3	Social	2519	50.24
3	Quick look into social media	3	Communication	1473	29.38
3	Quick look into social media	3	Browser	113	2.25
3	Quick look into social media	4	Social	2185	51.4
3	Quick look into social media	4	Communication	1288	30.3
3	Quick look into social media	4	Browser	106	2.49
4	Extensive social media usage	1	Social	187	37.93
4	Extensive social media usage	1	Communication	166	33.67
4	Extensive social media usage	1	Music and Audio	28	5.68
4	Extensive social media usage	2	Social	205	45.25
4	Extensive social media usage	2	Communication	153	33.77
4	Extensive social media usage	2	Video and Streaming	17	3.75
4	Extensive social media usage	3	Social	213	51.08
4	Extensive social media usage	3	Communication	128	30.7
4	Extensive social media usage	3	Browser	10	2.4
4	Extensive social media usage	4	Social	200	50.76
4	Extensive social media usage	4	Communication	126	31.98
4	Extensive social media usage	4	Browser	12	3.05
5	Quick browsing	1	Communication	751	29.27

Appendix

No.	Usage pattern	Rank	App category	Frequency	Share in %
5	Quick browsing	1	Browser	560	21.82
5	Quick browsing	1	Social	183	7.13
5	Quick browsing	2	Browser	789	33.89
5	Quick browsing	2	Communication	555	23.84
5	Quick browsing	2	Social	127	5.46
5	Quick browsing	3	Browser	749	36.7
5	Quick browsing	3	Communication	453	22.2
5	Quick browsing	3	Social	103	5.05
5	Quick browsing	4	Browser	658	38.12
5	Quick browsing	4	Communication	388	22.48
5	Quick browsing	4	Social	86	4.98
6	Browsing & chatting	1	Communication	238	28.3
6	Browsing & chatting	1	Browser	147	17.48
6	Browsing & chatting	1	Social	125	14.86
6	Browsing & chatting	2	Communication	214	27.37
6	Browsing & chatting	2	Browser	180	23.02
6	Browsing & chatting	2	Social	123	15.73
6	Browsing & chatting	3	Browser	207	28.43
6	Browsing & chatting	3	Communication	183	25.14
6	Browsing & chatting	3	Social	109	14.97
6	Browsing & chatting	4	Browser	163	23.94
6	Browsing & chatting	4	Communication	152	22.32
6	Browsing & chatting	4	Social	123	18.06
7	Music & audio only	1	Music and Audio	270	53.36
7	Music & audio only	1	Communication	121	23.91

Appendix

No.	Usage pattern	Rank	App category	Frequency Share in %	
7	Music & audio only	1	Social	37	7.31
7	Music & audio only	2	Music and Audio	208	50.86
7	Music & audio only	2	Communication	109	26.65
7	Music & audio only	2	Social	24	5.87
7	Music & audio only	3	Music and Audio	166	48.97
7	Music & audio only	3	Communication	90	26.55
7	Music & audio only	3	Social	14	4.13
7	Music & audio only	4	Music and Audio	132	47.48
7	Music & audio only	4	Communication	92	33.09
7	Music & audio only	4	Social	10	3.6
8	Short watching & chatting	1	Video and Streaming	277	36.35
8	Short watching & chatting	1	Communication	227	29.79
8	Short watching & chatting	1	Social	85	11.15
8	Short watching & chatting	1	Music and Audio	64	8.4
8	Short watching & chatting	2	Video and Streaming	327	47.12
8	Short watching & chatting	2	Communication	222	31.99
8	Short watching & chatting	2	Social	50	7.2
8	Short watching & chatting	3	Video and Streaming	267	43.49
8	Short watching & chatting	3	Communication	176	28.66
8	Short watching & chatting	3	Social	50	8.14
8	Short watching & chatting	4	Video and Streaming	233	43.71
8	Short watching & chatting	4	Communication	171	32.08
8	Short watching & chatting	4	Social	34	6.38
9	Medium watching & chatting	1	Communication	128	30.48
9	Medium watching & chatting	1	Video and Streaming	124	29.52

Appendix

No.	Usage pattern	Rank	App category	Frequency	Share in %
9	Medium watching & chatting	1	Social	59	14.05
9	Medium watching & chatting	2	Video and Streaming	156	40.94
9	Medium watching & chatting	2	Communication	118	30.97
9	Medium watching & chatting	2	Social	59	15.49
9	Medium watching & chatting	3	Video and Streaming	155	43.91
9	Medium watching & chatting	3	Communication	89	25.21
9	Medium watching & chatting	3	Social	46	13.03
9	Medium watching & chatting	4	Video and Streaming	140	44.59
9	Medium watching & chatting	4	Communication	76	24.2
9	Medium watching & chatting	4	Social	50	15.92
10	Long watching & chatting	1	Communication	79	31.85
10	Long watching & chatting	1	Video and Streaming	67	27.02
10	Long watching & chatting	1	Social	33	13.31
10	Long watching & chatting	2	Video and Streaming	82	35.19
10	Long watching & chatting	2	Communication	63	27.04
10	Long watching & chatting	2	Social	33	14.16
10	Long watching & chatting	3	Video and Streaming	70	33.18
10	Long watching & chatting	3	Communication	61	28.91
10	Long watching & chatting	3	Social	31	14.69
10	Long watching & chatting	3	Browser	22	10.43
10	Long watching & chatting	4	Video and Streaming	76	38.78
10	Long watching & chatting	4	Communication	51	26.02
10	Long watching & chatting	4	Social	25	12.76
11	Cluster: news apps only	1	News apps	288	41.26
11	Cluster: news apps only	1	Communication	199	28.51

Appendix

No.	Usage pattern	Rank	App category	Frequency Share in %	
11	News apps only	1	Social	45	6.45
11	News apps only	2	News apps	288	48.08
11	News apps only	2	Communication	153	25.54
11	News apps only	2	Browser	37	6.18
11	News apps only	3	News apps	241	47.72
11	News apps only	3	Communication	124	24.55
11	News apps only	3	Social	33	6.53
11	News apps only	4	News apps	193	45.63
11	News apps only	4	Communication	110	26
11	News apps only	4	Social	32	7.57
12	News apps chatting & browsing	1	News apps	178	44.72
12	News apps chatting & browsing	1	Communication	109	27.39
12	News apps chatting & browsing	1	Social	22	5.53
12	News apps chatting & browsing	2	News apps	179	49.58
12	News apps chatting & browsing	2	Communication	87	24.1
12	News apps chatting & browsing	2	Browser	27	7.48
12	News apps chatting & browsing	2	Social	23	6.37
12	News apps chatting & browsing	3	News apps	168	51.22
12	News apps chatting & browsing	3	Communication	74	22.56
12	News apps chatting & browsing	3	Browser	27	8.23
12	News apps chatting & browsing	4	News apps	166	54.97
12	News apps chatting & browsing	4	Communication	67	22.19
12	News apps chatting & browsing	4	Browser	20	6.62

Appendix

Diads per usage pattern

No.	Usage pattern	Transition	Frequency	Share in %
1	Checking	Communication Communication	61615	57.47
1	Checking	Social Social	6420	5.99
1	Checking	Music and Audio Music and Audio	5292	4.94
1	Checking	Others Others	4220	3.94
1	Checking	Communication Social	4116	3.84
2	Social media & chatting	Social Social	10407	40.35
2	Social media & chatting	Communication Communication	6126	23.75
2	Social media & chatting	Communication Social	2569	9.96
2	Social media & chatting	Social Communication	2103	8.15
2	Social media & chatting	Video and Streaming Video and Streaming	391	1.52
3	Quick look into social media	Social Social	13354	36.44
3	Quick look into social media	Communication Communication	10753	29.34
3	Quick look into social media	Communication Social	4031	11
3	Quick look into social media	Social Communication	2804	7.65
3	Quick look into social media	Video and Streaming Video and Streaming	468	1.28
4	Extensive social media usage	Social Social	3899	42.86
4	Extensive social media usage	Communication Communication	1981	21.77

Appendix

No.	Usage pattern	Transition	Frequency	Share in %
4	Extensive social media usage	Communication Social	841	9.24
4	Extensive social media usage	Social Communication	742	8.16
4	Extensive social media usage	Social Browser	138	1.52
5	Quick browsing	Communication Communication	4190	32.35
5	Quick browsing	Browser Browser	3217	24.83
5	Quick browsing	Communication Browser	1093	8.44
5	Quick browsing	Browser Communication	854	6.59
5	Quick browsing	Social Social	580	4.48
6	Browsing & chatting	Browser Browser	2783	20.21
6	Browsing & chatting	Communication Communication	2742	19.92
6	Browsing & chatting	Social Social	1720	12.49
6	Browsing & chatting	Others Others	992	7.21
6	Browsing & chatting	Browser Communication	712	5.17
7	Music & audio only	Music and Audio Music and Audio	1250	42.03
7	Music & audio only	Communication Communication	773	25.99
7	Music & audio only	Communication Music and Audio	232	7.8
7	Music & audio only	Music and Audio Communication	176	5.92
7	Music & audio only	Social Social	118	3.97
8	Short watching & chatting	Video and Streaming Video and Streaming	1909	30.34
8	Short watching & chatting	Communication Communication	1763	28.02
8	Short watching & chatting	Communication Video and Streaming	459	7.29

Appendix

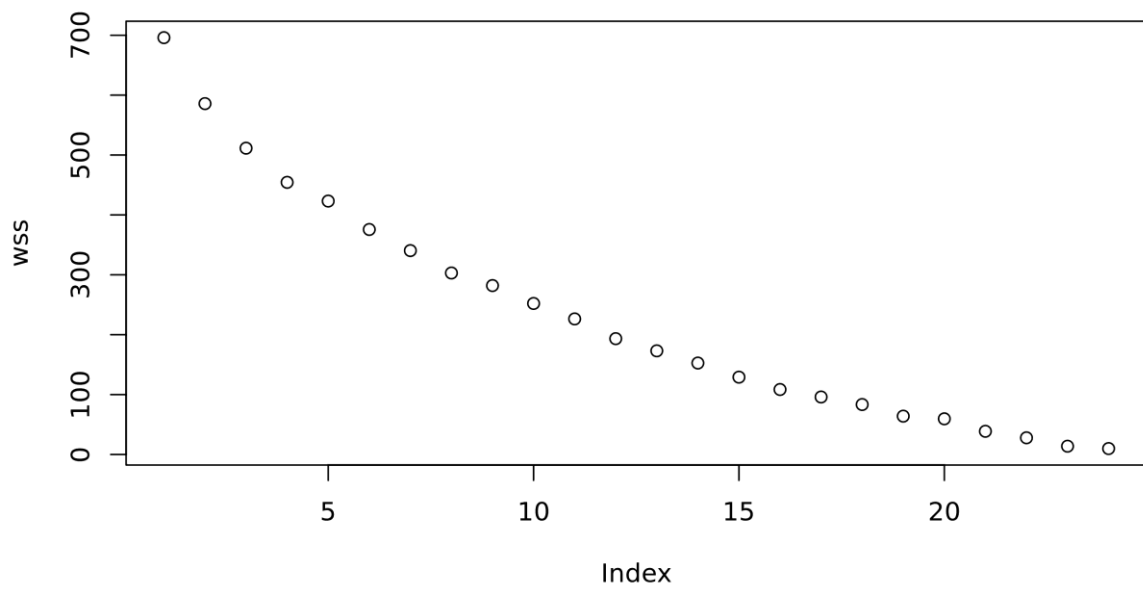
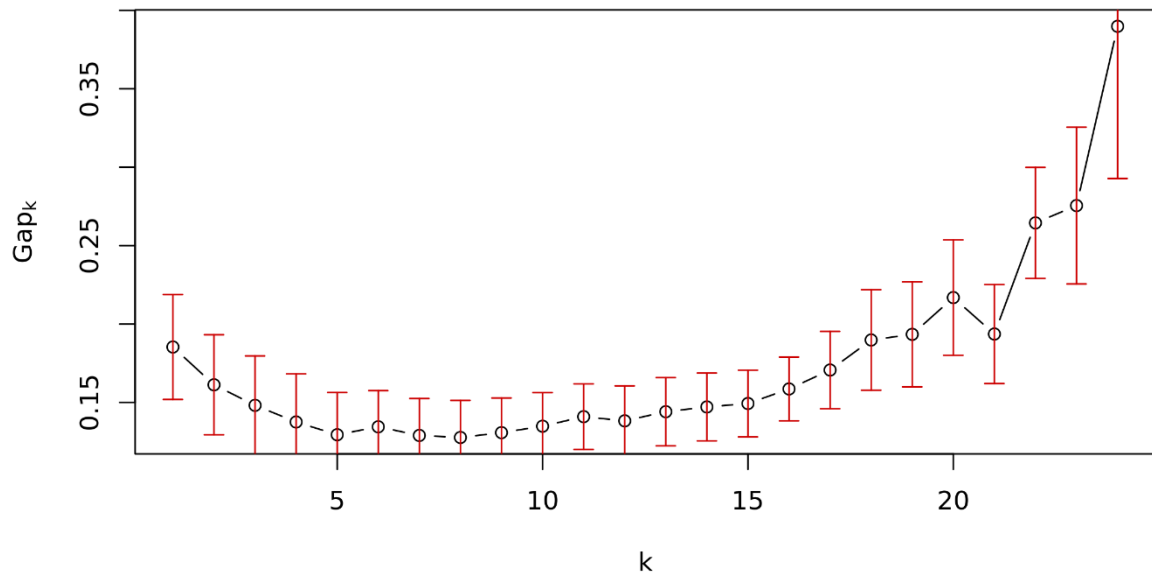
No.	Usage pattern	Transition	Frequency	Share in %
8	Short watching & chatting	Video and Streaming Communication	383	6.09
8	Short watching & chatting	Social Social	319	5.07
9	Medium watching & chatting	Video and Streaming Video and Streaming	1555	31.66
9	Medium watching & chatting	Communication Communication	1025	20.87
9	Medium watching & chatting	Social Social	610	12.42
9	Medium watching & chatting	Communication Video and Streaming	278	5.66
9	Medium watching & chatting	Video and Streaming Communication	250	5.09
10	Long watching & chatting	Video and Streaming Video and Streaming	1615	32.81
10	Long watching & chatting	Communication Communication	1012	20.56
10	Long watching & chatting	Social Social	443	9
10	Long watching & chatting	Browser Browser	235	4.77
10	Long watching & chatting	Communication Video and Streaming	223	4.53
11	News apps only	News apps News apps	1032	29.77
11	News apps only	Communication Communication	878	25.32
11	News apps only	Communication News apps	286	8.25
11	News apps only	News apps Communication	207	5.97
11	News apps only	Social Social	141	4.07
12	News apps chatting & browsing	News apps News apps	1762	39.68

Appendix

No.	Usage pattern	Transition	Fre- quency	Share in %
12	News apps chatting & browsing	Communication Communication	616	13.87
12	News apps chatting & browsing	Communication News apps	304	6.85
12	News apps chatting & browsing	News apps Communication	270	6.08
12	News apps chatting & browsing	News apps Browser	242	5.45

RQ 2: Information repertoires

Optimal number of clusters – GAP & WSS



Validation of cluster analysis – discriminant analysis

		Actual		
		<i>The Mobilist</i>	<i>The Omnivore</i>	<i>The Social Medi- ast</i>
Predicted By LDA	<i>The Mobilist</i>	3	0	0
	<i>The Omnivore</i>	1	2	0
	<i>The Social Medi- ast</i>	0	0	3

88% of the originally grouped cases were correctly classified.

Validation of cluster analysis – F-Scores

Predictor	The Mobi- list	The Omni- vore	The Social Medi- ast
Usage pattern: browsing & chatting	0.32	2.16	1.07
Usage pattern: extensive social media usage	0.33	0.51	1.86
Usage pattern: checking	0.99	0.77	0.44
Usage pattern: long watching & chatting	1.3	0.01	0.45
Usage pattern: medium watching & chatting	0.37	0	0.38
Usage pattern: short watching & chatting	0.5	0	0.28
Usage pattern: music & audio only	0.23	0.07	3.26
Usage pattern: news apps only	1.88	0.01	0.36
Usage pattern: quick browsing	0.53	1.92	0.68
Usage pattern: quick look into social media	0.6	1.36	1.19
Usage pattern: social media & chatting	0.48	1.2	1.16
Usage pattern: news apps chatting & brows- ing	2.06	0	0.03
News via Smartphone	1.98	0	0
News via PC	0.31	1.17	1
News via Tablet	0.52	1.22	0.6
News via SmartTV	0.24	1.4	1.06
News Source traditional TV	0.47	1.09	1.02
News Source online TV	0.85	0.91	0.38
News Source traditional radio	0.43	0.92	1.18
News Source online radio	0.69	0.38	3.21
News Source podcast	0.86	1.03	0.1
News Source print news	0.1	1.98	0.13
News Source online news	0.95	0.87	1

Appendix

Predictor	The Mobi- list	The Omni- vore	The Social Medi- ast
News Source news app	1.49	0.51	0.68
News Source free mail provider	1.43	0.96	0.38
News Source social media	0.91	1.55	0.77
News Source video	0.68	1.31	1.32
News Source search	0.92	1.05	1.51
News Source personal contact	0.95	0.79	1.02

Interpretation of cluster analysis – t-Scores

Predictor	The Mobi- list	The Omni- vore	The Social Medi- ast
Usage pattern: browsing & chatting	-0.22	0.16	0.27
Usage pattern: extensive social media usage	-0.35	-0.23	1.21
Usage pattern: checking	0.18	-0.67	0.64
Usage pattern: long watching & chatting	0.06	-0.66	0.92
Usage pattern: medium watching & chatting	-0.23	-0.7	1.67
Usage pattern: short watching & chatting	-0.21	-0.7	1.61
Usage pattern: music & audio only	-0.17	-0.43	1.1
Usage pattern: news apps only	0.26	-0.35	-0.08
Usage pattern: quick browsing	-0.24	0.03	0.52
Usage pattern: quick look into social media	-0.16	-0.21	0.71
Usage pattern: social media & chatting	-0.23	-0.25	0.96
Usage pattern: news apps chatting & brows- ing	0.23	-0.25	-0.14
News via Smartphone	-0.31	0.29	0.29
News via PC	0.33	0.22	-1.15
News via Tablet	-0.37	0.79	-0.38
News via SmartTV	-0.53	0.69	0.17
News Source traditional TV	-0.56	0.56	0.44
News Source online TV	-0.03	0.6	-0.88
News Source traditional radio	-0.58	0.66	0.35
News Source online radio	-0.09	-0.09	0.37
News Source podcast	0.53	-0.34	-0.72
News Source print news	-0.41	0.85	-0.38
News Source online news	-0.15	0.51	-0.45

Appendix

Predictor	The Mobi- list	The Omni- vore	The Social Medi- ast
News Source news app	0.02	0.23	-0.42
News Source free mail provider	0.01	0.01	-0.06
News Source social media	0.03	0.03	-0.11
News Source video	-0.09	-0.22	0.57
News Source search	-0.14	0.18	0.04
News Source personal contact	-0.34	0.56	-0.07

Appendix 2 (digital)

Data protection concept

Consent form

List of Fridays for Future and political groups contacted

Documentation pre-processing

App categories

Survey

Eidesstattliche Versicherung

Hiermit erkläre ich, Patrick Tobias Zerrer, dass die vorliegende Arbeit ohne unerlaubte Hilfe angefertigt wurde. Es wurden keine anderen als die angegebenen Quellen und Hilfsmittel benutzt. Die den benutzten Werken wörtlich oder inhaltlich entnommenen Stellen wurden als solche kenntlich gemacht.

Ort/Datum

Unterschrift