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The world around us and the picture(s) in our heads: The effects of news media use on belief organization

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ABSTRACT

Since Converse [1964. The nature of belief systems in mass publics. Critical Review, 18(1-3), 1 – 74 https://doi.org/10.1080/08913810608443650] asked "What goes with what?", research tries to answer this question. How individuals perceive the world around them depending on media use has been an endeavor of studying societal beliefs of societal issues separately. Building upon literature on cognitive architecture, we study how media use shapes the formation and stability of belief structures across issues in public opinion reflected in groups of individuals. Using a three-wave panel study, we found (1) that individuals' perceptions of different issues are interconnected, (2) translating into aggregate-stable, concurring groups in public opinion, and that (3) differential media use affects the formation and stability of these groups.

How individuals perceive the world around them has crucial consequences for democratic societies and their citizens. For example, the literature on sociotropic voting emphasizes that citizens largely base their voting decisions on how they perceive the overall state of the country's economy (Kinder & Kiewiet, 1981; Lewis-Beck & Stegmaier, 2018). Similarly, fear of becoming a victim of crime is influenced by perceptions of crime rates (Tyler, 1984). In short, extensive research shows that news media play a crucial role in shaping such perceptions about societal conditions and developments (Mutz, 1998). However, in this prior research, each issue seemed to be particularly addressed within one field of media effect research (for an overview, see McLeod et al., 2019). For example, early research on the cultivation effect was most often centered on the issue of violent crimes (Gerbner et al., 1986; Morgan et al., 2017), while classic framing effect studies have focused on issues such as poverty or unemployment (Iyengar, 1991). To draw a parallel to Lippmann's (1922) seminal words: most media effect research examines the world around us as distinct pictures in our heads.

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Although previous research has provided us with rich knowledge on the effects of media use on societal beliefs, it falls short of accounting for the fact that perceptions of societal problems rarely form as discrete issue domains: issues like economic recession, climate change, or immigration comprise interconnected systems of problems calling for corresponding solutions (Trist, 1983). In fact, the vast literature on the interconnected structure of cognitive postures (e.g., Converse, 1964; Goren, 2012; Peffley & Hurwitz, 1985), as well as on connectionist approaches (e.g., Van Overwalle & Siebler, 2005), supports the idea that societal beliefs are not a question of delimitated issues.

The aim of this study is, therefore, to shift the attention of media effects research from what people believe about single issues to how these beliefs are organized *across* issues. To do so, we combine three strands of research. First, the Cognitive Social Theory of Public Opinion (CSTPO) suggests that the formation and dynamics of societal beliefs are not questions of delimitated issues (Lavine & Latané, 1996). Building upon connectionist understandings of cognitive mental structures, the theory rests on the assumption that individuals form interconnected belief structures. In addition, social interaction and communication lead to a similar phenomenon on a societal level (Latané, 1996; Lavine & Latané, 1996). In the same way that perceptions of societal issues can cluster into interconnected structures, organized inter-belief structures also emerge in the public.

The CSTPO does not make assumptions about the way in which societal beliefs could *enter* an interconnected system, however. Therefore, second, we build on the long-standing research tradition on cognitive architecture from the related field of political attitudes (Alexandre et al., 2021; Converse, 1964; Daenekindt et al., 2017; Goren, 2012; Keating & Bergan, 2017; Peffley & Hurwitz, 1985). This strand of literature discusses the structuring of mental postures based on a constraint – "a sort of glue to bind together many more specific attitudes and beliefs" (Converse, 1964, p. 211). Combining media effects research on societal beliefs (Asp, 1986; Mutz, 1998), and the CSTPO assumption that communication has the ability to form inter-belief structures, we argue, third, that media use may function as such a "glue," connecting societal beliefs into an interconnected system reflected in groups of individuals with similar beliefs.

In this paper, we theorize and contrast two potential outcomes reflecting a process of horizontal (issue generic) or vertical (issue specific) constraining of beliefs and relate these to several well-known characteristics of news coverage. Empirically, we used a three-wave panel study conducted in Sweden between March 2020 and April 2021, assessing people's beliefs about the national conditions of five of the most important issues among Swedish citizens: crime, schools, health care, unemployment, and the economy.

Cognitive architecture of societal beliefs

To explore how beliefs are structurally organized in people's minds and hence, in society, it is important to define *beliefs* first. Our conceptualization of beliefs is anchored in research on media effects and *sociotropic beliefs* (Mutz, 1998; Shehata et al., 2021). Beliefs are typically defined as "associations people create between an object and its attributes" (Cottam et al., 2016, p. 48) or "mental constructions about the probability that an object or event is associated with a given attribute" (Potter, 2012, p. 141; see also Shehata et al., 2021). Sociotropic beliefs thus refer to perceptions about societal, and more precisely, national-level conditions of specific issue domains (e.g., the current state of the

national economy, crime rates, or poverty); we refer to them as *societal beliefs*. Research typically treats single issues as *objects* and various aspects or considerations of those issues as *attributes* – and these attributes include both substantive and affective elements (McCombs & Valenzuela, 2020; Sheafer, 2007).[1] An issue is defined as a larger societal domain "sharing inherent substantive characteristics which influence how they are framed and dealt with" (Burstein, 1991, p. 328). Issues can differ in various dimensions, such as obtrusiveness or prominence (McCombs & Valenzuela, 2020). Given these definitions, an issue such as the national economy (object) could be thought of in terms of a specific focus on inflation (substantive attribute), as well as with a positive or negative tone (affective attribute). In this study, we focus on some of the most salient societal issues that – even though they differ along relevant dimensions such as level of issue obtrusiveness and political polarization – constitute five of the most important issues among Swedish citizens.

The literature on societal beliefs outlines four factors behind the formation of beliefs: (1) ideological or partisan rationalization, (2) personal experience, (3) interpersonal communication, and (4) news coverage and media use (Kumlin, 2004; Mutz, 1998; Shehata & Strömbäck, 2014). Although the concept of sociotropic beliefs originates from research on economic voting, where citizens typically assess whether they see the national economy moving in the right or wrong direction (Lewis-Beck & Stegmaier, 2018; McCombs & Valenzuela, 2020), it is applicable to a wide range of public issues such as crime, health care, or unemployment (Mutz, 1998; Shehata & Strömbäck, 2014). In most cases, however, these issues are studied either as single issues or as multiple, but isolated, issues distinct from one another.

Horizontal and vertical constraining of mental postures

How mental entities reside in the human mind has been thoroughly studied in the context of the question of whether and how political attitudes form a coherent attitude system. Like attitudes, other cognitive elements can also form interconnected structures (Quine & Ullian, 1978). In the research tradition of political attitudes, postures that coalesce into a consistent system are referred to as "constrained" postures. We draw from Converse's (1964) definition to understand a constraint "as a sort of glue to bind together many more specific attitudes and beliefs" (p. 211). In other words, constraints are intra- or extra-individual entities that align mental postures into a coherent system, characterized by non-randomness (Martin, 2002). Depending on which form this alignment takes, two types are distinguished: horizontal and vertical constraints (Alexandre et al., 2021; Goren, 2012).

Converse (1964) analyzes ideology as a horizontal constraint in the formation of so-called belief systems.[2] He assumes that a high-order mental structure influences the coherence between different attitudes, aligning attitudes *issue-generically* into a system. Thus, a constraint binds attitudes on the same level of abstraction together into a coherent structure. In temporary research on polarization, this process is also described as issue alignment (see e.g., Baldassarri & Gelman, 2008; Bougher, 2017). Opposing the idea that constraining is possible across the delineation of issues, Peffley and Hurwitz (1985) suggest a multitiered framework of attitude structures. It rests on the assumption that vertical constraints operate *issue-specifically* but not across issues (see, e.g., Feldman

& Johnston, 2014; Goren, 2012). According to this understanding, constraints operate between different levels of abstraction.

Based on horizontal and vertical constraining, societal beliefs can group in two possible ways. On the one hand, beliefs might group horizontally across issues. In this case, individuals group beliefs based on whether they perceive societal conditions to develop in the right or wrong direction – irrespective of specific issues. The world outside would thus display as one picture in their heads. On the other hand, vertical constraining results in the grouping of societal beliefs along with issue demarcations. In this case, citizens make up their minds about societal conditions and developments issue by issue. The world outside would be displayed as many pictures in their heads.

The role of media use in the organization of beliefs

So far, we have only addressed the question of how and why societal beliefs can enter a perception system in the human mind. The Cognitive Social Theory of Public Opinion (CSTPO) bridges the gap from the individual to the societal level, assuming that in the same way mental structures group in the human mind, individuals with similar beliefs also group in the public (Lavine & Latané, 1996). On the individual level, mental structures, such as societal beliefs, are stored as "a single representation in which representations of all learned patterns are superposed or 'mushed together'" (Smith, 1996, p. 895). On a societal level, a grouping process of individuals with similar beliefs can be observed (Lavine & Latané, 1996): "recursive thought and communication processes allow cognitive elements (e.g., attitudes and beliefs) to organize themselves into the partially coherent and consistent clustered and bundled structures of public opinion, both within the cognitive systems of individuals and within the larger social system" (p. 49; see also Latané, 1996). Consequently, we can find segments of individuals in society that share beliefs about societal issues – or "thought communities" (Zerubavel, 1999).

How societal beliefs group and which thought communities emerge in public opinion are not fully conceptualized by the CSTPO (Fink, 1996). Lavine and Latané (1996) "believe that public opinion is the complex result of nonlinear dynamic processes occurring both within the minds of individuals and as results of social interaction and communication" (p. 55). Although CSTPO studies mention that "mass media as well as the Internet may reflect as much as shape the concerns and beliefs of a population … " (Huguet et al., 1998, p. 843), the role that the news media plays has, so far, not been theoretically nor empirically taken into account.

We argue that it is necessary to understand the formation of interconnected belief systems on a cognitive *and* societal level. This is based on two rationales. The first one speaks to the fact that societal issues often go beyond the personal realm. In such cases, impersonal influence becomes more important than direct experience or interpersonal communication with others, and "people are responding to a media-constructed pseudo-environment rather than their immediate personal experiences or those of friends and acquaintances" (Mutz, 1998, p. 6). The second rationale argues that use of news media – among other well-documented effects – may operate as Converse's "glue" (1964), influencing the constraining of societal beliefs into interconnected systems, similarly to interpersonal communication. As an extra-individual social constraint, the news media can be regarded a cognitive authority (Martin, 2002), that is,

"someone with extraordinary powers to supply webs of meaning connecting attitudes even across disparate domains" (Rawlings, 2020, p. 993). While the potential influence of cognitive authorities on belief systems has been addressed, for instance, in the context of political or religious leaders (for an overview, see Martin, 2002), the news media and covered political elites could also serve as such cognitive authorities, in particular with respect to societal beliefs where direct experiences are scarce (Malka et al., 2019).

How the news media covers societal issues may help foster the grouping of beliefs. Two characteristics of the news media speak to the two forms of belief constraining discussed earlier. On the one hand, news coverage tends to be decontextualized, focusing on individual issues without relating to a broader context (Brekken et al., 2012; for a similar discussion, see literature on episodic framing: Iyengar, 1991). Such news content could lead to vertical constraining where the thought communities align along the demarcations of different issues (i.e., objects). On the other hand, negativity in news coverage is a widespread content feature (Soroka & McAdams, 2015), suggesting that negativity in news content could constrain beliefs in such a way that thought communities emerge along the tone with which issues are reported (i.e., affective attribute). To our knowledge, so far, no study has addressed how media use could influence the organization of beliefs into interconnected systems.

While content analyses support a general negative-neutral bias in traditional news coverage of politics and society (Lengauer et al., 2012; Soroka et al., 2018), findings also suggest that different types of media differ with regard to these dimensions and that these differences lead to differential effects. The dual effects hypothesis specifies this assumption (Aarts & Semetko, 2003), resting upon the notion that media effects differ due to differences in, for example, media ownership (public versus commercial) or media types (television versus newspaper; broadsheet versus tabloid). For instance, commercial broadcasters are found to report less on political and current affairs issues (Aalberg et al., 2013; Reinemann et al., 2016), to be more negative and softer (de Vreese et al., 2016; Lengauer et al., 2012) and to be more decontextualized (Brekken et al., 2012) than public-service broadcasters. While not explicitly included in the dual effects hypothesis, alternative media, which oppose mainstream media, also differs in terms of issue selection and content style from their established counterparts (Holt et al., 2019). In recent years, especially right-wing alternative media have attracted readers – a success which has been associated with the rise of right-wing (populist) parties (Müller & Schulz, 2021). In this context, Rae (2021) lists personalization, emotionalization, or intensification of word choice as content characteristics of these media.

Stability of societal beliefs and belief groups

From a societal and normative perspective, it is important to assess societal beliefs beyond a snapshot of time. Addressing the longitudinal dynamics of societal beliefs provides answers to whether beliefs are stable or change over time. Given that public opinion functions as an indicator of governmental action, elected representatives should know if the public still perceives societal issues to be problematic or to go in the right direction (Druckman & Leeper, 2012).

Research has demonstrated that societal beliefs tend to be relatively stable on an aggregate level (for an overview, see Clawson & Oxley, 2020; Druckman & Leeper, 2012). While media use has been shown to contribute to various belief dynamics, studies of media effects more regularly focus on change rather than stability – even if stable beliefs seem to be the rule rather than the exception (Clawson & Oxley, 2020; Shehata et al., 2021). The relationship between information environments and opinion stability has been theorized in the literature, concluding that "stable attitudes are those with stable contexts" (Wilson & Hodges, 1992, p. 53). Stable information contexts can also be assumed for media use as antecedences of belief grouping since "the flow of political communication … on many issues (and perhaps most) important matters is relatively stable over time – locked into fixed patterns that reflect underlying division of power, partisanship, or societal inertia" (Zaller, 1996, p. 19).

Stability on an aggregate level does not automatically mean that individuals do not change their beliefs over time (Druckman & Leeper, 2012). Furthermore, stability and change of issue-specific beliefs are also different from stability and change of broader belief clustering across issues. From a connectionist approach, how systems of interconnected mental structures change can be explained by referring to parallel constraint satisfaction processes, which rest on the assumption that individuals strive for consistency in their beliefs, attitudes, and behaviors (Read & Miller, 1994). When people are exposed to an external stimulus – e.g., media content that alters one of the components of the belief structure – connected beliefs are assumed to follow this movement to reach a mental equilibrium. However, the flow of political communication is rather stable over time, and individuals tend to have stable media diets (Andersen et al., 2021). If the type of media use and content characteristics of that news coverage stay stable over time, then people are exposed to cumulative and repetitive media messages. In this vein, studies in the context of cultivation and agenda-setting research, as well as framing research, have demonstrated that media content contributes to the stability of societal beliefs (for an overview, see Shehata et al., 2021). Effectively, media use serves as a repeated reminder of the beliefs that individuals hold (Asp, 1986).

Research questions and hypotheses

The goal of this study is to provide insight into the question of whether and how societal beliefs group into interconnected structures in the mind and in the public, how stable these structures are over time, and if differential media use influences the grouping of beliefs, as well as the stability of these structures. Based on these aims, we ask three research questions. Building upon the research of the mental architecture of political attitudes (Converse, 1964; Goren, 2012; Peffley & Hurwitz, 1985) and the assumption of the CSTPO that societal beliefs also group in the public (Lavine & Latané, 1996), we first ask:

> *RQ1:* Are belief groups in the public characterized by horizontal (issue generic) or vertical (issue specific) constraining?

Second, assuming that media use has the ability to influence belief group membership due to the discussed content characteristics, we ask:

> *RQ 2*: What is the relationship between differential media use (public-service broadcasting, commercial TV, broadsheets, tabloids, and alternative media) and belief group membership?

Lastly, we address the stability of belief group membership and belief group composition in an exploratory fashion, before analyzing media use as priors to these dynamics:

RQ 3.1: How stable are (1) aggregate belief group composition and (2) individual membership over time?

RQ 3.2: What is the relationship between media use and the stability of individual belief group membership?

Method

To answer our research questions, we used a three-wave panel study conducted in Sweden.

The Swedish case

The context of our study is Sweden, which remains a typical case of the democratic corporatist media system (Hallin & Mancini, 2004; Humprecht et al., 2022). More specifically, the media system is characterized by strong public-service broadcasting institutions and a lack of partisan TV or radio outlets. Newspapers are still used regularly, with around 25% of people reading morning newspapers at least three times a week (Martinsson & Andersson, 2021). The two tabloid newspapers are used online and belong to the three most used online news outlets in Sweden (Newman et al., 2021). In contrast to broadcasting, newspapers have a political leaning, but it is only explicitly conveyed on the editorial pages. Right-wing alternative outlets have recently become more popular: these outlets have a solid base of readers with around seven percent of people saying that they refer to these outlets regularly (Newman et al., 2021).

With respect to news coverage, a neutral-negative tone dominates reporting in all major national news outlets in Sweden (Figure 1). The data are based on a large-scale news content analysis during the period 2007–2018 conducted by *The Institute for Media Studies*. Focusing exclusively on news about politics and society, there is a consistent tendency to frame such matters in a neutral-negative way, consistent with research on negativity bias as a crucial news factor. Although neutral-negative bias is relatively consistent across mainstream news outlets, studies show that Swedish right-wing alternative media are significantly more negative in their coverage of society (Holt, 2016).

To move beyond a single-issue focus, we included societal beliefs about five issue domains central to public and political discourse in Sweden for many years. These include beliefs about (1) the national economy, (2) unemployment, (3) crime, (4) schools, and (5) health care. Apart from constituting major topics on the political, media, and public agenda, these issues were also selected since they vary in obtrusiveness and polarization – thereby providing a variation on key issue dimensions (McCombs & Valenzuela, 2020; Mutz, 1998). It should be noted that the study was conducted during the COVID-19 pandemic, a turbulent time, influencing the context of the study. For example, Swedish unemployment increased at the beginning of the panel but recovered by April 2021 again (Statistiknyheter, 2022). The national economy showed a similar pattern (Statistiknyheter, 2021), while the rate of violent crimes was constant
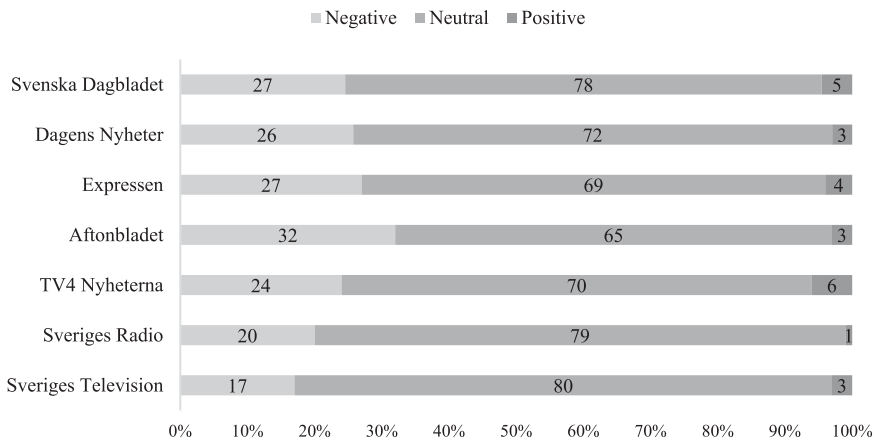
Figure 1. Overall tone in Swedish news coverage between 2007 and 2018. Note: Displays the share of news stories in percent with a negative, neutral, or positive dominant tone (N = 4457). Data include news reporting during a constructed week in 2007, 2014, 2016, and 2018. The following topic categories are included: politics, business, societal issues, accidents, environment, crime, and war/conflicts. Source: Institutet för Mediestudier (https://mediestudier.se/mediestudiers-innehallsanalys/).

(Brottsförebyggande rådet, 2022). In contrast to many other countries, schools in Sweden stayed open during the pandemic (Skolinspektionen, 2020).

Data collection

Data were collected online between March 2020 and April 2021 by the Laboratory of Opinion Research (LORE) at the University of Gothenburg, Sweden, using a probability sample drawn from a panel with more than 75,000 participants. In Wave 1 (March 2020), 3327 panelists were invited to participate – stratified by age, gender, and education – of which 2171 started the survey, and 2058 made a complete response (Gross Participation Rate: 62.7%, Net Participation Rate: 65.0%). In Wave 2 (October 2020), questionnaires were sent to 3134 panelists, of which 1785 started the survey and 1700 made a complete response (Gross Participation Rate: 55.1%, Net Participation Rate: 57.6%). In Wave 3 (April 2021), questionnaires were sent to 3010 panelists of which 1608 started the survey, and 1551 made a complete response (Gross Participation Rate: 52.3%, Net Participation Rate: 55.3%).

Measures

Following the literature on sociotropic beliefs and media effects, we focus on how citizens perceive current national-level conditions and developments with regard to these issue domains – i.e., how people perceive the status of the Swedish economy, crime rates, and unemployment rates, as well as how well the country's health care and schools currently function. For each issue domain, we used three single-item indicators that assessed whether respondents believed (1) that conditions in Sweden have *improved* in recent years, (2) that conditions in Sweden are *worse* than in other EU countries, and (3) that Sweden has *major problems* with respect to the specific issue. Participants were asked

to rate their answers on a 7-point scale (0 = "Not true at all" to 6 = "Completely true") (Table A2 in Appendix).

To address the differential effects of media use, we assessed media use online and offline for *public broadcast service* (PSB) (radio: Ekot on Sveriges Radio, SR; TV: Aktuellt and Rapport on Sveriges Television, SVT), *commercial TV* (TV4 Nyheterna), *broadsheet newspaper* (Dagens Nyheter, Dagens Industri, Svenska Dagbladet), *tabloid newspapers* (Aftonbladet, Expressen), and online right-wing *alternative media* (Samhällsnytt, Nyheter Idag, Fria Tider). This approach captures the most widely used traditional media outlets in the country (Martinsson & Andersson, 2021), as well as right-alternative outlets (Newman et al., 2021). Participants were asked to state their use of these outlets during the four weeks before each panel wave took place, ranging from 0 = "Never" to 5 = "Daily." We built an additive index for each type of media use (W1: PSB: $m = 10.23$; $SD = 5.23$; $min = 0$; $max = 20$; Commercial TV: $m = 3.52$; $SD = 2.92$; $min = 0$; $max = 10$; Broadsheet: $m = 4.34$; $SD = 4.96$; $min = 0$; $max = 30$; Tabloid: $m = 5.33$; $SD = 4.92$; $min = 0$; $max = 20$; Alternative: $m = .90$; $SD = 2.09$; $min = 0$; $max = 15$).

Five *control variables* were assessed in Wave 1: gender (0 = "Female"; 50%), age (0 = "younger than 30" (12%); 1 = "30-39" (14%); 2 = "40-49" (17%); 3 = "50-59" (16%), 5 = "60-69" (18%); 5 = "70 or older" (16%), and education (1 = "up to nine years of schooling" (5%); 2 = "up to nine years of schooling" (34%); 3 = "12 years and vocational training" (16%); 4 = "12 years and university degree" (38%). Additionally, we controlled for political interest; using a single-item measure, we asked the participants how interested they were in politics on a 4-point scale ($m = 2.05$; $SD = 0.72$). Political ideology was assessed with four items that captured attitudes toward policy proposals. We asked participants to rate the following policy proposals, ranging from 1 ("very good proposal") to 5 ("very bad proposal"): Sweden should (1) reduce taxes (reversed); (2) accept fewer refugees (reversed); (3) introduce much harsher prison sentences for criminals (reversed); and (4) not allow distribution of profits within stately financed health care, schools, or other public services. An explanatory factor analysis confirmed the unidimensionality of the construct (Kaiser–Meyer–Olkin test of sampling adequacy: 0.74; Bartlett's test of sphericity: $\chi^2 = 1237.970$, $df = 6$, $p < .001$). We thus predicted a standardized index that reflected a political left-right ideology with lower values indicating a left-leaning of the participants (Cronbach's α = .63) ($m = 0$; SD = 1; $min = −1.64$; $max = 3.04$). Finally, we included interpersonal communication as a control variable, asking the participants how often they discussed the five societal issues of crime, health care, schools, economy, and unemployment in Sweden with friends and family (0 = "Never" to 5 = "Daily"). We built a index out of the five items (Wave 1: $m = 11.61$; $SD = 4.42$; $min = 0$; $max = 25$).

Analytical strategy

Data analysis involved three steps. First, we applied latent profile analyses (LPA) for each wave of the panel. LPA is a statistical method to identify unobserved subgroups – latent profiles – "that models heterogeneity in cross-sectionally sampled data by grouping participants into latent categories based on similarities in their response variable scores" (Peugh & Fan, 2013, p. 617; for a comprehensive overview, see Collins & Lanza, 2009).

LPA is a person-centered and pattern-oriented approach that belongs to the same group of methods as cluster analysis but is regarded superior to simpler categorization methods since LPA is a probabilistic approach (Collins & Lanza, 2009). Besides an assignment to one of the analytically derived profiles, the method recognizes a degree of uncertainty in the classification procedure, calculating latent profile probabilities. LPA follows an iterative approach to find the optimal number of profiles, with various criteria that can be referred to determine the final number of profiles. In this paper, we rely on sample-size adjusted Bayesian information criteria (aBIC), Bayesian information criteria (BIC), and entropy. Although lower numbers of aBIC and BIC indicate better fitting models, an entropy value closer to 1 is better, with values larger than .8 being favored (Wang et al., 2017). Since aBIC and BIC tend to decrease with each profile added, additional plotting of these fit indices allows for examining where the indices slow down in their decrease (Nylund-Gibson & Choi, 2018). Finally, we used Lo-Mendell-Rubin Adjusted LR-test to compare a model with K profiles to a model with K-1 profiles.

Second, to answer research question 2, we followed the Three-Step-Approach by Asparouhov and Muthén (2014).[3] In contrast to simply regressing predictors on the most-likely profile in separate models, we accounted for the error such an approach would introduce to the model by relying on the maximum likelihood (ML) based bias correction (Vermunt, 2010). This correction includes explicitly a classification error in the profile assignments.[4]

Both steps gave us answers to research question 3.1.1. We evaluated the profile composition within the sample for all three waves individually to determine how stable profiles are over time, relying on configural and distributional similarity as indicators of stability (Morin et al., 2016). To answer research question 3.1.2, we conducted a latent transition analysis (LTA) – the longitudinal extension of LPA – to determine within-person transition probabilities between profiles and panel waves. Finally, to address research question 3.2, we performed a mover-stayer LTA (Collins & Lanza, 2009). Mover-stayer LTAs model two second-level latent variables. Stayers are individuals who do not change their belief profiles over time; movers switch belief profiles. We brought in communicative priors to address how differential media use contributes to stability or change, applying probability-weighted logistic regression (Clark & Muthén, 2009).

We used the R-package Mplusautomation (Hallquist & Wiley, 2018) and Mplus 8.5 (Muthén & Muthén, 2020). Models were estimated using the robust maximum likelihood estimator (MLR) under Full Information Maximum Likelihood (FIML) to account for missing data. To avoid local maxima, we used 1000 random sets of start values and 20 iterations to estimate the models, aiming for the best 100 solutions for final stage optimization.[5] We standardized all variables before running the analyses.

Results

Our first research question asked whether belief groups – i.e., LPA profiles – could be observed across societal issues and how to characterize them. We conducted three cross-sectional LPAs, one for each wave. As a first step, we assessed the number of profiles that emerged in these analyses. Table 1 presents the corresponding fit indices for one to nine profiles. We found that the three-profile solutions provided the best fit

Table 1. Model fit summary table for latent profile analysis in Wave 1–3.

Profiles	NPar	LL	BIC	aBIC	Entropy	LRT p-value
Wave 1						
Profile 1	30	−59013.8	118256.9	118161.6	NA	NA
Profile 2	46	−56449.6	113250.8	113104.7	0.85	<0.001
Profile 3	62	−55773.1	112020.4	111823.4	0.81	<0.001
Profile 4	78	−55502.0	111600.4	111352.6	0.77	0.15
Profile 5	94	−55277.3	111273.2	110974.6	0.76	0.11
Profile 6	110	−55068.2	110977.5	110628	0.76	0.10
Profile 7	126	−54907.2	110777.8	110377.5	0.76	0.03
Profile 8	142	−54787.5	110660.9	110209.7	0.75	0.05
Profile 9	158	−54682.1	110572.4	110070.4	0.76	0.68
Wave 2						
Profile 1	30	−48398.1	97020	96924.7	NA	NA
Profile 2	46	−46189.7	92722.6	92576.5	0.84	<0.001
Profile 3	62	−45623.8	91710.21	91513.2	0.81	<0.001
Profile 4	78	−45384.8	91351.61	91103.8	0.77	0.20
Profile 5	94	−45139.9	90981.11	90682.5	0.77	0.03
Profile 6	110	−45020.6	90861.87	90512.4	0.75	0.75
Profile 7	126	−44894.2	90728.5	90328.2	0.79	0.32
Profile 8	142	−44739.7	90538.8	90087.7	0.82	0.64
Profile 9	158	−44629.9	90438.65	89936.7	0.82	0.26
Wave 3						
Profile 1	30	−43304.7	86830.48	86735.2	NA	NA
Profile 2	46	−41483.3	83305.4	83159.3	0.84	<0.001
Profile 3	62	−40904.9	82266.43	82069.5	0.82	<0.001
Profile 4	78	−40621.1	81816.71	81568.9	0.76	0.02
Profile 5	94	−40447.4	81587.28	81288.7	0.76	0.63
Profile 6	110	−40304.9	81420.09	81070.6	0.77	0.19
Profile 7	126	−40184.3	81296.71	80896.4	0.76	0.68
Profile 8	142	−40085.7	81217.33	80766.2	0.77	0.50
Profile 9	158	−39989.5	81142.88	80640.9	0.78	0.33

Note. NPar = number of parameters, LL = log-likelihood, BIC = Bayesian information criterion, aBIC = sample-size adjusted BIC, LRT = Lo-Mendell-Rubin adjusted likelihood ratio test.

given the following three results. First, even though the log-likelihood, BIC, and aBIC continued to decrease between profiles 1 and 9, the visual inspection revealed that the decrease slowed down after the third profile (Figure A1a-A1c in the Appendix). Second, we assessed the Lo-Mendell-Rubin Adjusted LR-test for the first significant result while increasing the number of profiles. For Wave 1 and Wave 2, the results indicated that the four-profile solutions were not significantly better than the three-profile solution (Wave 1: $p = 0.15$; Wave 2: $p = 0.20$). For Wave 3, the Lo-Mendell-Rubin Adjusted LR-test indicated, however, that the four-profile solution fitted better (Wave 3: $p = 0.02$). Similarly, we found significant results for profile 7 ($p = .03$) in the first wave, as well as for the fifth profile in the second wave ($p = .03$). Third, we assessed the entropy of all solutions. Again, the three-profile solutions reached acceptable values of over .8 in each of the waves (W1: 0.81; W2: 0.81; W3: 0.82) while other solutions reached lower entropy values. In sum, we believe that the three-profile solution is the best for all waves – despite the few further significant Lo-Mendell-Rubin Adjusted LR-tests for more profiles.

After establishing the number of latent profiles in each wave, we inspected the nature of these three profiles. Figure 2 displays the estimated mean scores based on the LPA for Wave 1. Importantly, we found that the emerging profiles are not issue-specific, but perception-specific in terms of valence. This finding implies that the profiles depict citizens'
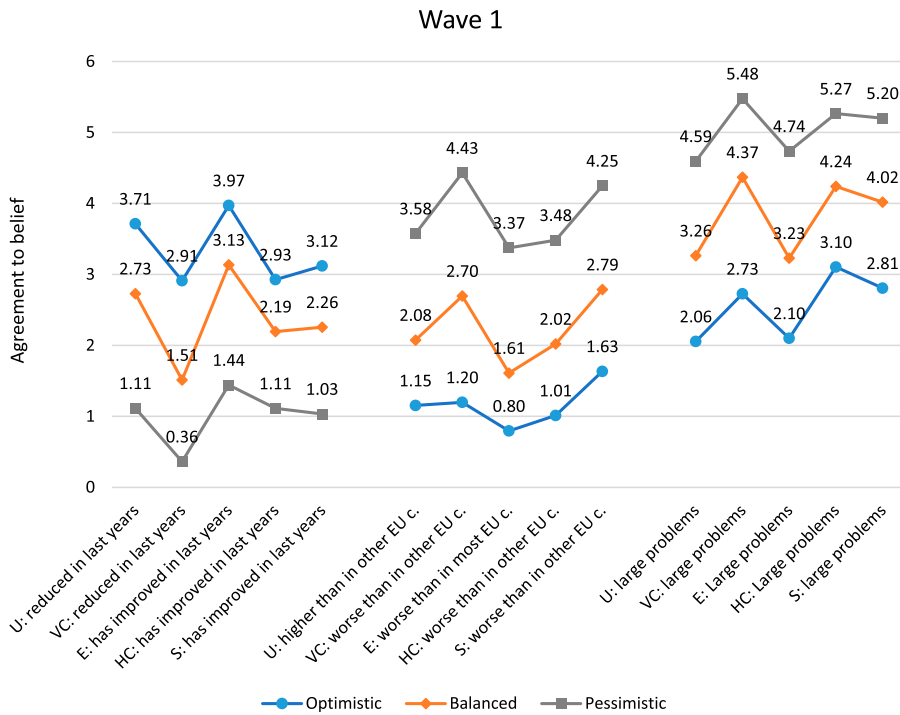
Wave 1

Figure 2. Means values of items about societal issues based on LPA for Wave 1. Note. Means for items for three latent profiles are displayed for Wave 1 (0 = "Not true at all" to 6 = "Completely true"). U = unemployment, VC = violent crimes, E = economy, HC = health care, S = schools.

general negative–positive perceptions across all issues. Thus, we labeled the first profile "Balanced." This profile is the largest with around half of the participants ($n = 1049$). The second profile can be labeled as "Optimistic." Individuals in this profile evaluated the status of health care, unemployment, economy, schools, and crime to be more positive. With $n = 684$, "Optimistic" are the second largest profile in Wave 1. Finally, we labeled the third and smallest profile ($n = 360$) "Pessimistic." Individuals in this profile report perceptions of all five issues that are more negative than those in the other two profiles. The "Balanced" profile scored between "Optimistic" and "Pessimistic" across all issues.

How differential media use relates to belief profiles was asked in research question RQ 2. We included the variables as predictors of the LPA presented above in a multinomial logistic regression, following the 3-step-approach by Asparouhov and Muthén (2014), controlling for ideology, gender, age, education, political interest, and interpersonal communication. In both regressions, "Pessimistic" served as the reference category.

As reported in Table 2, using PSB and broadsheet newspapers more often increased the odds of belonging to the "Optimistic" profile (PSB: OR = 1.67, $p < .001$ [95% CI: 1.29-2.18]; Broadsheet: OR = 1.55, $p < .001$ [95% CI: 1.22–1.98]). In contrast, relying more on commercial TV and tabloid newspapers, as well as alternative news media, decreased the odds of being in the "Optimistic" profile (commercial TV: OR = 0.78, $p = .042$, [95% CI: 0.61–0.99]; tabloid: OR = 0.75, $p = .011$ [95% CI: 0.59–0.94]; alternative:

Table 2. Results of multinomial logistic regression for belief group membership in Wave 1.

	Optimistic vs. Pessimistic			Balanced vs. Pessimistic		
	Odd ratio	SE	95%CI	Odd ratio	SE	95%CI
Ideology	0.34	0.04	(0.27–0.42)***	0.57	0.06	(0.47–0.69)***
Age	0.79	0.09	(0.62–0.99)*	0.86	0.10	(0.69–1.06)
Gender [a]	1.05	0.23	(0.69–1.61)	1.13	0.22	(0.76–1.66)
Education	1.19	0.13	(0.96–1.47)	0.99	0.10	(0.81–1.20)
Political interest	1.05	0.13	(0.82–1.34)	1.37	0.16	(1.09–1.72)**
Interpers. Com.	1.81	0.21	(1.44–2.27)***	1.51	0.16	(1.22–1.86)***
PSB	1.67	0.23	(1.29–2.18)***	1.28	0.17	(0.99–1.65)
Broadsheet	1.55	0.19	(1.22–1.98)***	1.29	0.16	(1.01–1.63)*
Commercial TV	0.78	0.10	(0.61–0.99)*	0.94	0.11	(0.75–1.17)
Tabloid	0.75	0.09	(0.59–0.94)*	0.82	0.09	(0.67–1.01)
Alternative media	0.38	0.06	(0.28–0.51)***	0.56	0.05	(0.46–0.67)***

Note: $N = 1686$; *$p < .05$, **$p < .01$, ***$p < .001$; (a) Reference group = female. PSB = public-service broadcasting.

OR = 0.38, $p < .001$ [95% CI: 0.28–0.51]). Contrasting the "Balanced" profile with the "Pessimistic" profile, only broadsheet use (OR = 1.28, $p = 0.039$, [95% CI: 0.99–1.65]) increased the odds of being a member of the "Balanced" profile compared to the "Pessimistic" profile. On the contrary, relying on alternative media decreased the odds of being a member of the "Balanced" profile compared to the "Pessimistic" (OR = 0.56, $p < .001$, [95% CI: 0.46–0.67]).

In the last step, we turn to the question of the dynamics of the belief profiles and the antecedents of stability. We first asked in RQ 3.1.1 about the stability of belief profiles on an aggregate level. Morin et al. (2016) suggest assessing the configural stability (i.e., whether the number of profiles is consistent over time) and distributional similarity (i.e., whether the relative size of the profiles stays the same over time) to determine stability. As reported above, we considered the three-profile solution to be the most adequate for all waves. Furthermore, when looking at the relative sizes of the profiles, we found that they were similar across waves: the "Balanced" profile covered around half of the participants, the "Optimistic" profile around one-third, and the "Pessimistic" profile around 15 percent (Figure 2, Figure A2a and A2b; Table A3 in Appendix for Waves 2 and 3). We take these results as an indicator of the aggregate stability of belief profiles over time.

Research question RQ 3.1.2 asked how stable individual belief profile membership was. We conducted a latent transition analysis to determine the within-person latent transition probabilities between Wave 1 and Wave 2, and Wave 2 and Wave 3, respectively.[6] The latent transition probabilities reflect individual trajectories between the profiles and between waves. Hence, only those participants, who answered the respective items in all three waves, were included. Figure 3 illustrates the probability to keep or change profile membership (for details, see Table A4 in the Appendix). We found that the latent belief profile membership was stable between the waves on the within-level: the probability to stay in the same profile over the course of the three waves was on average .91. The "Pessimistic" profile yielded the lowest stability of .87 and .84, respectively, between the waves. As depicted in Figure 3, the transitions took only place between the "Balanced" and the "Pessimistic", as well as the "Optimistic" profile (and vice versa). In other words, individuals became more moderate in their perceptions of the five societal issues but did not switch between the two extreme profiles. In addition, fewer
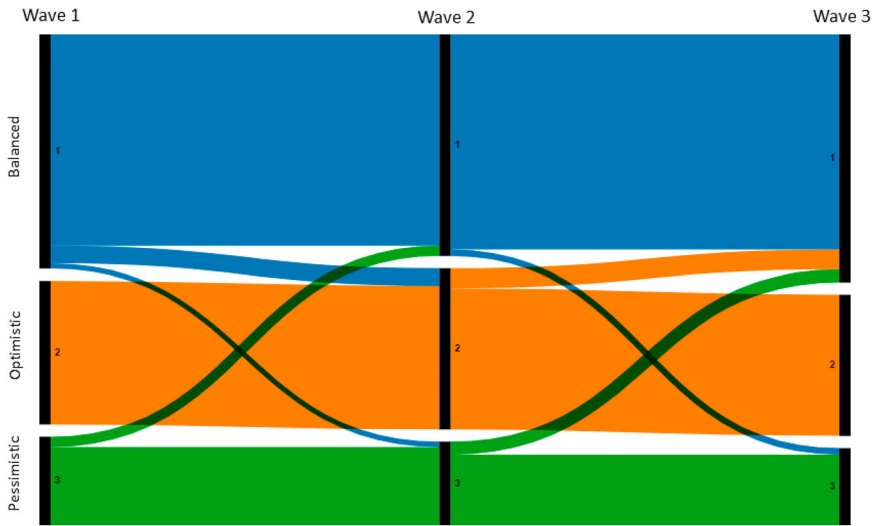
Figure 3. Latent transitions between latent profiles and waves. Note. The rows represent the three latent profile transition patterns based on most-likely profile membership in waves 1 to 3. Size of profile and number of switching individuals represented by width of bars. Only participants that completed all three waves were included (*n* = 1222).

individuals transitioned out of the "Balanced" profile into the more extreme profiles than the other way around. The transition probability from the "Pessimistic" to the "Balanced" profile was the largest with .13 for Wave 1–2 and .15 for Wave 2-3. Transitions in the other direction – from "Balanced" to either "Optimistic" or "Pessimistic" – were rare with transition probabilities between .03 and .12.

Our last research question RQ 3.2 asked about the predictors of stability of belief profiles. We applied a mover-stayer LTA, which allows for addressing the question of which factors influence stability and change between belief profile membership over time without relying on estimating the small transition probabilities as shown in Figure 4. We limited the analysis to evaluating only the transitions between Wave 1 and 2. This choice is based on the highly comparable transitions and transition probabilities between Wave 1 and 2 and Wave 2 and 3, respectively. We regressed the predicted membership of either mover or the stayer, weighted by the probability of being in one of the two profiles, in differential media use in a logistic regression, controlling for ideology, gender, age, education, political interest, and interpersonal communication (Figure 4; Table A5 in the Appendix). Using the movers as the reference category, we found that only relying more on public-service broadcasting (PSB) significantly increased the odds to be in the stayer profile (PSB: $OR = 1.27$, $p = .045$, [95% CI: 1.01–1.61]).

Discussion

Building upon the literature on the architecture of cognitive postures, the CSTPO (Lavine & Latané, 1996), and media effects research, the main goals of this study were (a) to determine whether societal beliefs group across issues; (b) how media use contributes to membership in these belief profiles; as well as (c) to analyze the stability of such profile
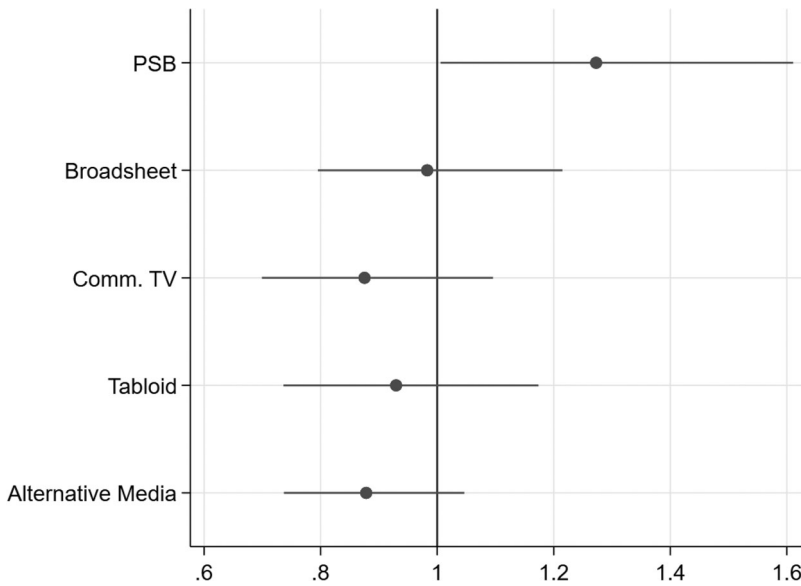
Figure 4. Results of a logistic regression to predict mover-stayer profile membership. Note. Odd ratios are displayed. $N = 1255$. Mover group used as reference category. Control variables of ideology, gender, age, education, political interest, and interpersonal communication are not displayed. PSB = Public-service broadcasting; comm. TV = commercial TV.

membership and composition over time in response to media use. Based on a three-wave panel study conducted in Sweden, we found that societal beliefs group across issues, based on the valence of perceptions. Three belief profiles in the public emerged: "Optimistic," "Pessimistic," and "Balanced." The individual belief profile membership was affected by media use. Using public broadcast news and broadsheet newspapers increased the odds of being a member of the "Optimistic" profile compared to the "Pessimistic" profile. Relying on commercial TV, tabloid newspapers, and alternative media decreased the odds of being in the "Optimistic" profile compared to the "Pessimistic" profile. Our results also indicated substantial stability of belief profiles, both on the aggregate and the within-person level, mirroring findings on the stability of societal perceptions – even during turbulent times, such as the global Covid-19 pandemic (Clawson & Oxley, 2020). Public-service broadcasting use increased the odds of being stable in the profiles between two waves.

Three major conclusions emerge from these findings. First, the results support the idea that individuals perceive different societal issues similarly and that thought communities emerge as stable profiles in the public (Lavine & Latané, 1996). While belief profiles group across societal issues, they delimitate along the valenced attributes of these issues. In other words, societal perceptions were horizontally constrained. While Converse (1964) could not find horizontal constraining with respect to *political attitudes,* concluding that this was due to a lack of ideological reasoning across issues, our findings indicate that citizens' *societal beliefs* are horizontally rather than vertically constrained – based on the valence of attributes. Therefore, groups coalesce around whether they perceive societal conditions in a negative or positive light, regardless of the specific characteristics of the issue.

Second, differential media use characterized the emerged profiles. The finding that users of commercial TV and tabloid newspapers, as well as of right-wing alternative media, were more likely to adhere to the "Pessimistic" belief profile might be driven by the higher degree of negativity used by these types of media (de Vreese et al., 2016; Holt, 2016; Lengauer et al., 2012). The effects of negativity in news coverage on how people form negative attitudes or perceptions about societal issues are well-studied against several theoretical backgrounds (Soroka & McAdams, 2015), such as framing (e.g., de Vreese et al., 2011; Sheafer & Dvir-Gvirsman, 2010) or cultivation research and the mean-world syndrome (Morgan et al., 2015). At the same time, these differential media use patterns may also reflect a type of selection effect whereby groups of people who share pessimistic or optimistic worldviews (belief profiles) are more likely to seek out and reinforce those worldviews through certain media.

Third, against the backdrop of discussions around negativity bias, media malaise, and mean world syndrome (Cappella & Jamieson, 1997; for an overview, see Schuck, 2017), our results also provide a silver lining. The belief profile of the "Pessimistic" was the smallest throughout the study period. In addition, we could not find an obvious trend toward more pessimism. Yet, our analytical approach did not allow for us to address what precisely affected changes from the "Balanced" profile to the "Pessimistic." In any case, the low numbers of such changes speak against a spiral of negativity in the relationship between media use and perceptions, supporting assumptions that most individuals have "middle-of-the-road positions on a variety of issues" (Moskowitz & Jenkins, 2004, p. 416).

Taken together, the fact that citizens' issue perceptions appear to be horizontally rather than vertically constrained has implications for media effects research. Although studies of single issues are still important and valid in addressing specific media-effect processes, they may underestimate the fact that issue perceptions are connected both at the individual and societal levels. The formation and stability of belief profiles reflecting broader "worldviews" may well be a type of long-term, transactional, and cumulative media effect (Slater, 2015; Valkenburg & Peter, 2013), which goes beyond exposure to single stimuli and is impossible to capture in short-term experimental studies of single issues.

Despite these insights, we acknowledge that our study has limitations. First, while it is reasonable to assume that differential media use is a driver of belief profile membership, we cannot, as noted above, determine the exact content features affecting these processes. Future studies may make use of a linkage approach, assessing media content features to determine how content characteristics influence the composition of belief profiles. Second, the selection of issues and specific items limits the generalizability of the results. Similarly, it is easy to think of a plentitude of other items to operationalize societal perceptions as the relationship between objects and attributes. At this point, we could only speculate whether including other items in the analysis would have led to different profiles. For example, scientific issues, such as environmental protection, climate change, and food safety, or socio-cultural issues, such as immigration, were not part of our study. The current increase in the importance of these issues in the public (Inglehart & Norris, 2017) calls for their incorporation into future studies. At the same time, relying upon a quantitative approach does not allow us to assess if the participants assigned the same meaning to issues and used items. Latent profile analyses, like

all clustering approaches, face the problem of finding descriptive labels for detected profiles, with researchers cautioning against "engag[ing] in 'naming fallacy'" (Weller et al., 2020, p. 289) where the labels of the profiles and the concrete reality of people do not match. We followed the valenced attributes of the societal issues to name and differentiate between optimistic, pessimistic, and balanced profiles. Whether the balanced group has middle-of-the-road positions or was just indifferent to societal issues is a question that cannot be addressed with applied methods. Future studies could analyze latent belief profiles using qualitative methods, focusing, for instance, on the motivations behind the perceptions of individuals. Finally, while we controlled for some important (socio-)demographics – foremost political ideology – we did not account for psychological priors that play a role in information processing and belief formation. Individuals with, for example, high dispositional optimism were found to engage in more positive perceptions than individuals low in this trait (Malouff & Schutte, 2017).

Notwithstanding these limitations, this study is one of the first to address the assumed interconnected structure of societal perceptions across issues and to explore how communication priors generally relate to the emerged belief profiles. The challenge for future public opinion and media effects research is now to shed light on more specific content characteristics to study the world around us as *one* picture in our heads.

Funding

Notes

1. The term belief is conceptually ambiguous, often used synonymously with, e.g., attitudes or opinions (Camina et al., 2021). Since we rely on the understanding of societal beliefs or perceptions common in research on media effects and sociotropic beliefs (Mutz, 1998), beliefs are distinct from attitudes. While attitudes include an individual's favorable or unfavorable evaluation of an object (Eagly & Chaiken, 1993), societal beliefs, or perceptions lack this expression of favor/disfavor.
2. Given the operationalization of beliefs in Converse's (1964) paper, it would be more appropriate to speak of an attitude system. It is important to point out that the research departing from Converse (1964) seminal work aims to determine if citizens use ideological rationalization when evaluating different policies. If the majority of citizens did not show to evaluate policies from different issue domains in a coherent way, researchers concluded that citizens were "ideologically innocent" (Kinder & Kalmoe, 2017). Ideology is here understood as a higher-order top-down driver that constrains attitudes and policy preferences. In our study, we make use of the vast knowledge of the different ways mental structures can be constrained – or organized in the mind – but we do not aim to study how that allows us to draw conclusions about ideology as a higher-order mental entity.
3. We refrained from bringing in covariates directly into modeling the profiles (One-Step-Approach) since the Three-Step-Approach is particularly useful when interested in several predictors and lacking prior knowledge of predictors (Hickendorff et al., 2018).
4. We relied on the automated implementation in Mplus, using the "auxiliary = R3STEP" option (Asparouhov & Muthén, 2014).
5. We doubled these values to ensure that we could replicate the log-likelihoods.
6. We assessed longitudinal measurement invariance, which is referred to how the observed items relate to the assessed latent variable. We compared a full invariance model (i.e.,

assuming a stable profile structure across all three waves) and a full non-invariance (i.e., no constraints were imposed), assessing the model fit with a log-likelihood difference test ($p < .001$). This comparison indicated that full non-invariance fits the data better.

Ethics approval

This study was approved by the Etikprövningsmyndigheten (approval no. Dnr 2019–04079).

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