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Diverging associations of traditional versus social media with government trust

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Trust in government and institutions is a cornerstone of functioning representative democracies. While previous research documented negative associations between social media use as a news source and institutional trust, temporal dynamics and even basic moderating factors remain underexplored. We aim to contribute evidence on these issues by asking: How is the media use-trust association shaped by moderators like traditional media use, age and partisanship, and does it have a time component? For this, we analyze a unique comparative dataset comprising 20 representative panel waves in the United States and Germany, each consisting of at least 1500 participants (totaling in $N = 16,679$ in the US, $N = 11,277$ in Germany). We find that associations of trust and social media use are crucially moderated by traditional media use, particularly for younger people. In Germany, evidence from our specific survey structure suggests that lower trust temporally precedes higher social media use, a relationship that has not been documented before. At the same time, media use patterns differ between opposition and government party supporters, and these differences increase with age. Further, associations of social media use and government distrust are most pronounced among older participants and opposition supporters. A deeper understanding of these dynamics and heterogeneities is essential for democracies worldwide, particularly in the context of increasing social media use.

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Introduction

Amid rising concerns about democratic backsliding and political polarization, institutional trust has become central to understanding democratic resilience. The functioning of representative democracy relies on citizens' willingness to accept the legitimacy and authority of core institutions such as parliaments, political parties and the elected government, as well as civil servants, courts, and law enforcement (Dodsworth and Cheeseman, 2020; Ruscio, 1996; Warren, 2018). Conversely, citizens' satisfaction with the work of state institutions reflects in institutional trust; it thereby reveals perceived democratic performance (Estlund and Landemore, 2018). Thereby, institutional trust is both a cornerstone and an indicator of democratic stability. Meanwhile, a growing body of literature suggests that decreasing institutional trust may be linked to broader challenges for deliberative democracy, including rising ideological and affective polarization in liberal democracies such as the US and European countries like Germany (Brady and Kent, 2022; Estadieu et al., 2025; Lenard, 2005; Spadaro et al., 2020; Torcal and Thomson, 2023; Twenge et al., 2014). Empirical studies link institutional trust to interpersonal social trust in societies (Sønderskov and Dinesen, 2016). The erosion of trust in institutions is associated with protest voting, support of extreme right-wing and populist parties (Hooghe et al., 2011), believing disinformation (Zimmermann and Kohring, 2020) and even tolerance for unlawful behavior (Marien and Hooghe, 2011). We use the proxy of government trust (GT) as an established operationalization of institutional trust to increase this study's comparability (European Commission, 2024; Newton, 2001; Nguyen et al., 2022; OECD, 2017, 2024; Ward et al., 2016).

While institutional trust and GT shape how individuals engage with political information, the ever-increasing prevalence of modern media environments raises urgent questions about how they, in turn, influence trust. Classically, in deliberative democracy, the role of media is to aggregate and to organize individual opinions (Habermas, 1991). This induces a public sphere of opinions, forming a base for citizens' deliberation and belief formation. Yet, the nature of the media-sustained public sphere depends on media's properties, i. e. inclusion and equality of opinions (Habermas, 1983). Considering that democratic performance is grounded in plural perspectives and rational reflection (Estlund and Landemore, 2018; Habermas, 2022), media environments sustain democracy functioning and, consequently, institutional trust.

Social media (SM) are highly interactive, network-based sources of news information and have presently become central arenas for public discourse (Gimmler, 2001). Yet, the discussion on their role in sustaining or undermining democratic norms through phenomena associated with SM, including disinformation, algorithmic curation, and echo chambers, has intensified (Cinellia et al., 2021; Nguyen and Vu, 2019). Rather than acting as passive intermediaries, these platforms influence how information is presented, prioritized, and interpreted within the digital public sphere (Habermas, 2022). They are increasingly entangled with political processes and actors, influencing how information spreads and, at the same time, how political agendas are framed, opinions are formed, and democratic norms are upheld or undermined (Lorenz-Spreen et al., 2023). By contrast, traditional media (TM) such as public media and private established media, via radio, television, newspaper or websites of established outlets, provide news reports produced and compiled under editorial oversight. When public media is protected from political interference, it tends to produce more critical and varied news coverage as compared to other news outlets (Aalberg and Curran, 2012) as well as more equally distributed political knowledge (Iyengar et al., 2010). Empirically, associations between

institutional funding of public media and "democratic health" have also been shown (Neff and Pickard, 2024). Private established media are typically subject to commercial competition, resulting in more disparate presentation, tone and political orientation (Hallin and Mancini, 2004). Customers of private media are—like public media consumers—not subject to the individual personalization and social mechanisms of news distribution through interaction typical for SM. TM are structurally different from SM, as they produce the majority of their content themselves, indirectly modulated by consumer counts and institutional regulations. SM on the other hand act as an instance of automated, individualized curation that focuses on presenting user-produced content to other users. Typically, TM are considered more legally and ethically accountable for the content they deliver than SM (Griffin, 2023). As TM face diminishing influence in the attention economy, many outlets have established presences in SM networks in an attempt to increase the outreach of their news (Aalberg and Curran, 2012; Ramírez, 2022). There however, they are just one of many contributors of news and other information; when embedded in SM, the context and prominence of their contributions among others, like influencers, advertisement and friends, is controlled by the platforms' curation algorithm (Ramírez, 2022). Media types also differ in their psychological function and fulfill different needs for societal groups (Grady et al., 2022). While it has been shown that media use is overall largely habitual (Ghersetti and Westlund, 2018), use practices are individually expressed in different routines (Bengtsson and Johansson, 2022; Hepp et al., 2014, 2022; Kim and Fingerman, 2022): I. e. younger people use SM more, whereas older generations on average rely more on TM (Fotopoulos, 2023; Gottfried, 2024); partisanship divides media use habits via "lifestyle polarization" (Chang et al., 2023; Talaifar et al., 2025). From a theoretical perspective, age is highly relevant to the function of media use for individuals as socialization ("digital natives" vs. "digital immigrants") shapes the way people interact with online platforms (Prensky, 2001) and how they are psychologically affected by TM and SM use (Hardy and Castonguay, 2018; Hutto et al., 2015; Prensky, 2001). Such group-specific divides to the role of media use may interfere with an inclusive public sphere concept of democratic deliberation and its requirements to media. Partisanship too significantly shapes peoples' experience of using media, through partisan media diet segregation (Muisse et al., 2022) and online echo chambers (Baumann et al., 2020): Individuals' opinions and sentiments become reinforced, when exposed to content mirroring the same attitude i.e. via personalized recommender algorithms. This effect has been empirically confirmed in US and German contexts, including on the topic of GT (Akram and Nasar, 2023; Ohme, 2021). Its extent, however, depends on the media user's political orientation (Chang et al., 2023). Further, recent studies emphasize diverging patterns in age group-partisanship interactions: The higher vulnerability to hyperpartisan news among older partisans who are missing digital skills (Lyons et al., 2024) or the right-wing political affectation of especially younger individuals via TikTok (Gerbaudo, 2024; Tukiainen et al., 2024), who are psychologically more susceptible to political interference (Eckstein et al., 2012).

Despite growing concerns, key questions remain unresolved: Is the use of different media for news associated with GT? Does low trust change individuals' media use patterns in favor of SM? Which individual properties influence these associations? Indeed, empirical analysis of SM effects remains challenging. Platform algorithms are proprietary and frequently updated; data access remains—despite regulations such as the European Commission's Digital Service Act—limited; and the inner workings of digital media ecosystems are often opaque to researchers. This limits

causal inference and impedes efforts to assess how SM, in comparison to TM, affects trust in key public institutions—a foundational element of democratic resilience.

We address these questions using a high-frequency empirical dataset collected biweekly from representative panels in the United States and Germany. With over 26 million observations since late 2022, the dataset enables fine-grained temporal modeling and comparative analysis. We apply regression and random intercept cross-lagged panel models (Hamaker et al., 2015) to estimate cross-sectional associations and identify temporal dynamics between media use and trust.

A growing body of empirical work in social science links general SM usage to shifts in trust, participation and polarization (Lorenz-Spreen et al., 2023; Xia et al., 2025). Yet, as to associations with trust in institutions, only a few studies have been conducted in the past ten years: Survey data across 27 European countries in 2015 revealed GT decrease with SM use, while TM sources were positively associated; individual demographics played a minor role (Ceron, 2015). A study conducted in Italy in 2018 even indicates a detrimental causal effect of SM use on institutional trust through extensively controlling for exogenous variables related to internet use (Sabatini and Sarracino, 2019). Further, in comparison of both SM and TM associations with GT, Verboord et al. use multinational European survey data to examine how the usage of various media types predicts institutional trust (Verboord et al., 2023). They confirm positive associations with public television use, printed press and domestic digital news sites and a negative association with SM use, including video platforms. Relevant demographic properties for trust in Verboord et al.'s study were age and education, while gender did not have a significant association (Verboord et al., 2023). Still, the strongest, positive predictor of institutional trust turns out to be a “progressive-liberal value orientation”. Figure 1 illustrates the relationships between SM use, TM consumption, GT, age and partisanship 1a. While these pairwise associations are consistent across studies, findings regarding moderating effects remain contradictory. Verboord et al. note that the positive association of age with institutional trust turns negative when media use is included as a control variable (Verboord et al., 2023); suggesting a potential hidden moderating role of age in the media use-trust relation. Yet, while their study includes numerous model predictors, it does not investigate the possible moderating role of these variables and thus does not fully address the nature of their interrelations. Partisanship, recognized as a crucial predictor of government trust (Johnson and Kaye, 2015; Verboord et al., 2023), was studied as a moderator on the media-trust association by Klein and Robinson in the US with data from 2012 to 2018 (Klein and Robison, 2020): Here, government partisans had a positive association of trust and SM use when controlling for their general media use. For opposition partisans, this association was negative, implying a potentially polarizing role of SM. However, Klein and Robinson's models assign “Non-Social Media Use” a negative association with GT, contradicting other sources (Ceron, 2015; Verboord et al., 2023). This discrepancy could be attributed to either inconsistency of media use items between studies or critical differences of the US and Europe; or statistical artifacts, as in Klein and Robinson's study, the variance of parameter estimates exceeds the magnitude of absolute parameter values. Thus, age and partisanship emerge as variables of interest and potentially relevant moderators, yet their role in the media use-trust association remains not established. Other control variables that were used in close to all studies cited above are gender and education. However, gender is not considered associated to media use frequencies for news information or GT (Schroeder et al., 2023). Education, on the other hand, is known as a weak but comparatively well-described moderator variable, connected to both traditional media consumption and GT

(Verboord, 2024). Therefore, we do not focus on these variables as moderators for this analysis and instead concentrate on age and partisanship.

Further empirical studies are thus required to comparably determine the association of media and GT across different countries, as well as the potentially crucial moderating nature of age and partisanship. Media landscapes, of course, diverge across countries: In the US, public media are considered less influential than private outlets (Aalberg and Curran, 2012; Roscini, 2024), while in western European countries, public news outlets remain comparatively popular and well-funded (Aalberg and Curran, 2012; Humprecht et al., 2022; Neff and Pickard, 2024; Wolleschensky and Sehl, 2024). Private established media in the US such as Fox News and MSNBC have been criticized of exacerbating social polarization (Gil de Zúñiga et al., 2024; Roscini, 2024). In Germany's multi-party landscape, partisan dividing lines in established public and private media are not as clear-cut and media organizations are stronger and more stable (Humprecht et al., 2022). Further, it was observed that radical opposers of the government rely on news on social media rather than on established channels (Angermaier, 2023; Zehring and Domahidi, 2023). On the other hand, these two countries have structural similarities: Both are liberal democracies, economically stable and secure, and with sufficiently similar cultural response styles that a cross-country comparison is feasible (Harzing, 2006). Given that past studies on the relationship of trust and media use focused on either the US (Johnson and Kaye, 2015; Klein and Robison, 2020) or European countries (Verboord et al., 2023) and resulted in inconsistent findings, Our research could provide differentiated evidence on this topic, and at the same time contribute to bridging the continental gap through data from a survey conducted concurrently in both spheres.

Thus, we identify the following issues as requiring further empirical, cross-country investigation and formulate our research hypotheses: The association between GT and both TM and SM use has yielded contradictory findings (Ceron, 2015; Johnson and Kaye, 2015; Klein and Robison, 2020; Sabatini and Sarracino, 2019; Verboord et al., 2023). TM use may moderate the relationship between SM and GT (Verboord et al., 2023), but this has not yet been explicitly studied.

Government trust is positively associated with news consumption via traditional media (H1.1), and negatively related to the use of social media (H1.2), especially in persons who consume little traditional media (H1.3).

Further, all relevant studies are exclusively cross-sectional (Ceron, 2015; Johnson and Kaye, 2015; Klein and Robison, 2020; Verboord et al., 2023). Therefore, it remains unknown whether higher TM use and lower SM use lead to higher GT or whether GT lead to changes in media use, which makes it challenging to formulate theories on the underlying mechanisms (Verboord, 2024). A panel study on a adjacent topic, the relation of disinformation belief and loss of trust in media, revealed a reciprocally reinforcing spiral (Valenzuela et al., 2022). Here, disinformation belief temporally preceded a decline of trust. It seems likely that similar mechanisms could be decisive as in the media use-institutional trust association. Our semi-panel study too design allows to discern temporal interrelations, so that we can add a layer of analysis to inform theory on the primacy of media use or trust by studying the temporal precedence in this relation:

An increase in social media use for news temporally precedes a decline of government trust in a mutually reinforcing feedback loop.

At the same time, age importantly affects TM and SM use (Fotopoulos, 2023; Ghersetti and Westlund, 2018; Prensky, 2001), as does partisanship (Chang et al., 2023; Talaifar et al., 2025).

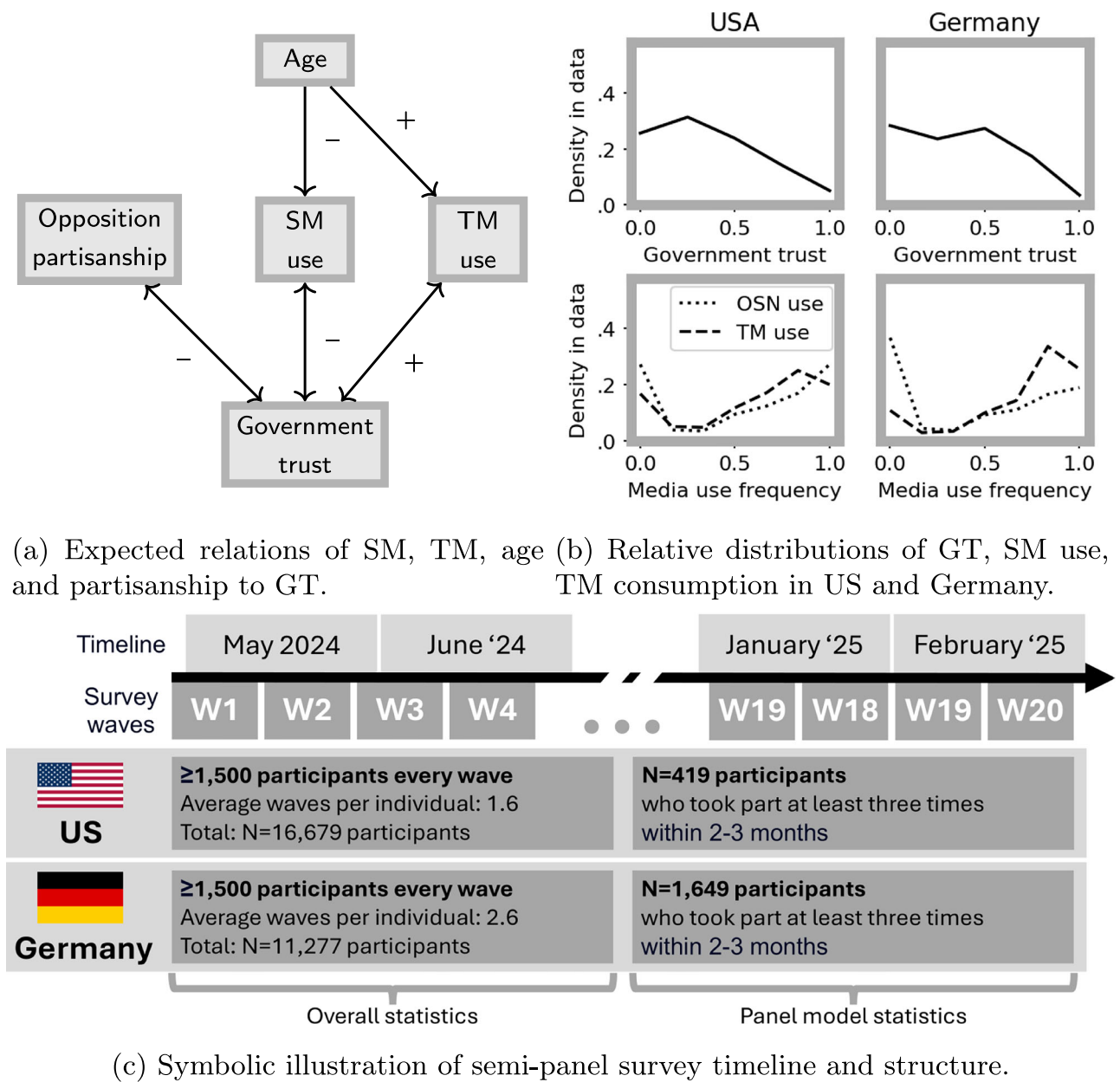


Fig. 1 Overview of expected relations, demographics and dataset structure. Directed graph of associations conjectured from literature with indicated positive and negative relationships (a), relative distributions of government trust (GT), social media (SM) and traditional media (TM) variables in the dataset (b): X-axes normalized Likert scales (“No trust at all” to “A lot of trust” and “Less frequently” [than “1–2 times a month”] to “Several times a day”). Below is a visualization of the survey structure (c).

Differences in media socialization and digital literacy imply age-specific use patterns (Fotopoulos, 2023). Further, age-group specific SM phenomena may pertain to users’ political partisan orientation: Particularly, older partisans’ higher susceptibility to hyperpartisan news on the web (Lyons et al., 2024) in connection with the higher prevalence of conservative online echo chambers (Chang et al., 2023) could be connected to a greater share of SM use in opposition partisans among older generations. Yet, no studies examine whether government or opposition party supporters’ TM and SM use varies with age.

Higher age is negatively associated with social media (H3.1) and positively with traditional media use for news information

(H3.2). These associations are weaker for opposition partisans (H3.3).

Partisanship has been identified as a significant moderator for the relation of SM use and GT, though again, within contradictory findings on the nature of the relation between media use and GT (Klein and Robison, 2020; Verboord et al., 2023). Age, on the other hand, strongly determines not only media use frequencies, but also the psychological function of media use (Prensky, 2001). Young adults’ political orientation is regarded as still forming and more subject to extraneous influence (Eckstein et al., 2012); at the same time, a spread of extreme political content is observed among young users on TikTok (Gerbaudo, 2024; Tukiainen et al.,

2024). For a differentiated account, it is thus important to consider both partisanship and age as moderators.

Opposition partisanship is associated with a stronger negative relationship between government trust to social media use (H4.1). The association strength of government trust and traditional media (H4.2) as well as social media use (H4.3) is higher for younger participants.

For H1, we compare GT among participants based on their use of different media types, and for robustness repeat the same with an institutional trust construct. To address H2, we apply a random intercept cross-lagged panel model to identify the temporal ordering between changes in SM and TM use and changes in GT. For H3, we examine distributions to understand how individuals of different ages and partisan affiliations rely on SM for news and what their average GT levels are. Finally, for H4, we analyze how partisanship and TM consumption moderate the association between GT and SM use while taking into account demographics, and how age moderates the GT-SM and GT-TM relationships when controlling for the respective other media type, partisanship, and demographic variables. Our findings show opposing directions of associations of GT with TM and GT with SM, respectively, and the complex interplay between media ecosystems, institutional trust, and individual factors.

Methods

Data. This study uses data collected within the Social Sentiment in Times of Crises (SOSEC) research project. Since November 2022, SOSEC has collected high-frequency panel data in the US and Germany on trust, media use, emotional well-being, fears and political opinion to capture collective sentiments and anticipate potential tipping points. Specifically, this investigation relies on 20 waves conducted biweekly from 2024-05-23 through 2025-02-02, in parallel in both countries. For the translation of survey items from English to German, a committee approach was employed. The survey was carried out by a professional polling company, which distributed it to participants of their online access panel. Participation was restricted to individuals aged 18 or older. Each wave was first administered to individuals who also responded to at least one previous wave; to compensate for panel attrition, additional participants were recruited as needed. Participant selection in each wave was subject to constraints on age group, gender, ethnicity (in the US) and geographic location (in Germany) to achieve representative samples. The target quotas were calculated using 2022 Census data for both the US and Germany. A total of 16,679 respondents participated in the 20 waves of the US survey (49.7% female, mean age 46.9), resulting in 25,592 completed surveys. Of these, 419 individuals took part in three waves spaced four or 6 weeks apart; this subsample formed the panel dataset used to estimate the cross-lagged model. While the overall US survey dataset closely approximated Census benchmarks (U.S. Census Bureau, 2022) for gender and age (US population over 18: 51.0% female, mean age: 48.1), the panel dataset showed an attrition-related increase in average age (53.9% female, mean age 60.0). In Germany, the pooled survey dataset comprised 11,277 participants (49.3% female, mean age 49.7), distributed close to Census (Federal Statistical Office of Germany, 2022) estimates (over 18: 51.2% female, mean age 51.3) and totaling in 29,566 completed surveys. For Germany, 1649 participants met the criteria for inclusion in the panel model; here, panel attrition effects were weaker (46.0% female, mean age 54.8). Detailed descriptive dataset statistics are provided in Supplementary Table ST1.

Measuring trust. For the operationalization of institutional trust, the proxy of government trust (GT) is frequently used (Newton, 2001; OECD, 2017; Ward et al., 2016), even though strictly speaking, institutional trust also encompasses trust in non-government institutions. Yet, its other determinants, trust in state powers and organs, are closely connected to GT both semantically (Estadieu et al., 2025) and in the perception of citizens (OECD, 2017). While the scientific study of the various components of institutional trust may provide a more complete picture and better robustness, using GT as an indicator has some advantages in a cross-country investigation: First, it is a clearly interpretable indicator of institutional trust, whereas a construct may be more subject to inter-country differences in the roles and cultural perception of national institutions (Joxhe, 2023; OECD, 2017). Further, the public perception of institutions may change over time so that trust in a certain institution contributes differently to institutional trust. Lastly, while the role of government may also be subject to changes, this is typically connected to change of the governing party (Brady and Kent, 2022) or major crises (Aassve et al., 2024) and therefore easier to track than the interplay of a set of public institutions in day-to-day politics. We therefore focus on GT in this work. Still, for selected key results, analogous evaluations applied to an institutional trust construct are provided in the Supplementary Materials.

Government trust. GT was measured with the following survey item: “Please take a look at the list below. How much trust do you have in each of the institutions mentioned?”, one of the institutions listed being “The government”. Responses were recorded on a 5-point Likert scale: “A lot of trust, Quite a lot of trust, Neither trust nor distrust, Little trust, No trust at all”. Figure 1b visualizes the distribution of these values in the SOSEC dataset on a normalized scale, where 0 corresponds to “No trust at all” and 1 to “A lot of trust”. For easier interpretability, in all Figures and calculations, we invert the scale of trust items so that responses indicating higher trust correspond to larger numbers, contrary to the initial survey response coding (see Supplementary Table ST18).

Institutional trust. Institutional trust is typically defined as a construct encompassing trust in different government institutions. In democracies with division of powers, this includes trust in the legislative, judiciary and executive branches (González and Smith, 2017). Following Sønderskov and Dinesen Sønderskov and Dinesen, we measured trust in the parliament, the judiciary, the police, the public sector and politicians.

To validate this construct, we conducted a single-factor confirmatory factor analysis: The resulting loadings for all factors were good to excellent for both the US and Germany according to established standards (Comrey and Lee, 2013; Tabachnick et al., 2013), reported in Supplementary Fig. SF5. Cronbach’s alpha indicated high internal consistency: 0.839 for US (95%-confidence intervals 0.837, 0.842) and 0.879 for Germany (95%-confidence intervals 0.873, 0.878). The Supplementary Information (Supplementary Fig. SF6) includes a scatterplot illustrating the strong relationship between GT and the institutional trust construct in both countries.

Measuring media usage. To quantify media usage, we used 7-point Likert scale survey items. Participants responded to the header question “How often do you get news from sources, such as...?” by choosing an option from “Several times a day” to “1–2 times a month” and “Less frequently”. Table 1 shows the respective survey items and response options.

Table 1 Self-report media use sub-items in the SOSEC survey and response options.	
Subitems for "How often do you get news from sources, such as...?"	Response options: 7-point Likert scale
"...public media institutions (National Public Radio (NPR)), Public Broadcasting Service (PBS), and local public broadcasting services)"	"Several times a day" "Once a day" "3–4 times a week" "1–2 times a week" "3–4 times a month" "1–2 times a month" "Less frequently"
"...privately established media companies (Fox Broadcasting Company (abc), National Broadcasting Company (NBC), The Wall Street Journal, New York Times, US Today)"	
"...messenger services (e.g., Telegram, WhatsApp, Signal)"	
"...social networks (e.g., X/Twitter, Facebook, Instagram)"	
"...video platforms (e.g., YouTube, TikTok)"	
US items are shown; in Germany, participants are displayed German translations with corresponding country-specific examples.	

As with the trust items, we invert the scale of the media use items so that higher values correspond to more frequent media use, contrary to the original survey coding (see Supplementary Table ST17).

Measuring demographics and partisanship

Demographics. Demographics were collected using standard items such as “What gender are you?” and “In which year were you born?”; the population density of a participant’s residence was calculated based on postal administration codes (ZIP codes in US, PLZ codes in Germany) and mapped to population per square kilometer using public access US Census data reformatted by Walker et al. (2021) and German Census data (Federal Statistical Office of Germany, 2015).

Partisanship as group membership. In the US, partisanship was measured with the question “If the 2024 presidential election were between Donald Trump for the Republicans and Joe Biden for the Democrats, would you vote for Donald Trump, Joe Biden, someone else, or probably not vote?”, with response options “Donald Trump”, “Joe Biden”, “Someone else” and “I did not vote”. After the Democratic Party nominated Kamala Harris in August 2025, the item was updated accordingly. Following the November 2024 election, the item was rephrased to “In the 2024 presidential election, who did you vote for? Donald Trump, Kamala Harris, or someone else?”.

In Germany, where more parties receive significant vote shares, and therefore play a role in the political discourse, participants were asked (in English translation): “Which party would you vote for if the parliament election were to take place on this week’s Sunday?” The participants were then able to choose among the following options: “CDU/CSU”, “Bündnis 90/Die Grünen”, “SPD”, “AfD”, “Die Linke”, “FDP”, “Freie Wähler”, “Bündnis Sahra Wagenknecht”, “Werte Union”, “Another party”, “I don’t intend to take part in the election”.

Partisanship for regression controls. For regression controls, we used a series of different survey items that allowed us to capture political orientation in a more nuanced way. Participants were asked to rate these same parties on an 11-point Likert scale: “For each party, we would like you to indicate how good or bad you think this party is”, together with with response options “0-Very Bad”, “1”, “2”, ..., to “10-Very Good” and the alternative checkbox “I don’t know this party”.

Statistics

Regression models. Regression models are used to quantify how the average of one measure varies according to the levels of another variable (Gordon, 2015). Like related studies (Johnson and Kaye, 2015; Klein and Robison, 2020; Sabatini and Sarracino, 2019; Verboord et al., 2023), we model GT as an exogenous

variable predicted by media use. To address H1, we calculate one regression per each media use survey item, which serves as the only exogenous variable, and an intercept. In this first series of descriptive models we apply ordinary least squares (OLS) estimation and use no control variables. The corresponding regression formulas are of the form

GT = b + p_M * M

with GT as exogenous variable, intercept *b* and slope *p_M* for each media use item *M* of “public media”, “private established media”, “messenger services”, “social networks” and “video platforms”. The parameters *p_M* are descriptive of the association strengths for the respective media types and are used to test H1.1 and H1.2. We then split the participants into three categories by TM use: Much TM use corresponds to self assessments “Once a day” or “Several times a day”, medium TM use to “3–4 times a month”, “1–2 times a week”, or “3–4 times a week”, and few TM use to “1–2 times a month” or “Less frequently”. Then, we regress SM use (endogenous) on GT (exogenous) and intercept for each category, again using OLS and without control variables. The corresponding regression formula is then:

GT_{TM-category} = b + p * SM

We fit such a regression on the subdataset of survey participants for each TM use category as described above; for each category, *p* determines the association strength. Thus, regressions allow us to capture moderation effects of TM use on the association of GT and SM use.

During the survey time period, elections in the US and a government coalition breakdown in Germany took place. Partisan bias may differently affect citizens’ trust levels in the face of such events and changes of the ruling party, as is known from research on economic expectations (Bachmann et al., 2021; Binder et al., 2024). To assess the impact of such time-varying confounders in H2, which is relevant to the validity of the RI-CLPM findings, we conduct a regression of GT on TM and SM use for each wave and compare the changes in association strength over time with the following formula for each wave:

GT_{wave} = b + p₁ * TM + p₂ * SM + p₂ * gen + p₃ * age + p₄ * ed + p₆ * pop + p₇ * inc

As control variables, we include gender (*gen*), age (*age*), education (*ed*), population density of the participant’s place of residence as determined by their postal code (*pop*) and income (*inc*) with an intercept (*b*) in a generalized linear model regression (GLM). Additionally, we include a variant with *p₈*partisanship* as an addend, operationalized by their self-reported voting intention. The regression is fit by iteratively reweighted least squares (IRLS). We use IRLS, a standard robust estimation procedure (Rodríguez, 2008). It is also the standard parameter estimation procedure for GLMs in R¹. As compared to ordinary least squares parameter

estimation, it is less sensitive to outliers, as out-of-distribution data points are assigned lower weights during estimation, but still contribute information to the fitting (Peng et al., 2023). Robust estimators are recommended for large datasets, as such datasets are hard to examine for potential outliers visually, especially if high-dimensional (Bramati and Croux, 2007).

H3 is studied by three simple regressions of the format

$$y = p * age + b,$$

where we model SM use, TM use and GT as y , respectively. Parameters p and b are estimated done for the subset of participants categorized by intended voting preference as Republicans and the subset categorized as Democrats in the US; for Germany, for AfD-supporters as well as for the set of other participants. Again, comparing the values of p decides H3.1–H3.3 is confirmed or rejected.

For H4, we are interested in the property of age as a potential moderator of the associations of GT and SM as well as GT and TM. For this, we move beyond descriptive statistics and include control variables in a GLM fit by IRLS: We model GT (endogenous variable) by the exogenous variables SM use, TM use categories and the interaction of SM use with different TM use categories. As controls we include age, education, population density, income and an intercept. The resulting regression formula is:

$$GT = b + p_1 * SM + p_2 * TM_{cat} + p_3 * SM * TM_{cat} + p_4 * gen + p_5 * age + p_6 * ed + p_7 * pop + p_8 * inc + p_9 * part$$

It is again estimated for partisanship groups as determined via voting preference (*part*). Here, p_1 is the relevant parameter to hypothesis H4.1. Lastly, to better describe the (potentially nonlinear) moderating relations with age for a more specific test of H3, we estimate a GLM containing SM use, TM use, gender, education, population density, partisanship, income, and an intercept for all individuals with the same age in years via IRLS:

$$GT_{age} = b + p_1 * TM + p_2 * SM + p_3 * gen + p_4 * ed + p_5 * pop + p_6 * inc + p_7 * part$$

In this formula, p_1 and p_2 's estimated sizes inform the acceptance or rejection of H4.3. To ensure sufficient sample sizes, only ages where included, for which the dataset contains at least 100 participants (resulting in $N = 25,592$ survey responses in the US and $N = 29,566$ in Germany). To contrast the average impact of each media type, we estimate four series of models: With SM or TM use as endogenous variable respectively and including or omitting the other media type as a control variable. We thus conduct four regressions for each group of participants of the same age. That is, we leave out either component $p_1 * SM$ or component $p_2 * TM$ from the above formula to demonstrate their respective contribution. As we do this to permit a meta-estimation of age and GT-media use association strengths, in this analysis we do not require the parameters of age groups to be statistically significant; if they are not, they will be distributed around zero and we will find null effects.

For better comparability of associations of variables with different scales, we normalize all features to a range between 0 and 1.

Random intercept cross-lagged panel model. We assume that repeated exposure to SM news content would lead to decreases in GT and increased alternative news consumption in a self-reinforcing cycle. Such dynamics can contribute to growing polarization, similar to how partisan news content reinforces ideological attitudes in sociopolitical contexts (Earle and Hodson, 2022).

The random intercept cross-lagged panel model (RI-CLPM) is a type of structural equation model designed to detect and describe bidirectional associations in time series data for individuals. This approach is widely used in the social sciences, psychology and medicine (Narmandakh et al., 2020; Orben et al., 2022) and extends the cross-lagged panel model (Hamaker et al., 2015). Notably, the RI-CLPM only identifies temporal ordering among observed variables within a panel. This does not prove causal primacy or directional mechanisms, nor rule out unobserved confounders that vary between individuals. It must thus be interpreted cautiously with respect to conjectures on causal mechanisms. According to Orth et al. (2024), in cross-lagged panel models, 0.03 effect sizes should be interpreted as small effects, 0.07 as medium, and 0.12 as large. In the model for Germany, most calculated parameters fell within the medium and large effect sizes.

We use a RI-CLPM with three time steps to be able to detect temporally ordered associations over time. To address H2, we include variables GT and SM use. Additionally, as TM use may be not only a relevant control but also a time-dependent confounder, we consider it as a third variable modeled over all three time steps. We apply it to the subset of data for each country, where participants responded to the survey at least three times with an interval of 4–6 weeks (2–3 waves). This seems to us the most reasonable time frame to expect mutually associated change in GT or media use. However, as a robustness check, we also report results for a corresponding RI-CLPM evaluation with extracted panel datasets with only participants who took part in subsequent waves (Supplementary Tables ST9: US and ST10: Germany), 4–5 wave intervals (Supplementary Tables ST11: US and ST12: Germany) and intervals of 6 or more waves (Supplementary Tables ST13: US and ST14: Germany). In the RI-CLPMs, we include gender, age, population density and income as demographic, time-invariant controls and apply a maximum likelihood estimation.

Dataset codings and descriptive statistics. All scales and codings are reported in the Supplementary Materials: Supplementary Tables ST15 (US) and ST16 (Germany) list exact texts for each survey item, Supplementary Tables ST17 to ST25 show respective response scales and Supplementary Tables ST25 (US) and ST26 (Germany) report summary statistics for all items.

Detailed demographic and descriptive dataset statistics are shown in Supplementary Table ST1: Average media use frequency as well as GT level means and standard deviations are mostly very similar in both pooled and panel datasets. The only notable exception is SM use, that is less frequent in the US panel dataset (normalized mean value 0.39) than is the US pooled dataset (normalized mean value 0.56). Likely, this is related to the higher mean age in US panel dataset participants. On the other hand, to exclude that these datasets' contain significantly different associations, we also compare simple Pearson correlations of the three main variables (GT, SM, TM): These are highly similar for both pooled and panel US datasets (Supplementary Table ST1). Thus, the difference in age and SM use must be considered when interpreting the US panel data results, but would not be expected to drive significant differences in relationships found in these datasets.

Results

Use of different media and GT. Figure 2 shows the average GT associated with use frequencies of different media for the US and Germany. We see that, on the normalized Likert scales, average GT ranges between “Little trust” (0.25 on the normalized scale) and “Neither trust nor distrust” (0.5 on the normalized scale) for

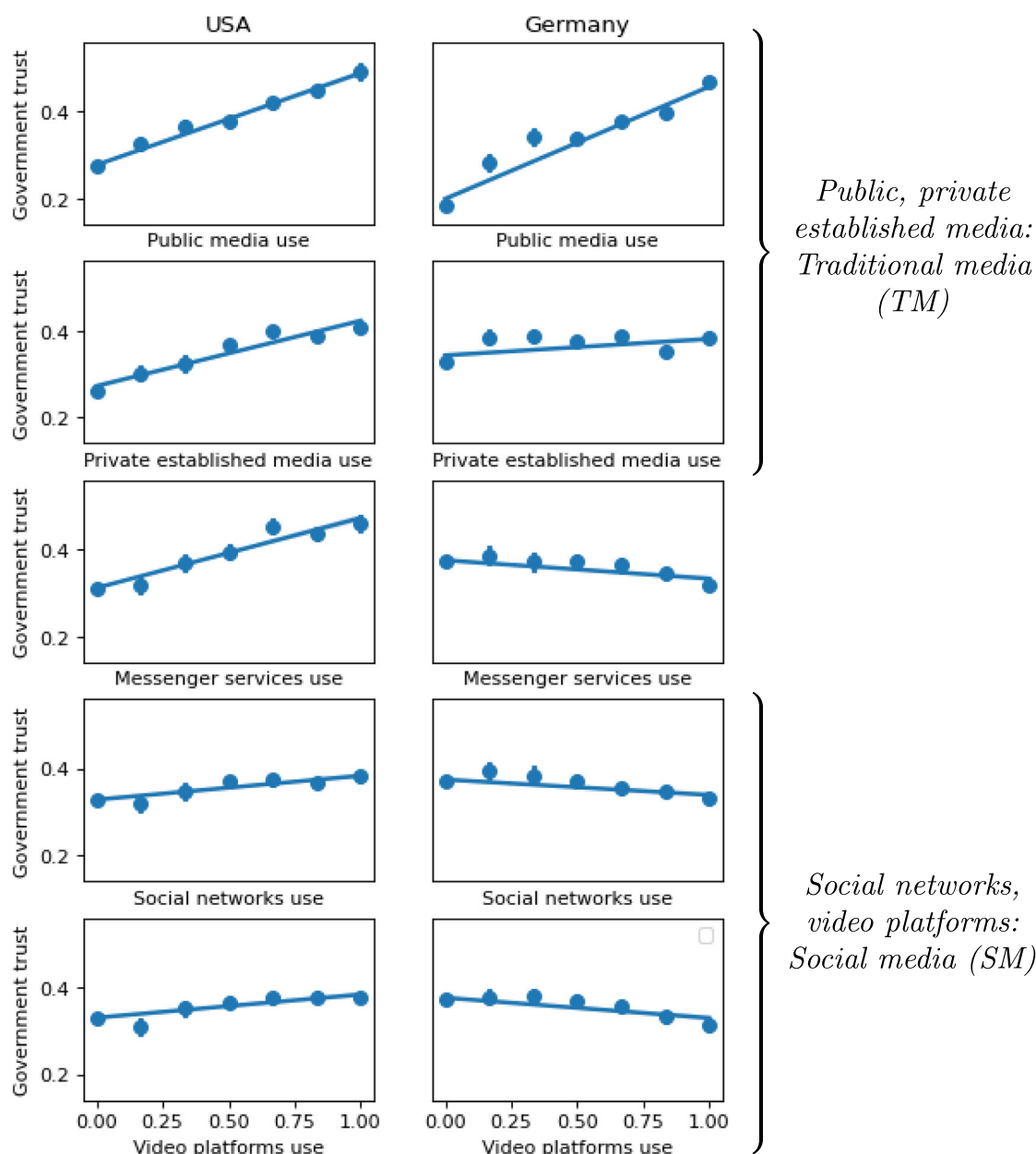


Fig. 2 GT and using different media for news: Public and private established media as TM; messenger services; social networks and video platforms as SM. Both scales are normalized Likert scales: For media usage, 7-point Likert scale items with the header question “How often do you get news from sources, such as...?” with responses ranging from “1–2 times a month” and “Less frequently” (than “1–2 times a month”) to “Several times a day”. Parameter tables for approximated regression lines provided in Supplementary Tables ST2 (US) and ST3 (Germany).

different media use frequencies. In both countries, frequent public media use and private established media use have a positive association to GT (rising slope), while higher social network use and video platforms use have lower positive association with GT in the US and a negative association with GT in Germany. In the US, the use of private established media is associated with GT almost as strongly as the use of public media. In Germany however, the positive association between private established media and GT is much weaker. Further, the distribution of messenger services use is qualitatively more similar to the use of public media or private established media in the US. Meanwhile in Germany, this association more resembles that of social networks or video platforms with GT. We check the robustness of these associations by applying it to a more general construct of

five common (González and Smith, 2017; Sønderskov and Dinesen, 2016) institutional trust components other than GT: Trust in the parliament, the judiciary, the police, the public sector and politicians. With this construct of institutional trust in place of GT, the resulting distributions are highly consistent with the ones we see in Fig. 2 (compare Supplementary Fig. SF7).

Here, we are interested how GT is differently associated with SM than TM. We consider the characteristic defining feature of SM, the presence of network effects (Aalberg and Curran, 2012; Gimmmler, 2001; Habermas, 2022). Therefore, we regard public media use and private established media use as TM and subsume social networks and video platforms as SM (Gerbaudo, 2024; Johnson and Kaye, 2015). We drop messenger services in further analyses, as here cross-country comparability is not straight forward.

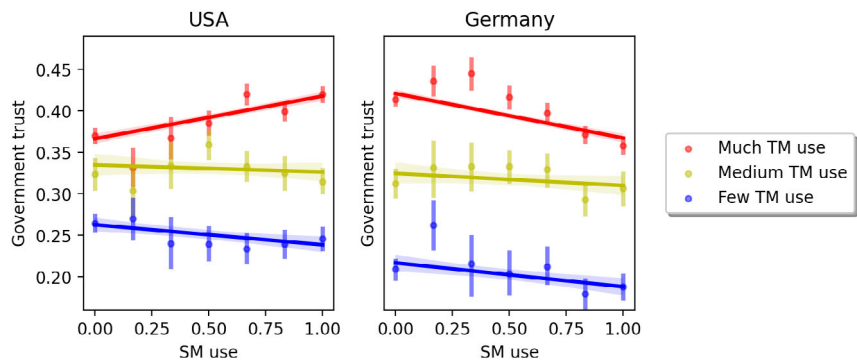


Fig. 3 TM consumption groups moderating the SM-GT association. TM use is shown as the individual participants maximum of their public media use and private established media use. Social networks use and video platforms use are subsumed as SM. Table 2 shows detailed parameter values. The TM categories are grouped as follows: Much TM use corresponds to self assessments “Once a day or “Several times a day”, medium TM use to “3–4 times a month”, “1–2 times a week”, or “3–4 times a week”, and few TM use to “1–2 times a month” or “Less frequently”.

Table 2 Regression table: Modeling target variable GT in groups of TM consumption by just SM use and an intercept.						
	US: TM use			Germany: TM use		
	few	medium	much	few	medium	much
SM use	−0.02*** (0.01)	−0.01 (0.01)	0.05*** (0.01)	−0.03*** (0.01)	−0.01 (0.01)	−0.05*** (0.00)
intercept	0.26*** (0.01)	0.33*** (0.01)	0.37*** (0.00)	0.22*** (0.01)	0.32*** (0.01)	0.42*** (0.00)
Obs	5541	4192	15859	3996	3895	21675
R ²	0.00	0.00	0.00	0.00	0.00	0.01
Adj. R ²	0.00	−0.00	0.00	0.00	0.00	0.01
F-stat	8.51	0.48	77.88	9.05	1.48	123.60

Standard errors are reported in parentheses.
*** indicates significance at the 99% level.

Supplementary Figs. SF2 and SF3 report distributions of TM and SM use levels with respect to age, gender, education and income, showing that most demographic properties are shared between TM consumers and SM users. Only with respect SM there is a notable group of older participants who do not use it at all. Overall, however, most participants use both TM and SM to some extent rather than just one of them (Supplementary Fig. SF4).

SM use is associated with GT, moderated by TM use. Figure 3 visualizes how SM use relates to GT in the US and in Germany for different levels of TM consumption. US participants with little TM consumption on average report trust levels around “Little trust” in the government (0.25), while in Germany they mostly are slightly lower. Only participants with much TM use are, on average, closer to “Neither trust nor distrust” (0.5) than to “Little trust”. For the US, the distinction of TM consumption levels uncovers that TM use is a significant moderator: Only high TM use is associated with GT increasing with SM use ; low and medium TM consumption is associated with slight GT decrease. For Germany, no qualitative differences emerge. The parameter values and standard deviations for regression lines drawn per TM use group in Fig. 3 are listed in Table 2. We see that parameter sizes for SM use, although significant, are lower or equal to 0.05 and thus not very large when compared to the distance between survey responses that is 0.25 on the normalized GT scale. Yet, the qualitative difference for US participants not using much TM, is obvious, as associations become notably weaker and even negative (compare Supplementary Table ST2).

These results are descriptive of media use and trust in the survey participants; they report the average GT of individuals with a particular media use habit and approximate overall associations on population level. However, this does not take into account that GT is also effected by properties such as age, education and income, which may too be related to media use. Therefore, we now move beyond descriptive statistics and apply models that approximate the relations of media use and GT. Here we introduce additional control variables, aiming to discern the contribution of the variables of interest from the influence of other individual measures.

Does SM use temporally precede institutional trust? We use a cross-lagged model to inspect whether either loss in GT or SM use is observable earlier than the other in survey participants. For this, we select all participants in our dataset who participated at least three times over the course of any 2–3 months. Between each two participation, at least one month must have passed. This is to detect short term effects, relations measurable on a scale of a few months rather than years. At the same time, excluding subsequent waves (with just 2 weeks distance between them), intends to avoid spurious fluctuations; we assume that within two weeks, no measurable effect would occur.

In the cross-lagged model, we control for education, age, income and rural-vs.-urban place of residence. The resulting fitted model parameters are visualized in Fig. 4: For the US, the model estimates all assumed relations but one as non-significant, while for Germany, many strong associations are identified. The

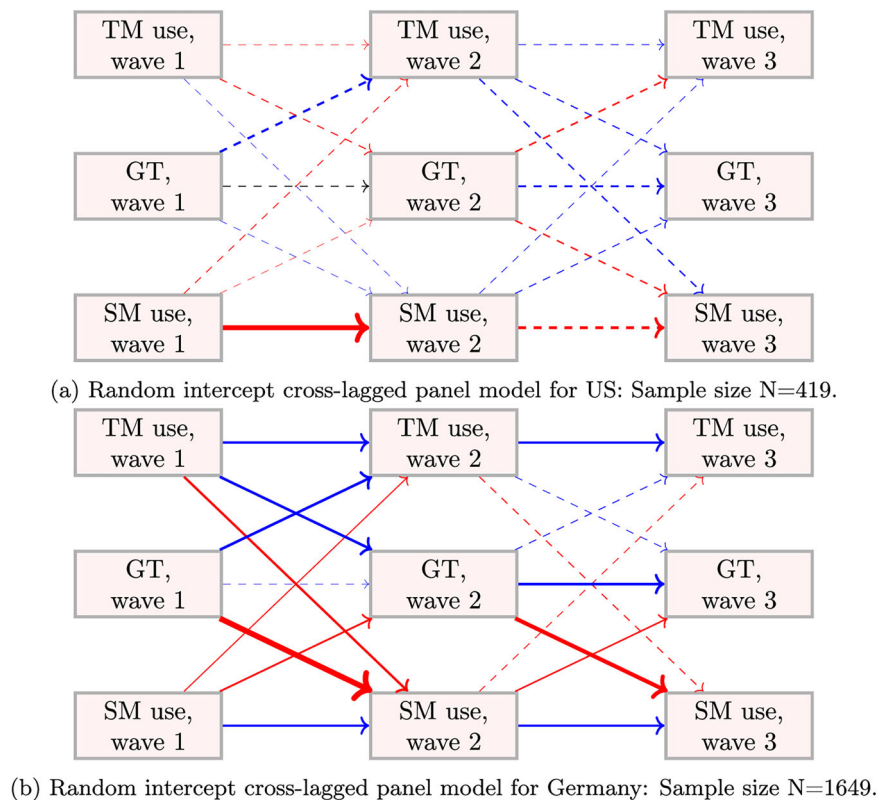


Fig. 4 Visualizations of random intercept cross-lagged panel models. One graph showing associations for US (a) and Germany (b), respectively. Line thickness indicates effect size; blue for positive and red for negative effects respectively. Dashed lines indicate non-significant relations ($p < 0.1$). Control variables age, education, income and rural/urban place of residence are included in the estimation but are not displayed.

estimated model parameters are provided in Supplementary Tables ST7 (US) and ST8 (Germany).

The model shows that SM is negatively associated with GT in each subsequent wave, and conversely GT is negatively associated with SM use in each subsequent wave. This points to the presence of a reciprocal spiral-type relationship between SM use and lower GT in Germany. This relationship is pronounced stronger than the mutual reinforcement TM consumption and GT, where these associations are only significant in two of the three selected subsequent waves.

Robustness tests with other intervals than 2–3 waves between measures show consistent results: For the US dataset, still almost no significant parameters are estimated (Supplementary Tables ST9, ST11 and ST13). For Germany, associations are even slightly stronger for subsequent waves (corresponding to two weeks distance), especially the parameters linking GT to SM use are larger and more statistically significant values (Supplementary Table ST10). For 4–5 wave intervals, the associations are weaker, although the temporal precedence of GT over media use remains, and for intervals of 6 or more waves the estimated parameters are no longer significant (Supplementary Tables ST12 and ST14). To further check whether the association strength of media use and GT changes over the time of the survey's 20 waves, we plot regression coefficients for individual regressions per wave (Supplementary Fig. SF8): They are largely constant, suggesting that unobserved time-varying confounders are less likely to drive the results.

Age, partisanship, and media use. How much are TM and SM used at different ages? In both countries, younger people use SM more than older generations and higher age is associated with

higher TM consumption. While in older groups, a notable share of individuals report using SM for news information less than once per month (10% for persons aged above 65 in the US and 17% for the same age cohort in Germany), this group almost disappears in persons below age 25. Further, there is a considerable gap between such non-users of SM and most other participants: Either participants use no social media or rather much social media, just few stating to use social media 1–2 or 3–4 times per month. TM is used in Germany more than in the US across all age groups, the difference increasing with age.

When further distinguishing by party preference, we observe that older opposition sympathizers in both countries, but especially in Germany, use SM more than government party sympathizers: Figure 5 shows average values of SM use, TM use, and GT by age and partisanship. Opposition partisans also report lower levels of TM, and this partisan gap increases with older age. While the gap between Republicans and Democrats is visible for both SM and TM, it remains smaller than the distance between two adjacent categories on the normalized 7-point media use Likert scale, which would correspond to 0.14. In Germany however, the distinction between AfD supporters and others reveals that especially older participants exhibit notable difference in media use: The oldest non-AfD supporters' average responses are close to "1–2 times a month" (0.14) for SM and "Several times a day" (1) for TM, while participants supporting the AfD report average values of "1–2 times a week" (0.5) for SM and "Once a day" (0.86) for TM. Average GT in both US and Germany is highest for older partisans of the governing party and lowest for older partisans of the opposition party. The difference is around 0.25 points on the normalized trust Likert scale, with Democrats reporting "Neither trust nor distrust" (0.5) and Republicans "Little trust" (0.25). In Germany, the difference between the two

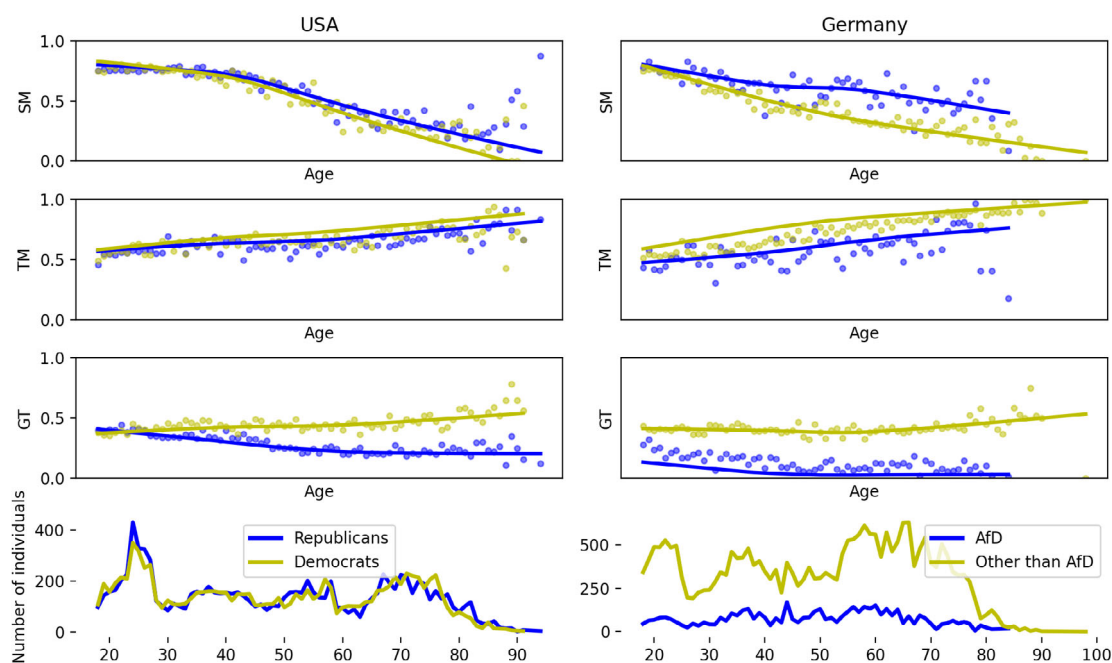


Fig. 5 GT, SM use and TM use by age and partisanship. Y-axes are normalized Likert scales. Partisanship is determined by voting preference—in Germany, only values for AfD voters and others are visualized (AfD being considered the strongest German anti-establishment party (Hansen and Olsen, 2024; Wagner et al., 2023) and associated with lowest GT). Smoothed lines approximate the associations for each partisanship. Regression parameters estimating the shown associations of age with SM, TM and GT per partisanship are provided in Supplementary Tables ST4 (US) and ST5 (Germany). The distribution of birth years in the dataset is plotted below in absolute numbers.

selected partisanship groups is even larger, with oldest AfD supporters having response averages closer to “No trust at all” (0) than to “Little trust”. For US participants younger than 25 years of age, GT is even slightly higher for Republican sympathizers than for Democrats; in Germany too, the GT level is closely tied between the youngest AfD sympathizers and opposers. Complete distributions of media use by age groups and partisanship are provided in Supplementary Figs. SF3a (for SM) and SF3b (for TM).

Trust and media use moderated by partisanship and age. First, we identified the moderating role of TM on the association of SM and GT (Fig. 3). We then reported associations of age with media use and with GT, differentiating by partisanship. Lastly, we now investigate potential additional moderating roles of partisanship and age. For partisanship, we apply a regression to model the dependence of GT on CM use within partisanship groups, also considering the shown interaction with TM use: This reveals that TM consumption interacts much more strongly with SM use {in opposition partisans than in government party voters. In the US, this moderation is stronger, while in Germany, TM consumption is associated more with GT levels than GT-SM use association. The participants with clearest negative associations between trust and SM use across both countries are opposition partisans with low TM use. We further see that partisanship is much more connected to GT levels and moderates the influence of demographic control variables (i. e. age) rather than the slopes describing the association of SM use with GT (full results provided in Supplementary Table ST6).

As to the moderating role of age on the relation of media use and GT, we must consider that it may be non-linear like other age associations (compare Fig. 5). Due to the size to our dataset, we are able to estimate association strengths for every age by an individual regression for all participants of the respective age.

Again, we include control variables and show regression parameters for both modeling GT by age and TM, and GT by age and SM. To evaluate the interactive role of using the other media type respectively, we show both a variant when controlling for the other media type or not: Figure 6 thus shows the strength of association between TM use or SM use and GT across ages and control conditions. The parameter size estimations roughly correspond to the parameters calculated as significant in Table 2: Slightly below zero for SM and between 0.2 and 0.4 for TM. Only in the US, the additional control variables lead to a lower estimated parameter size for TM with higher age. In both US and Germany, if disregarding TM use, SM use has a slight positive association with GT for younger participants (controlling for other demographics). However, when accounting for their TM consumption, younger participant’s SM use is no longer associated with trust. At the same time, for older participants the association of GT and SM use becomes negative and the moderating influence of TM disappears. The tipping point seems to be at a higher age in the US than in Germany (roughly around 55 years in the US and 40 years in Germany). Further, the association of TM consumption and GT is stronger than that of SM use and GT. In both US and Germany, high TM consumption is strongly associated with higher GT, but this association decreases with age in the US and increases in Germany. This figure confirms that the relation between SM use and GT is strongly moderated by age: On average, mostly older participants who are also frequent SM users, have slightly lower GT in both US and Germany.

Discussion

We confirm findings (Ceron, 2015; Verboord et al., 2023) in line with H1.1 that individuals who consume TM more frequently also report higher levels of GT on average, contradicting results by Klein and Robinson (2020). Higher SM use is generally

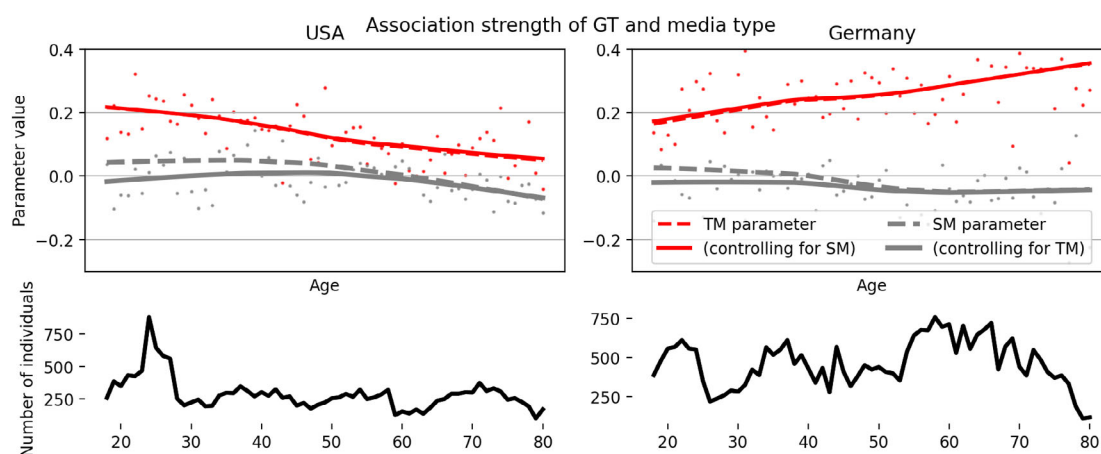


Fig. 6 This figure visualizes the association strength and direction between TM and GT and between SM and GT, both controlling and not controlling for TM consumption. For each age in years and each media type (TM, SM), an OLS-regression was run mapping the media type and an intercept as well as the control variables education, population density, income and partisanship to GT. To ensure sufficient sample sizes, only ages were included, for which the dataset contains at least 100 participants. This results in $N = 25,592$ survey responses in the US and $N = 29,566$ in Germany. The x-axis shows the respective media use parameter's magnitude.

associated with a weaker increase in GT in the US and even a decline in GT in Germany, as found by more recent studies (Ceron, 2015; Klein and Robison, 2020; Sabatini and Sarracino, 2019; Verboord et al., 2023) and consistent with H1.2, but contrary to earlier findings from 2011 (Johnson and Kaye, 2015). In Germany, the relationship between messenger use and GT more closely resembles that observed for social networks and video platforms. This may be explained by the unequal spread of the messenger app *Telegram*. According to estimates by Meltwater and We Are Social (Meltwater and We Are Social, 2024), *Telegram* is used considerably more in Europe, including Germany, than in the US. Although technically a messaging application, *Telegram* shows properties characteristic of social networks and has been widely adopted by conspiracy theorist groups to disseminate information framed by non-conformist worldviews (Angermaier, 2023; Dogruel et al., 2023; Hoseini et al., 2023).

Our data further reveal that when differentiating participants by levels of TM consumption, negative associations in the lower TM consumption groups hold in the US and across all groups in Germany. In the US, the association of SM and GT is more ambiguous than in Germany: For US participants with high levels of TM consumption, higher SM use is related to higher GT. This confirms H1.3, pointing to the importance of understanding TM use as moderator in the SM and GT association rather than a control variable. One interpretation of these findings is that individuals who regularly consume TM may be more resilient to negative GT-SM associations, and that the structural differences between the media systems in the two countries contribute to these divergent patterns. Where consumption of TM, i. e. public media, is less established, it may more exclusively be a habit of individuals with high GT.

In the US, our temporal modeling approach yields no evidence for a reciprocal spiral relationship between SM use and GT, suggesting a more complex interrelation between TM, SM and GT over time. Though the US panel sample is smaller than the German panel dataset, it should be sufficiently large to detect modeled associations if they were present. Further, though we see a considerable age difference in the US panel (the participants are on average older than in the pooled US dataset), this alone should not have led to weaker results, as we have seen that association strength of GT and SM use increases with age (Fig. 6). Thus, we consider this null result reasonably robust and

reject H2 for the US. In Germany, however, the cross-lagged model identifies mutual positive associations between TM use and GT and, even more strongly, a negative association between GT and SM use in subsequent considered survey waves. We interpret these findings as indicating that in Germany, the reciprocal across-wave association is more pronounced for the relation between GT and SM than for TM and GT. Moreover, the associations of GT to future SM use are stronger than the associations of SM use to future GT, suggesting that lower trust temporally precedes increased SM use. Therefore, H2 must be rejected for Germany as the results indicate the opposite temporal pattern: Loss of government trust temporally precedes increase in social media for news use.

Both the zero-findings on the US dataset and the positive findings on the Germany dataset are considerably stable with respect to different time intervals, but fade out when considering distances of 6 or more waves (3 months or more) between timesteps. However, the RI-CLPM models do not account for time-varying confounders; theoretically, we cannot rule out that another variable may causes low GT at one timestep and high SM use at the next. This could be external events (i. e. crisis events) that both affect trust levels and media use patterns. However, in the present analysis we do not use a fixed set of three measure dates for all participants. Instead, our multi-wave panel design allows to include participant's responses spread out over the whole survey's time period in the RI-CLPM estimation, as long as their distance corresponds to the specified interval. Further, we have seen that the associations of GT and TM use as well as GT and SM use within waves are largely invariant throughout the timeframe of the survey (Supplementary Fig. SF8). Thus, we consider the present estimations to be reasonably robust against the latent impact of specific external events.

Finally, our analysis sheds light on the role of age and partisanship. Younger participants use SM more frequently (confirming H3.1) and consume less TM (confirming H3.2). This raises the question whether TM users and SM users are distinctly separate demographic groups. However, TM or SM is not mutually exclusive for the majority of participants and most users of TM and SM share similar demographic characteristics with respect to age, gender, education and income; yet, as to SM use, there is a large group of older non-users (Supplementary

Fig. SF2b). To a smaller extent, respondents supporting opposition parties also favor SM. The gap in SM and TM consumption between opposition and establishment partisans increases with age, confirming H3.3. When controlling for age, education, income and population density, negative associations between SM use and GT are strongest among opposition partisans with low TM consumption (confirming H4.1), compared to government partisans with similar TM consumption habits or opposition partisans with higher TM consumption. At the same time, the strong positive association between TM and GT decreases with age in the US but increases in Germany, in both cases contradicting H4.2. Negative associations between SM use and GT are less pronounced overall and primarily observed among older opposition-partisan participants, when controlling for TM consumption, and demographics. Further, young individuals who frequently consume TM tend to exhibit a more positive association between SM use and GT, thus falsifying 4.3. What could explain these age-related patterns? Prior research shows that SM use affects age groups differently. Hardy and Castonguay report that among individuals under 30, SM use decreases anxiety, whereas it increases anxiety for those over 30 (Hardy and Castonguay, 2018). They attribute this generational difference to younger people's familiarity with SM, which may enable them interacting with SM differently. Given the strong link between anxiety and distrust (Reid et al., 2024; Scandurra et al., 2023), a similar mechanism may underlie the negative associations between SM and GT in older participants who frequently use SM. This interpretation aligns with our findings (Fig. 6), which show a lower age threshold in the US than in Germany, consistent with the earlier and more widespread SM adoption in the US (Statista Research Department, 2025) and aligning with the dichotomy of "digital natives" and "digital immigrants" (Prensky, 2001).

Partisanship primarily affects trust levels rather than strongly moderating the relationship between SM and GT. According to the theory of echo chambers, larger partisan effects (i. e. opposition) might have been expected. Yet, if GT were to amplify users' sentiments, we would have observed positive associations with GT in government partisans and clear negative associations among opposition partisans. Particularly young people, who are considered to be both receptive to political influence (Eckstein et al., 2012) and subject to radical opposition content on SM (Gerbaudo, 2024; Tukiainen et al., 2024), in fact exhibit low negative associations of SM use and GT. An alternative explanation for this result is that SM algorithms produce diverging experiences for users depending on their political orientations. For instance, a 2016 US study describes that SM platforms "boost exposure to incongruent political content more for Democrats than Republicans"; suggesting that the phenomenon of echo chambers may be less pronounced in this group (Vraga, 2016). Similarly, a Twitter study with data from 2009 to 2019 (Chang et al., 2023) found that US Liberals engaged more with more diverse and toxic content than Conservatives. This could explain why SM use does not observably amplify trust among government party supporters, i. e. through mechanisms like echo chambers. In fact, the mostly negative association between GT trust and SM use does not significantly differ between opposition and government party supporters.

In the broader picture, our findings show that differences in media use and its association with GT largely align with distinct patterns of media consumption across population groups. The generational difference that profoundly moderates the studied association is also a prominent parameter in studies on functional roles of media. While individuals across all generations use media to fulfill their need of being informed, younger individuals tend to rely on it for social connectedness and emotional mood

management (Bengtsson and Johansson, 2022), whereas older people complement and compensate their oftentimes fewer social ties through media (Kim and Fingerma, 2022). Further, older individuals mostly use SM to augment their TM consumption (Hutto et al., 2015), while in younger persons SM use tends to replace TM consumption (Fotopoulos, 2023; Hepp et al., 2022). Our findings show that only in younger participants, TM consumption contributes positively to the association of SM with GT (Fig. 6). Knowing that higher age is associated with stronger polarization on SM use, TM consumption and GT (Fig. 5), we can assume that selection effects contribute to the differing associations through group-specific media use patterns and functional roles: Likely, older people with low GT increase their SM usage once they find that it can offer them not only compensation for social ties but also more individually aligned political information than TM. Younger individuals, on the other hand, use much SM in general, regardless of their political orientation (Fig. 5). Their GT depends much more on additional TM use, potentially because high TM use at a young age might be a strong indicator of high GT. Alternatively, TM use might (inhibitorily) interfere with negative SM-GT associations. Partisanship not only accounts for different SM and TM use habits (Fig. 6), but also for different associations of SM use and trust—however unrelated to the associations of TM consumption and trust (Table ST6). This suggests that opposition partisans may not distrust TM per se but might simply be less inclined to consume it. We interpret our findings as evidence of a complex interplay between media use and institutional trust, shaped by the everyday needs and habits of specific social groups. Frameworks describing effects of media on institutional trust and related indicators of functional deliberative democracy must take into account group specifics and note different functional roles of media, such as described by Grady: Meeting influence and relatedness needs, enabling cohesion and cooperation (Grady et al., 2022). Persons who use both SM and TM will likely take advantage of the different affordances of the respective media type. Depending on their age and political partisanship, they may assign different roles to a media type, and experience the news information they are presented with differently. This carries significant political implications: The public sphere is no longer merely divided into online and offline domains or fragmented into social media echo chambers (Baumann et al., 2020; Fraser, 2014). Instead, the media landscape itself is segmented by age, political alignment, and institutional trust levels—posing major challenges for inclusive, pluralistic, and impartial spaces of democratic deliberation.

By evaluating our research questions using an extensive up-to-date dataset, we were able to clarify the relationship of media use and trust, particular by addressing temporal orderings and detailing the nature of supposed moderator variables age and partisanship. Our findings highlight substantial differences between key groups (e.g., frequent TM users vs. not-TM users, younger vs. older participants, opposition vs. government partisans), offering a basis for more differentiated theoretical frameworks on the role of modern media for trust in democratic institutions. Building on these insights, further research may help design empirically grounded interventions aimed at strengthening trust, tailored to the needs and characteristics of specific groups. Yet, several limitations should be considered. First, the sample structure is that of an unbalanced panel: Although each wave is representative of the national population, especially in the US, retention rates differ across demographic groups. While we control for all major demographic variables (age, income, education, population density, partisanship), future studies could replicate the present findings using a fully balanced panel and a larger US sample. Second, it remains unclear to what extent these observed results generalize to other countries: Meta-reviews on

psychological effects of SM suggest that inter-country differences may be particularly pronounced in regions with different economic properties and media landscapes, i. e. in Southeastern Europe and Southeast Asia (Cai et al., 2023; Huang, 2022). Our findings emphasize the strong moderating role of individual characteristics, in particular the striking influence of age on the relationship between media use and trust. This raises important questions about whether TM and SM content are processed differently across generations or assume different social functions depending on age. Experimental designs and advances in developmental psychology could help clarify potential causal mechanisms underlying these effects and their links to other outcomes, such as SM use's impact on anxiety. Equally, the estimated temporal trust-media use succession must be consolidated and specified experimentally for theoretic advances on causal effects of media use or trust.

More generally, the societal effects of SM use on public opinion and sentiment cannot be fully understood without accounting for the specific design choices and mechanisms embedded in individual platforms. Platform architecture ranging from algorithmic curation to feedback loops and user interface design, plays a pivotal role in shaping users' exposure, engagement, and belief formation (Orben et al., 2024). These effects are not uniform across platforms, as different affordances and incentive structures yield varying patterns of polarization, trust erosion, and opinion reinforcement (Bak-Coleman et al., 2025). Recent studies further underscore the relevance of platform-specific design choices for democratic outcomes. Kölbel et al. (2023) document the use of so-called dark patterns—interface mechanisms that exploit cognitive biases to steer user behavior—across major platforms. This is further complicated by a rapid evolution of SM ecosystems, marked by changing platform policies on existing networks (Özturan et al., 2025) and the rise of fast-paced video platforms such as *TikTok*, *Instagram Reels*, and *YouTube Shorts* (Gerbaudo, 2024; Roberts and David, 2025). Building on this, Information Systems researchers argue that the design and engineering disciplines should broaden its analytical scope (Weinhardt et al., 2024): Rather than focusing on commercial optimization, researchers should increasingly engage with the normative and institutional consequences of platform design. As SM structure not only influences information flows but also patterns of political reasoning, deliberation (Cohen et al., 2021) and practices of opinion formation (Chang et al., 2023), their association with trust or distrust deserves closer investigation.

In summary, while the known association of SM, TM and GT is confirmed in our data, our findings contribute to a more nuanced understanding of how media consumption relates to GT by demonstrating how these relationships are strongly shaped by age and partisanship. Our findings point to the temporal ordering of the SM-GT relationship: In the German panel, lower government trust precedes higher social media use within the observed time frame. This knowledge provides valuable context for efforts aimed at countering trust erosion, particularly among groups most affected: Individuals, who are already critical of the government, rely on SM for news and do not additionally consume TM, as well as older generations who use SM. Being a crucial issue for the stability of liberal democracies, the consequences of declining trust and fragmented media diets should be further differentiated in future studies.

Data availability

Code and data for replication of the presented results are available at https://osf.io/r83x6/overview?view_only=30eee5ed16a54b84a8b01277486dcfc2. Access to the raw data can be made available on reasonable request to the corresponding author.

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1 <https://search.r-project.org/R/refmans/stats/html/glm.html> (2nd June, 2026).

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Author contributions

The idea for the paper was jointly conceived by the authors. J. F. and D. B. designed the questionnaire items and managed the survey fielding. D. B. performed the calculations

and statistical analyses. J. F. and P. L.-S. contributed the theoretical framework and relevant related work, and jointly supervised the project. All authors contributed to the final version of the manuscript.

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Competing interests

The authors declare no competing interests.

Ethical approval

The conducted study was granted ethical approval by the German Association for Experimental Economic Research e.V. on 13th September 2023 (Institutional Review Board Certificate No. MSEIsPRB).

Informed consent

Informed consent was obtained in written form from all participants before participation in each survey wave. The respective date of consent is therefore individual for all participants. Participants were explicitly informed of their right to withdraw from the study at any time without any negative consequences. Participants were further informed that all personal information and data collected would be kept strictly confidential, anonymized and used solely for academic research purposes.

Additional information

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