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Supporting opinions to fit in: a spiral of silence-theoretic explanation for establishing echo chambers and filter bubbles on social media

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Abstract

Purpose – Social media communities contain like-minded members who disclose opinions about various topics that are important to them. These communities often function as echo chambers, filter bubbles or separate spaces for users to share conforming opinions and discredit others deliberately. In extreme cases, they build their alternative reality with limited information that can lead to real-world action, as seen in the storming of the capitol. Therefore, we need to better understand the mechanisms of opinion disclosure in such communities.

Design/methodology/approach – We base our research on the spiral of silence theory to understand both trait-based and state-based fear of isolation as the mechanism that prevents opposing opinions in three scenarios focusing on topics dominating the mainstream US media landscape at that time: immigration, presidential election and COVID-19. We recruited 164 participants from an online research platform and analyzed the data using structural equation modeling.

Findings – Our results reveal empirical evidence that state-based fear of isolation prompts community members to express agreement and support for the community's opinion, regardless of their views. We show that hot-button issues impose an even greater danger of establishing an environment in online communities that becomes an echo chamber of filter bubbles.

Originality/value – The spiral of silence theory provides a fine-grained understanding of the concept of fear of isolation, which was either used as a trait or as a state. Furthermore, we go beyond the initial hypotheses of the spiral of silence and show that within online communities, members stay silent and start to argue against their own opinions.

Keywords Spiral of silence, Filter bubbles, Echo chambers, Communities, Social media, Fear of isolation, Opinion disclosure

Paper type Research paper

Introduction

Social media communities have been the starting point for numerous harmful actions. Among other things, Telegram was used to organize several "walks" among COVID-19 skeptics, where participants threatened the health minister of the state of Saxony with flaming torches

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(Courbet, 2022). On Facebook, social media communities were also used to mobilize individuals against the law during the Capitol Storm (Jaffe and Gillum, 2021; Frenkel, 2021) or the mobilization of truck convoys (O'Brien and Allegri, 2022).

Following recent insights from literature, these actions are possible because social media provides opportunities to form social media communities, providing a thematically distinct space of information exchange among users. Such communities can be open (e.g. everyone is allowed to join), closed (e.g. with required approval), or secret (e.g. users can only join with an invitation) (Kietzmann *et al.*, 2011) and are realized as Facebook groups, Twitter communities, Discord servers or Subreddits. Each social media community allows its members to interact with each other on specific topics. In those social media communities, members interact via answers, posts, or reactions (e.g. commenting, liking) when the post's content confirms their pre-existing opinions (Coscia and Rossi, 2020; Moravec *et al.*, 2018). It is well-known that the fear of being isolated from others guides members' reactions to opinions. Research has theoretically shown that fear of isolation as a concept can have two distinct shapes: trait-based (i.e. a stable personality trait that is independent of the context) (Hayes *et al.*, 2013) and state-based (i.e. an emotional state that emerges from a specific situation) (Kushin *et al.*, 2019). Empirically, research shows that both shapes can influence online opinion disclosure. Despite those insights, there is a research gap in how the two shapes interact and how fear of isolation is contextualized within social media communities in contrast to the open space of social media.

Due to that and the topic's relevance, we provide a unique perspective of social media communities through fear of isolation. This research focuses on how community members disclose their opinions when they fear being isolated if they do not affirm the social media community's beliefs. Therefore, the research question is thus:

> *How does fear of isolation influence opinion disclosure within social media communities where users interact most frequently?*

We build on social media research, explaining how opinions are disclosed to answer this research question. We use the core arguments of the spiral of silence theory (Noelle-Neumann, 1974), which explicitly focuses on the fear of isolation as the main influence on opinion disclosure. The theory posits that individuals will only engage in opinion disclosure when it is consistent with what they perceive as public opinion (Noelle-Neumann, 1974). We analyze data from a scenario-based online survey of 164 social media community members and use structural equation modeling to evaluate the proposed research model. We show that state-based fear of isolation influences community member opinion disclosure in social media communities more than trait-based fear of isolation. Furthermore, state-based fear of isolation mediates the influence of trait-based fear of isolation on opinion sharing. Community members experiencing state-based fear of isolation stop disclosing opposing opinions and start supporting the community opinion against their own opinion. These results let us contribute to social media research by showing that social media communities promote their own community opinion, facilitate self-censorship, and even support the community opinion. We also contribute to research in communication by showing that the power of public opinion in the social media space diminishes when certain opinions are considered acceptable in a particular community. This research can furthermore guide solutions to counteract radicalization on social media.

The remainder of this paper is organized as follows. First, we provide an overview of the research context on social media disclosure and communities and introduce the spiral of silence theory. We then present our research model and hypotheses, describing the scenarios, measurement, and operationalization. We then present the structural equation modeling results and discuss their significance. Finally, we discuss the contributions of our study to research and practice and its limitations before concluding.

Theoretical development

Opinion disclosure in social media communities

Social media allows for the creation of self-defined user communities (Bucher and Helmond, 2018) or the joining of existing interest groups (Bakshy *et al.*, 2015). Participation in such communities happens through interaction with other community members and, consequently, opinion disclosure. Opinion disclosure is a form of self-disclosure of any message about oneself to another person (Wheeless and Grotz, 1976; Jourard and Lasakow, 1958). Users on social media disclose opinions for various reasons, such as establishing new relationships (Krasnova *et al.*, 2010; Cheung *et al.*, 2015) or maintaining existing relationships (Bazarova and Choi, 2014). Opinion sharing allows users to build relationships based on shared hobbies, professional interests, and opinions about social, political, personal, health, religious, economic, educational, cultural, lifestyle, current events, and other societal issues. Further motivations incorporate status-seeking (Park and Lee, 2020) or simple hedonism, as users consider sharing something on social media enjoyable (Balakrishnan *et al.*, 2021; Zhang *et al.*, 2022). Findings in social media research agree that opinion disclosure is socially driven (Kushin *et al.*, 2019; Hadlington *et al.*, 2023).

Even though such communities contain members with pseudonyms, members generally know who is interacting with them, who is reading their posts, and who has invested time and effort to be socially connected to the community. We have two main indications for users to have high social stakes on social media despite the ability to remain anonymous. First, reputation building is important for social media users (Kietzmann *et al.*, 2011). Second, opinion leaders (Oueslati *et al.*, 2021) indicate that groups use specific personalities to form or follow opinions. Therefore, even though there is pseudonymization, we still observe that within such pseudonyms, community members enact behavior to bond with others. Further, participating in such closed networks with other users builds social ties, leading to homophilic clusters (Cinelli *et al.*, 2021).

Users start or join communities with members having similar interests (McPherson *et al.*, 2001), becoming community members themselves. In extreme cases, such social media communities resemble echo chambers. Only a pre-defined set of opinions is welcome in such echo chambers, and different perspectives are actively excluded (Cinelli *et al.*, 2021). Extant research on the drivers of echo chambers shows that social media users tend to revisit news outlets that reaffirm their opinions (Flaxman *et al.*, 2016), reflecting the natural human tendency to seek agreement and affirmation in communities (Baumgaertner, 2014). This tendency is exacerbated among users of more extreme political ideologies (Boutyline and Willer, 2017). Communities tend to shift toward the spectrum's extremes because most social media users are passive consumers of disclosed opinions (Cho *et al.*, 2018; Heiss, 2021). While social media generally allows for the free disclosure of opinions and is a space for robust discourse, communities that actively restrict the disclosure of nonconforming opinions undermine this notion and foster extremism and polarization (Dandekar *et al.*, 2013). This paper explores how social media communities are sustained and the circumstances that prevent community members from engaging in aggressive discourse by disclosing opposing opinions or offering different perspectives.

Spiral of silence theory

The spiral of silence theory is based on what individuals perceive as public or mainstream opinion on a given issue (Noelle-Neumann, 1974). It posits that individuals who are aware of public opinion but hold an incongruent opinion experience fear of social sanction and isolation and, as part of a minority, are less likely to actively and publicly express their opinions. Conversely, individuals whose opinions align with public opinion do not experience fear and are more likely to express their opinions openly. As a result, mainstream opinions are disclosed while alternative opinions are silenced (Kushin *et al.*, 2019). The spiral of silence theory and the fear of isolation have been applied to many contexts, including offline and public (Noelle-

Neumann, 1993; Moy *et al.*, 2001), as well as online and social media (Wu *et al.*, 2020) settings, and on a range of issues such as elections (Kushin *et al.*, 2019), foreign intervention (Neuwirth *et al.*, 2007) and police discrimination (Fox and Holt, 2018).

Public opinion and fear of isolation. Public opinion is the dominant opinion that compels conformity of attitude and behavior by isolating the dissenting individual (Noelle-Neumann, 1977). Individuals observe their social environment and assess the distribution of opinions and the likelihood that their opinion on an issue is consistent with public opinion using what is referred to as a "quasi-statistical organ" (Noelle-Neumann, 1977). The perception that disclosing one's opinion will be supported increases one's self-esteem and encourages opinion disclosure. In contrast, the perception that sharing one's opinion may result in sanctions discourages opinion sharing. We argue that social media communities contain their own dominant community opinions, which are not necessarily congruent with what would be considered public opinion. Community opinions do not exist in a vacuum but can be informed by public opinion since every individual perceives some form of public opinion (Noelle-Neumann, 1974). For example, in a healthcare-centered Subreddit, a community member can fully align with public opinion, such as championing the efficacy of vaccines. However, the same community member may oppose public opinion in a Facebook group concerning the overall healthcare system in their respective country.

Fear of isolation and its unique characteristics

The spiral of silence theory postulates that it is human nature to fear separation and isolation from our fellow human beings and to respond to this fear by undermining our judgment in the face of an opposing majority (Noelle-Neumann, 1974). This fear prevents people from disclosing opinions that they believe might separate them from society because they are unpopular or controversial. On the one hand, this concept of fear of isolation is a trait-based influence based on individual differences because the intensity of perceived fear varies from person to person (Hayes *et al.*, 2013). Trait-based fear of isolation is an individual personality trait that fears social isolation for disclosing an opinion that the community or public does not accept (Hayes *et al.*, 2013). It influences disclosure and is stable over time and across different situations and contexts (Scheufele *et al.*, 2001; Thatcher *et al.*, 2018). In contrast, state-based fear of isolation is a transient emotional state of fear of social isolation that arises only in specific contexts and situations (Wu *et al.*, 2020). For example, one thinks about a highly relevant topic to society, such as politics or social justice (Fox and Holt, 2018; Neuwirth *et al.*, 2007). This emotional state disappears when the situation or context changes or the individual does not express their opinion (Neuwirth *et al.*, 2007). Individuals with a strong trait-based fear of isolation may be more susceptible to the emotional state of fear of isolation (Wu and Atkin, 2018). Trait-based and state-based fear of isolation are the same mechanisms influencing behavior (i.e. fear of being socially isolated from a group or community).

Therefore, when we mention only fear of isolation, we refer to how the concept affects behavior. When we mention trait- and state-based fear of isolation, we refer to the causes of the fear. Table 1 provides an overview of the differences between trait-based and state-based fear of isolation.

Table 1. Trait-based and state-based fear of isolation with its unique characteristics

Fear of isolation	Trait	State
Origin	Personality	Contextual
Stability	Stable over long periods	Disappears after the situation is resolved
Duration	Long-term	Short-term
Impact on behavior	Pervasive	Situation-specific
Response to interventions	Long-term therapeutic approach	Alleviated by addressing specific situations

Source(s): Authors' own work

Information systems literature taps into concepts that are similar to fear of isolation. Therefore, we illustrate the uniqueness of the concept and provide a case for why the lens of fear of isolation provides additional insights beyond established concepts. Two concepts in information systems (IS) literature show similarities: herd behavior (Sun, 2013) and subjective norms (Venkatesh *et al.*, 2003).

Herd behavior is based on an extensive source of information (Sun, 2013). Individuals adopt behaviors that others in their peer group have already adopted and perceive as beneficial. Among others, the underlying mechanism of herd behavior refers to a larger peer group acting a certain way or expressing a specific opinion. Individuals adopt behaviors that others in their peer group have already adopted and perceive as beneficial. In contrast, the mechanism of fear of isolation differs in several ways (see Table 2). First, the sources of information are different. While herd behavior refers to a large perceptible group of real individuals, the fear of isolation is based on an individual's perception of public opinion among a group that shares an opinion. Therefore, herd behavior strengthens as the faceless mass that shares a particular opinion grows. At the same time, the fear of isolation depends only on the perception of public opinion, allowing small groups to define public opinion simply by "shouting the loudest" or by having the means to shape public discourse, such as through the media (Hayes *et al.*, 2013). The difference is that herd behavior involves many individuals behaving in a certain way. At the same time, this is not necessarily the case for fear of isolation. Second, the primary motivation mentioned in herd behavior is the individual-centered desire to avoid uncertainty and cost (Sun, 2013). In contrast, fear of isolation is characterized by how individuals position themselves in a community (Noelle-Neumann, 1974), such as a social media community, and driven by the fear of isolation, as discussed in the previous section.

Table 2. Fear of isolation, herd behavior, and subjective norms

	Fear of isolation	Herd behavior	Subjective norms
Definition	Fear of being isolated by the public for disclosing opinions contrary to perceived public opinion	Adopting behaviors that the peer group has adopted and that are perceived as beneficial	Perception of how important peers think one should act
Information source	Perceived public opinion in the community	A large group of faceless individuals	Important peers
What information is inferred from others	Public/community opinion; mainstream opinion within a community	Viability of the opinion	Other opinions about a topic
How information is inferred from others	Observation	Observation	Perception of how others would think about an opinion
Relevance of community size	Public opinion is independent of community size. Small groups can define public opinion by being "loud." The media can shape public opinion	The larger the group, the stronger the influence	The importance of specific peers outweighs the size of the peer group
Motivation	To avoid being excluded from a community	To avoid uncertainty, costs, and blame for the choice	To avoid being judged unfavorably or to be judged favorably by important peers
Long-term impact	Changes in line with public opinion	Herds are often fragile, and later reversals of herd practices are expected	Subjective norms do not matter after an opinion is adopted

Source(s): Authors' own work

Subjective norms motivate individuals to behave in certain ways because they believe important peers think they should (Venkatesh *et al.*, 2003). Fear of isolation differs from subjective norms (see Table 2). First, fear of isolation does not relate to how important peers are to the individual but to how the individual perceives a more general public consensus and opinion (Noelle-Neumann, 1974; Hayes *et al.*, 2013). Second, subjective norms leave room for learning and examining how important others accept certain behaviors (Fishbein and Ajzen, 1977). Third, the long-term effects of the fear of isolation are more fragile than subjective norms because public opinion perceptions can change.

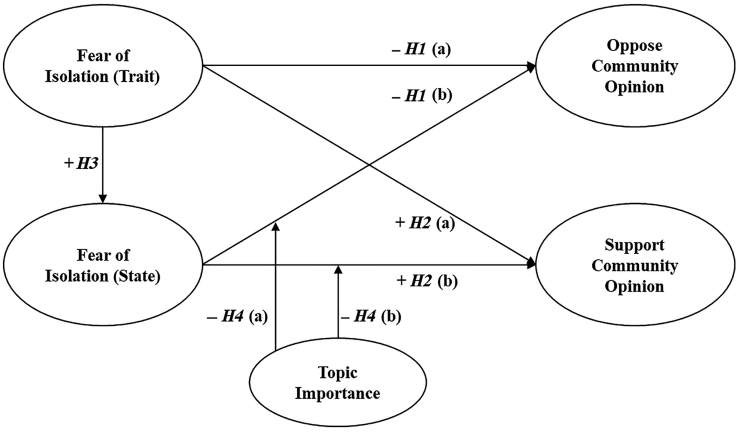
Research model

This study aims to explain the role of fear of isolation in influencing disclosure in social media communities. As a dependent variable, we observe the likelihood of community members opposing or supporting the perceived community opinion. Hence, we want to predict how opinions are disclosed in social media communities (see Figure 1).

We propose that trait-based and state-based fear of isolation influence opinion disclosure in communities because of the human desire to form bonds with and adopt behaviors like people similar to oneself, known as homophily (Boutyline and Willer, 2017). Generally, we expect individuals with the personal trait of fear of isolation will be reluctant to disclose opposing opinions to avoid social isolation (Noelle-Neumann, 1974; Moy *et al.*, 2001). Individuals experiencing state-based fear of isolation desire to belong to communities that reflect their interests (Nguyen, 2020) and provide the context in which opinions are disclosed.

For both types of fear of isolation, we argue that community opinion can be the source of public opinion on a smaller scale. In social media communities, opinions can form dynamically by affirming dominant beliefs or blocking or eliminating oppositional, cross-cutting content that challenges dominant beliefs (Messing and Westwood, 2014; Sunstein, 2018). Thus, members participating in social media communities are likely to fear isolation if they express opinions contrary to the dominant community opinion, reducing the likelihood of oppositional comments. Thus, we postulate:

H1. High (a) trait-based and (b) state-based fear of isolation negatively influence the likelihood of posting an oppositional comment.



Source(s): Authors' own work

Figure 1. Research model with fear of isolation influencing opposing and supporting community opinion

Social media disclosure research shows that users primarily share information to maintain and build relationships (Cheung *et al.*, 2015; Bazarova and Choi, 2014). Echo chamber research shows that social media communities are built on homophily, meaning that similarities among community members build connections and structure the network (Boutyline and Willer, 2017; Dandekar *et al.*, 2013), ultimately supporting highly homogeneous opinions. Furthermore, social identity theory shows that depersonalization leads individuals to strive to become community members and behave in ways that are appropriate for the community (Stets and Burke, 2000; Carter and Grover, 2015). Depersonalization may lead individuals to disclose an opinion they do not hold (Stets and Burke, 2000; Carter and Grover, 2015). Given the spiral of silence theory and the fear of isolation, we expect community members to affirm the dominant community opinion to avoid isolation. Community members consider the ramifications for their reputation when sharing content and choose not to share content that may infringe on their reputation (Mathews *et al.*, 2022). Likewise, not expressing an opinion on certain topics may be viewed as an opinion expression. Therefore, we argue that social media community members also weigh their silence against potential ramifications for their reputation. Hence, they choose to support the community opinion to mitigate potential backlash. In this specific case, being part of a community creates fear of isolation that pressures members to conform to community opinion (Gilovich *et al.*, 2010). Community members take a stand on a topic that receives much attention, express the dominant opinion, and reinforce the community opinion by posting supportive comments. We therefore postulate:

H2. High (a) trait-based and (b) state-based fear of isolation positively influence the likelihood of posting a supportive comment.

Most existing research applying the spiral of silence theory focuses on either trait-based (Scheufele *et al.*, 2001) or state-based (Kushin *et al.*, 2019) fear of isolation. As discussed above, trait-based fear of isolation is a stable personality trait (Moy *et al.*, 2001), whereas state-based fear of isolation is situational and transient (Neuwirth *et al.*, 2007). We build on stable individual differences that influence emotional states in different situations, such as fear of a specific situation (Watson and Clark, 1984; Thatcher and Perrewe, 2002; McElroy *et al.*, 2007). Previous research has examined the mediating relationship between traits and states (Ching *et al.*, 2014; Howell *et al.*, 2017). Theoretically, traits are biologically based and form states to influence behavior (Maier, 2012). Aligning with that argumentation, we expect that community members high in trait-based fear of isolation will be more reluctant to disclose dissenting opinions and more likely to experience the emotional state of fear of isolation in certain situations. Thus, we postulate:

H3. High trait-based fear of isolation positively influences state-based fear of isolation.

Members of social media communities disclose their opinions and establish relationships based on homophily (Boutyline and Willer, 2017; Nikolov *et al.*, 2015; Sunstein, 2018). Individuals have certain *a priori* expectations that the opinions they can expect from the community will be consistent with their pre-existing beliefs and opinions. However, when individuals interact through information sharing, they are exposed to potentially conflicting information that cannot be easily reconciled (Festinger, 1962; Mills, 1999). Research shows that the human mind acts as a cognitive miser by ignoring conflicting information to reduce cognitive load (Fiske and Taylor, 2013). When social media community members are exposed to unexpected conflicting opinions, they may experience more or less cognitive discomfort (Aronson, 1969), depending on how important the issue is and how radically the conflicting opinion challenges their pre-existing beliefs. Consistent with existing research (Fox and Holt, 2018), we argue that the personal importance of the topic to an individual moderates his or her level of state-based fear of isolation. When individuals express conflicting opinions about a topic, the importance of the topic introduces an additional emotional dimension to the decision to disclose a comment, in addition to fear of isolation. This new dimension opposes the fear of isolation and the presented conflicting opinions within the community. We argue for the

opposite case, that when a community member is under low state-based fear of isolation, topic importance is the dominant factor. This leads to an increasing factor in articulating an opinion contrary to the community opinion. When community members do not fear isolation, they feel free to oppose opinions on important issues. As the state-based fear of isolation increases, the issue's importance dampens this influence. For the supporting case, we argue that articulating an opinion that supports the community opinion (against one's own) increases cognitive dissonance with topic importance. Reaffirming an opinion one does not hold directly contrasts how important one considers a topic to be. This leads to a dampening effect. Under high issue salience, the influence of state-based fear of isolation is reduced. We therefore postulate.

H4a. Under high topic importance, the lower the state-based fear of isolation, the higher the likelihood of posting an oppositional comment.

H4b. Under high topic importance, the higher the state-based fear of isolation, the lower the likelihood of posting a supportive comment.

Method

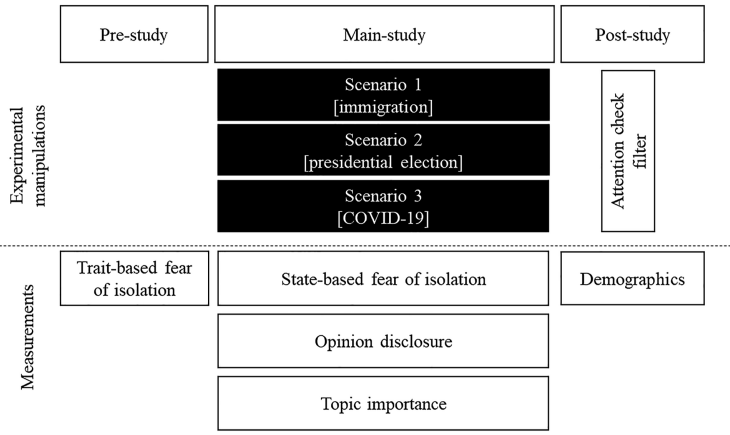
Scenarios

We tested our hypothesis in three scenarios, focusing on three popular topics dominating the mainstream US media landscape in 2021, when our study was conducted: immigration, the presidential election, and COVID-19. We chose these topics since the sample consists of American citizens. The proposed topics were equally tied in importance in public opinion in 2020 among Americans (Hrynowski, 2020). We adapted scenarios used in a previous spiral of silence research to the social media context (Neuwirth *et al.*, 2007; Scheufele *et al.*, 2001), and to ensure the relevance of the issues, we asked participants how important the issues were to them on a Likert scale ranging from "not at all important" (1) to "extremely important" (7). The average importance score was 5.012 for immigration (standard deviation (SD): 1.410), 5.232 for the presidential election (SD: 1.509), and 5.287 for COVID-19 (SD: 1.422). We tailored the scenarios to participants in a particular social media community, focusing on the dominant community opinion on the issue rather than the messenger of the opinion, who was not identified to rule out the influence of social ties. In each scenario, participants were asked how likely they would be to share an opinion, which is our dependent variable (see Appendix). We chose this setup as it provides a controlled environment to test for the specific influence of fear of isolation. Even though social media platforms provide content of authentic opinion disclosure, it would not be possible to infer whether such disclosure stemmed from fear of isolation or other variables. Therefore, in a scenario-based study, we can control such influences more clearly and make a case for fear of isolation as the influencing factor of disclosure.

Study procedure

In early 2021, we conducted a study with a three-step procedure to collect measures at different stages (Maier *et al.*, 2023). In the pre-study, we assessed fear of isolation (trait-based) as individual differences (see Figure 2 for the study procedure).

In the main-study, participants were asked which social media community they interact with the most and what topics are discussed there. In this way, participants have a stronger attachment to the community because they already have a stake in participation and connections. Therefore, the study had the premise that the participants are active in a social media community. Based on this premise, we introduced the three scenarios. We asked participants whether they posted supporting and/or opposing comments and what level of state-based fear of isolation they perceived. We included two attention controls: First, we asked participants to select the scenario topic from a broader list that included movies, immigration, sports, elections, the stock market, and COVID-19. We only scored responses



Source(s): Authors' own work

Figure 2. Study procedure

that correctly identified the topic of each scenario. Second, we asked questions that required a predetermined response (e.g. "mark strongly disagree") on a seven-point scale ranging from "strongly disagree" to "strongly agree." In the post-survey, participants provided demographic information, including gender, age, and education. Participants completed the survey at surveymonkey.com. We recruited US-based participants from Amazon Mechanical Turk (MTurk) with a previous MTurk task approval rate of over 97% and over 500 approved tasks, paying each participant one US dollar. We reached 296 participants, eliminating 46 participants due to missing data. Of the remaining 250 participants, 164 passed the attention checks. All data were anonymized. The sample of 164 complete surveys yielded 492 observations across the three scenarios. Concerning the gender distribution, 49.39% of the sample identified as female, 50% as male, and 0.61% as neither. The table below presents a more detailed view of the sample demographics. Table 3 shows the sample demographics.

Table 3. Sample $n = 164$ demographics with gender, age, and education

	Frequency	Percent		Frequency	Percent
Gender			*Education*		
Male	82	50.00	Some high school, no diploma	2	1.22
Female	81	49.39	High school graduate or diploma	16	9.76
Diverse	1	0.61	Some college credit, no degree	28	17.07
Age			Trade/technical/vocational training	5	3.05
19–25	7	4.27	Associate degree	7	4.27
26–30	30	18.29	Bachelor's degree	85	51.83
31–35	31	18.90	Master's degree	18	10.98
36–40	32	19.51	Professional degree	2	1.22
41–45	12	7.32	Doctorate degree	1	0.61
46–50	13	7.93			
51–55	10	6.10			
56–60	5	3.05			
60+←	24	14.63			

Source(s): Authors' own work

Scale development

Following previous measurement development approaches (Moore and Benbasat, 1991), we conducted a card-sorting procedure with four scientists who were not part of the development to test the validity of the five items. We developed the items to measure state-based fear of isolation. We compared them to the related concepts of anxiety and fear of negative evaluation, which refer to the emotional state of fear or anxiety in a particular context. In total, the researchers selected five items for fear of isolation (self-developed), three items for anxiety (Venkatesh *et al.*, 2003), and five items for fear of negative evaluation (Watson and Friend, 1969). All items were tailored to the specific social media context to prevent participants from recognizing which items belonged together. Card-sorting results indicate the fear of isolation items was correctly mapped (correct classification: 85%). No single item was misclassified more than once. Based on metrics of interrater reliability (Landis and Koch, 1977; Cicchetti and Sparrow, 1981), we conclude that state-based fear of isolation is perceived differently and has inherent properties that distinguish it from similar concepts.

Measurement and operationalization

Opinion disclosure: We measured opinion disclosure as the dependent variable (Kim and Dennis, 2019), asking, *"The likelihood you would write an opposing/supporting comment?"*. The items were measured on a seven-point Likert scale ranging from "very unlikely" (1) to "very likely" (7).

Topic importance: We measured topic importance (Kim and Dennis, 2019) by asking, *"Do you find the issue described in the article important to you?"* This indicates that we are asking about the topic's personal importance. The item was measured on a seven-point Likert scale ranging from "not at all important" (1) to "extremely important" (7).

Trait-based fear of isolation: We adapted two items (Scheufele *et al.*, 2001) that incorporate the isolation and the trait aspects. An example is, *"I worry about being isolated if people disagree with me."* The items were measured on a seven-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (7).

State-based fear of isolation: To measure the state-based fear of isolation, we drew on the relatively small body of scientific research, which has followed various approaches (Neuwirth *et al.*, 2007; Fox and Holt, 2018; Kushin *et al.*, 2019). We developed five new items and a new scale (see Table 4), incorporating four characteristics from scale items in extant research: the emotional state of fear or anxiety, the behavior of opinion disclosure, the concept of being isolated from the community, and the topic in focus. The items were measured on a seven-point scale Likert ranging from "strongly disagree" (1) to "strongly agree" (7).

Table 4. Items developed to measure state-based fear of isolation

Item number	Item
1	I am afraid that <social media community> will no longer talk to me if I express my opinion about <topic>
2	I worry that <social media community> will ignore me if I express my opinion about <topic>
3	I feel regret that if I express my opinion about <topic>, <social media community> will no longer engage with my ideas
4	I am concerned that <social media community> will no longer communicate with me if I express my opinion about <topic>
5	I fear <social media community> will exclude me from future discussions if I express my opinion about <topic>

Source(s): Authors' own work

Results

The sample size of 164 exceeds the rule of ten (Hair *et al.*, 2016), requiring at least 30 surveys. Some scholars argue that results based on the rule of ten sample size are too rough. Instead, this provides only the minimum data set to run the algorithm. Research (Hair *et al.*, 2016) recommends assessing the sample size by estimating the minimum explanatory power of the model's R^2. Research within the context of social media shows R^2 values around 30% (Bhattacherjee and Sanford, 2006; Zha *et al.*, 2018). Spiral of silence theory studies report R^2 at between 10 and 35% (Neuwirth *et al.*, 2007). If we estimate a minimum R^2 of 0.1, the lowest value, and the research model indicates that a maximum of two arrows point at a construct (opinion disclosure), the minimum R^2 method determines the minimum sample size of 110 participants exceeded by this study.

Internal consistency reliability was assessed using Cronbach's Alpha and composite reliability (CR). Cronbach's Alpha is a conservative criterion, whereas composite reliability considers the different outer loadings. Values above 0.70 are desirable (Hair *et al.*, 2016). As illustrated in Table 5, Cronbach's Alpha and CR values exceed that threshold.

Convergent validity was assessed by the average variance extracted (AVE) and by observing the factor loadings. AVE values above 0.5 indicate convergent validity (Hair *et al.*, 2016), which is the case for our model (see Table 5). In addition, the factor loadings are all above the threshold of 0.708 (Hair *et al.*, 2016) and significant at the 0.001 level. Based on these criteria, this research model can conclude convergent validity.

We assessed discriminant validity based on three criteria. Even though simulations show that cross-loadings do not reliably identify discriminant validity (Henseler *et al.*, 2015), we first observed the cross-loadings to show that the indicators most strongly correlate with their respective construct. Second, we applied the Fornell-Larcker criterion to assess discriminant validity. Table 5 shows that the squared AVE at the top is higher than the correlation between the constructs, indicating discriminant validity. Lastly, we calculated the heterotrait-monotrait ratio (HTMT). Values above 0.90 are considered not to show discriminant validity (Hair *et al.*,

Table 5. Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and the Fornell-Larcker criterion

	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)	Fornell-Larcker criterion	
				FoI trait	FoI state
Scenario 1 (immigration)					
FoI trait	0.838	0.924	0.859	0.927	
FoI state	0.960	0.969	0.863	0.694	0.929
Scenario 2 (presidential election)					
FoI trait	0.838	0.924	0.859	0.927	
FoI state	0.972	0.978	0.899	0.647	0.948
Scenario 3 (COVID-19)					
FoI trait	0.838	0.924	0.859	0.927	
FoI state	0.972	0.978	0.898	0.674	0.948

Note(s): FoI = fear of isolation
Source(s): Authors' own work

2016). A more conservative threshold is the value of 0.85 (Henseler *et al.*, 2015). As illustrated in Table 6, our model's HTMT ratios are well below this threshold, confirming the discriminant validity of our constructs.

We tested for support for our hypotheses through structural equation modeling using SmartPLS 3.3.9 with the PLS-SEM algorithm on the three scenarios. As illustrated in Table 7, trait-based fear of isolation across all scenarios does not significantly impact whether community members oppose (Scenario 1: $\beta = -0.057$, n.s., Scenario 2: $\beta = -0.023$, n.s., Scenario 3: $\beta = 0.10$, n.s.) or support (Scenario 1: $\beta = 0.055$, n.s., Scenario 2 $\beta = 0.118$, n.s., Scenario 3 $\beta = 0.000$, n.s.) the dominant opinion in the community. We reject the influence of the trait-based condition in H1 (a) and H2 (a). However, state-based fear of isolation significantly influences opposing opinion disclosure in two scenarios (Scenario 1: $\beta = -0.217$, $p = 0.029$, Scenario 2: $\beta = -0.238$, $p = 0.009$, Scenario 3: $\beta = -0.170$, n.s.) and state-based fear of isolation significantly influences supporting opinion disclosure in one scenario (Scenario 1: $\beta = 0.209$, n.s., Scenario 2: $\beta = 0.163$, n.s., Scenario 3: $\beta = 0.380$, $p < 0.001$). Therefore, our results partially support the influence of the state-based condition in H1 (b) and H2 (b). We found that trait-based fear of isolation significantly influences state-based fear of isolation (Scenario 1: $\beta = 0.694$, $p < 0.001$, Scenario 2: $\beta = 0.647$, $p < 0.001$, Scenario 3: $\beta = 0.674$, $p < 0.001$). Therefore, the results indicate support for H3.

Based on those initial findings, we performed a post-hoc mediation analysis because the insignificant effect of trait-based fear of isolation on opinion disclosure indicates full mediation via state-based fear of isolation. Our findings show mediation effects from the trait-based fear of isolation via state-based fear of isolation on opinion disclosure for opposing the opinion in scenarios one and two and for supporting the opinion in scenario three (Scenario 1: $\beta = -0.150$, $p = 0.039$, Scenario 2: $\beta = -0.154$, $p = 0.014$, Scenario 3 $\beta = 0.256$, $p < 0.001$).

Furthermore, we found that the topic importance consistently influences all significant effects of the state-based fear of isolation for opposing the community opinion in Scenario 1 and Scenario 2 (Scenario 1: $\beta = -0.219$, $p < 0.000$, Scenario 2 $\beta = -0.126$, $p = 0.043$). Furthermore, we found for Scenario 3 that topic importance significantly moderates the

Table 6. Heterotrait-monotrait ratio

	FoI trait	FoI state	Opposing	Supporting
Scenario 1 (immigration)				
FoI trait	–			
FoI state	0.764	–		
Opposing	0.218	0.257	–	
Supporting	0.218	0.253	0.240	–
Scenario 2 (presidential election)				
FoI trait	–			
FoI state	0.711	–		
Opposing	0.154	0.231	–	
Supporting	0.237	0.232	0.198	–
Scenario 3 (COVID-19)				
FoI trait	–			
FoI state	0.741	–		
Opposing	0.098	0.161	–	
Supporting	0.238	0.318	0.056	–

Note(s): FoI = fear of isolation
Source(s): Authors' own work

Table 7. Path coefficients, mediation analysis (indirect effects), and R^2 (coefficient of determination)

Independent variables	Scenario 1 (immigration)				Scenario 2 (presidential election)				Scenario 3 (COVID-19)			
	Oppose		Support		Oppose		Support		Oppose		Support	
Fear of isolation (trait)	−0.057	n.s.	0.055	n.s.	−0.023	n.s.	0.118	n.s.	0.010	n.s.	0.000	n.s.
Fear of isolation (state)	−0.217	*	0.209	n.s.	−0.238	**	0.163	n.s.	−0.170	n.s.	0.380	***
FoI (state) X importance	−0.219	***	−0.019	n.s.	−0.126	*	−0.066	n.s.	−0.128	n.s.	−0.230	*
FoI (trait) on FoI (state)	0.694		***		0.647		***		0.674		***	
FoI (trait) indirect effect	−0.150	*	0.145	n.s.	−0.154	*	0.106	n.s.	−0.114	n.s.	0.256	***
Dependent variable R^2	*33.2%*		*6.6%*		*21.1%*		*6.5%*		*10.0%*		*13.5%*	
FoI (state) R^2	*48.1%*				*41.8%*				*45.4%*			

Note(s): $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, n.s. not significant; X indicates the moderation; FoI = fear of isolation
Source(s): Authors' own work

influence of state-based fear of isolation on supporting the community opinion (Scenario 3: $\beta = -0.230$, $p = 0.020$). Therefore, we found support for H4 (a) in Scenario 1 and Scenario 2 and for H4 (b) in Scenario 3. H4 (b) could not be supported for Scenario 1 and 2. Furthermore, H4 (a) could not be supported for Scenario 3.

Lastly, we controlled age, gender, and education to have any significant impact on the dependent variables. The analysis showed no significant influence in either scenario.

Discussion

Social media communities allow their members to communicate on various topics. Besides the upsides of connecting with like-minded people, social media communities are also places where harmful actions can be orchestrated if the proposed opinions become extreme. An exacerbation of this behavior can ultimately lead members of communities to take action, as we have seen in times of the COVID-19 pandemic (Courbet, 2022) or the Storm of the Capitol (Jaffe and Gillum, 2021). This study examines how members of social media communities disclose or fail to disclose opinions that support or oppose the dominant community opinion. To close this gap, we provide empirical insights on how members of social media communities experience fear of isolation and subsequently silence themselves or even support opinions against their own.

Our results show that the trait-based fear of isolation does not significantly influence opinion disclosure in any of the three scenarios. In other words, when community members are confronted with a dominant opinion that does not confirm their beliefs, no stereotype silences itself by default. However, trait-based fear of isolation is mediated by the influence of state-based fear of isolation on opinion disclosure. This means that a disposition to fear social isolation needs a concrete context to manifest itself. We found that particularly important societal issues provide such contexts. Therefore, an individual's contextual state-based fear of isolation is influenced by their trait-based fear of isolation.

Results from our scenarios indicate that state-based fear of isolation reduces the likelihood that members will disclose opinions that contradict the dominant community opinion and actively maintain the community opinion. We show that community members feel pressure to actively participate in expressing opinions in social media communities, confirming the prevailing opinion on some topics. Furthermore, we conclude that context and topic influence whether community members actively disclose opinions that oppose or support the prevailing community opinion. This finding extends the spiral of silence theory by demonstrating the pressure to support an opinion that differs from one's beliefs. This mechanism further increases the strength of the dominant opinion and leaves even less room for alternative viewpoints to emerge. This dynamic shows that due to the constant interconnectedness, members of social media communities may fear that the community will judge purely passive consumption of information on the platform and expect them to position themselves in the opinion environment at the risk of isolation.

Finally, our results show how a social media community member's view of topic importance influences the relationship between state-based fear of isolation and opinion disclosure. When community members perceive the topic as unimportant, their state-based fear of isolation is less likely to influence opposing opinion disclosure in two of our three scenarios. People are less afraid of social isolation and, therefore, more likely to disclose a dissenting opinion for mundane, superficial topics such as favorite foods. Conversely, suppose the community member feels the topic is necessary. In this case, cognitive dissonance is induced. However, it is resolved in the form of the least resistance: their affiliation and identification with the community will prevail, and they may even actively argue against their own opinion to avoid isolation from the community (Scenario 3). Overall, this research provides insight into how social media communities homogenize opinions. This suggests that even in times of strong polarization, different groups are becoming more homogeneous internally.

Contribution to research and theory

This study deepens our understanding of why community members disclose opinions in social media communities and extends existing research on this behavior in social media in general (Wu and Atkin, 2018; Kushin *et al.*, 2019). Members of social media communities create a distinct environment for opinion disclosure, one that differs from the public social media environment in general.

This study contributes to social media participation research in the following ways. First, with the spiral of silence theory, we provide insight into the mechanism of fear of isolation within social media communities. Previous research has shown that social media users are more likely to engage in discourse when content reaffirms their current beliefs (Coscia and Rossi, 2020; Moravec *et al.*, 2018; Kim and Dennis, 2019). We extend this by examining the social environment within communities that go beyond the content of social media posts. Building on the concept that individuals quasi-statistically determine the prevailing opinion in society (Hayes *et al.*, 2013), we show that members of social media communities rely on a dominant community opinion, which significantly influences their opinion disclosure. The social environment in communities can even reduce confirmation bias when the content becomes irrelevant, and members simply want to confirm the community opinion. This implies for research that there is a certain hierarchical order of factors that influence opinion disclosure on social media. In this case, the perception of the dominant social media community opinion supersedes previously held beliefs concerning disclosure behavior.

Second, we distinguish the influence of trait and state-based fear of isolation on opinion disclosure. We thereby contribute to the concept of fear of isolation, which has been poorly defined (Kushin *et al.*, 2019). While it has been unclear where fear of isolation originates and how it interacts, we provide empirical evidence that state-based fear of isolation has far greater predictive power than trait-based fear of isolation. The interesting finding is that the effect of the trait fear of isolation is mediated by state-based fear of isolation. This mediating relationship is consistent with previous research on how the state mediates traits (Ching *et al.*, 2014; Howell *et al.*, 2017). Therefore, state-based fear of isolation is driven by context and trait-based fear of isolation. This lets us derive important implications for theory by concluding that there is a relationship between trait- and state-based fear of isolation in terms of mediation and that only both provide a full understanding of the consequences of fear of isolation.

Third, we show that state-based fear of isolation is topic-dependent (Neuwirth *et al.*, 2007). The more critical a social media community member views a topic, the more their state-based fear of isolation will increase their reluctance to disclose an opinion that opposes the community. The moderating effect of personal salience of a topic provides new insights into how echo chambers emerge, especially around controversial topics such as political discourse. Social media community members are even less likely to express opinions that oppose the dominant community opinion if they consider the topic necessary, increasing the risk that communities that identify with hot-button issues become echo chambers. Theoretically, this lets us conclude that the spiral of silence is highly relevant under high personal issue salience conditions. In its original form, the spiral of silence theory is based on the perception of public opinion that an issue is particularly important when it is widely articulated. We, therefore, provide contextualization of the spiral of silence theory as the importance of the topic emerged as a moderating effect. This insight further illuminates the nature of opinion disclosure in social media communities and why we see particularly harmful actions in certain instances.

Fourth, because our study considers a range of topics, our results provide insights into topic-specific characteristics that influence how state-based fear of isolation influences opinion disclosure. We show that certain topic-specific characteristics can lead community members not to oppose the dominant opinion but to actively support and affirm it, even when it goes against their beliefs. The transparent, ubiquitous nature of communication in social media communities may lead members to perceive silence on certain topics as a potential justification for social isolation. This facet of the spiral of silence theory and the fear of isolation

mechanism was not originally hypothesized when the theory was developed (Noelle-Neumann, 1974) but is now clearly evident in social media communities.

Contribution to practice

Our findings also have implications for social media community members and providers of social media platforms. First, community members should understand the mechanisms that influence their decisions to express opinions that support or oppose the prevailing opinion of the community to which they belong. As evidenced by additional participant comments voluntarily provided at the end of our survey, the threat of isolation, community backlash, bullying, or even physical violence reinforces the dominant opinion. Knowing this, community members should consciously promote civil discourse in online environments. In this regard, members could adopt the "see something, say something" behavior to develop a healthier communication environment.

Second, to combat radicalization, platform providers should adjust their algorithms to broaden the range of viewpoints offered to their community members on various issues rather than only feeding users content that reinforces pre-existing opinions. By doing so, platform providers can encourage discourse between different opinions and reduce the tendency for communities on their platforms to become echo chambers. This may seem at odds with the attention-seeking business model of social media platforms. However, social media platforms as an environment for the growth of radicalized groups may not be positive for the image of the platform in the long run. This may reduce the attractiveness of advertising and, ultimately, revenue, as seen with demonetized content on YouTube. Furthermore, as content becomes more extreme on social media, community members may also experience negative emotional states that can hurt participation in the long run. Social media platforms may turn to strategies to foster long-term engagement instead of short-term fast interaction with extreme content (e.g. such as rage baits). Since we found that the state-based fear of isolation dominantly influences opinion disclosure, there is an argument for social media platforms to hold significant responsibility to facilitate social environments that represent its user base's actual state of mind.

Limitations and future research

This study has several limitations that should be considered in future research. First, participants in the scenario study were presented with a hypothetical situation with the knowledge that their responses would be monitored and evaluated. This setup creates a risk that participants will not respond honestly and authentically due to social desirability bias (Edwards, 1957). Second, the sample was limited to US-based participants. Future research should confirm our findings in other cultural settings with different norms for expressing opinions and communication styles influenced by individualism and collectivism (Gudykunst *et al.*, 1996). Third, because all participants were exposed to all three scenarios, they may respond to the backlash, challenge their pre-existing beliefs in the first or second scenario, and begin coping by conforming to prevailing opinions. This coping behavior may have influenced their responses. Lastly, we acknowledge that asking for both opposing and supporting the community opinion may induce inner conflict within the study, especially when the topics are of personal importance. This may infringe to some extent on the reliability of the results.

Future research should also explore the factors and circumstances that lead to the observed rather radical behavior of social media community members actively expressing opinions they do not, even those opposite to those they hold, presumably out of fear of strong negative community reaction. For example, what characteristics of the topic lend themselves to this behavioral response? To what extent is such behavior driven by personal, subjective perceptions, observed and expected community reactions, and the individual's level of emotional significance and investment in the community's defining focus? Furthermore,

beyond the fear of isolation, to what extent do community members fear other forms of backlash, firestorms, mobbing, or even physical violence from other community members or powerful institutions (Drasch *et al.*, 2015; Jöntgen, 2020)? A more in-depth analysis of such questions could help further adapt the spiral of silence theory to modern phenomena, such as social media communities and echo chambers.

Furthermore, although several social media platforms allow users to create rather closed communities, it would be important to understand whether there are differences. For example, the Reddit platform consists of only Subreddits and, therefore, communities, while on Facebook, there is a rather open network besides the possibility of forming communities. Investigating whether such open space influences communities and opinion disclosure would be worthwhile.

In the same sense, research can tap into cross-community dynamics. Community members are not bound to a single community but can participate in various ones. Research should investigate whether supporting opinions one does not hold in one community may also translate in other communities. Lastly, research should also shed light on differences between open, closed, and secret communities (Kietzmann *et al.*, 2011) since the exclusivity of members within closed or secret communities may provide an even stronger fear of isolation than open communities.

Conclusion

This study helps explain how members of social media communities disclose their opinions within their respective community on social media. We use the spiral of silence theory and consider trait and state-based fears of isolation. We use a scenario-based study that focuses on three issues dominating the mainstream US media landscape in 2020: immigration (an ongoing issue), the presidential election (an ongoing issue), and COVID-19 (an ongoing issue). Our results show that state-based fear of isolation leads community members to refrain from posting opposing opinions in some cases and even to actively support the community's opinion in the case of COVID-19, even when they disagree with the community's opinion. The importance of the issue to community members moderates this relationship. Individuals are even less likely to disclose an opinion that opposes the community's opinion if the topic is essential to them. Our findings shed light on echo chambers where certain opinions are accepted, and others are discredited and silenced. In particular, social media communities that focus on hot-button issues such as abortion, religion, race, politics, gender, taxation, gun safety, and other social issues are more likely to become echo chambers.

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Appendix

Scenarios

Immigration

One day, you see a post from a group member addressing issues concerning immigration. The group member's opinion is not in line with yours, in fact you feel the opposite of what is stated in the post. Since the post was shared yesterday evening, there are already several comments from the community which support the presented opinion. Now, you are thinking about contributing to the discussion.

Presidential election
You see a post from a group member addressing the topic of election fraud in the context of the 2020 presidential election. The group member elaborates on the topic and comes to a completely different conclusion than you have on the matter. The post is already a few hours old and several comments from the community which support the conclusion of the group member have been posted. Now, you are thinking about whether or not you should engage in the conversation.

COVID-19
In your community, you see that a group member posted information about whether wearing masks help reduce the spread of COVID-19. The group member articulates a stance on the efficacy of masks which you do not share. However, several comments from the whole community have already accumulated over time that support the group member's stance. You are thinking about also posting your opinion on the matter.

Source(s): Authors' own work

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