

Empathy Vs Reluctance to Challenge Misinformation: The Mediating Role of Relationship Costs, Perspective Taking, and Need for Cognition

Rabab Ali Abumalloh ^{1,*}, Selin Gurgun ², Muaadh Noman ³, Keith Phalp ², Osama Halabi ¹, Vasilis Katos ², Raian Ali ^{3,*}

¹ Department of Computer Science and Engineering, Qatar University, Doha, Qatar

² Faculty of Science and Technology, Bournemouth University, UK

³ College of Science and Engineering, Hamad Bin Khalifa University, Doha, Qatar

Abstract. Misinformation can harm individuals and societies, with social media and online communities amplifying its reach and impact. One effective strategy to counteract the spread of misinformation online is social corrections, in which people on social media actively challenge others who post or spread it. People hesitate to do so for reasons related to empathy, fear of affecting their relationships, futility, and subjective norms. This research aims to explore the impact of empathy on individuals' willingness to challenge misinformation. The research also investigates the mediation role of the personal factors of perspective-taking and the need for cognition, along with the perceived impacts on their relationships, on the relationship between empathy and the willingness to challenge. The data was collected from 250 UK-based social networking users and then analyzed using Partial Least Squares Structural Equation Modeling. The results of the analysis supported that perspective-taking ($\beta = 0.064$, $p = 0.011$), the need for cognition ($\beta = 0.022$, $p = 0.048$), and perceived relationship costs ($\beta = 0.035$, $p = 0.003$) all fully mediated the impact of empathy on the willingness to challenge misinformation. The results also show that empathy does not have a direct impact on willingness to challenge misinformation. Individuals with varying levels of empathy converge in their attitudes toward challenging misinformation influenced by a combination of cognitive processes and considerations of their relationships.

Keywords: Misinformation, Social Correction, Relationship Cost, Empathy, Perspective Taking, Need for Cognition.

1. Introduction

The growth of online communities has facilitated widespread misinformation, negatively affecting individual well-being and societal progress [1]. Engagement with online misinformation has intensified following the COVID-19 crisis and the war in Ukraine. Several phrases, including misinformation, rumors, fake news [2], and disinformation have been used in tandem to describe inaccurate information [3]. Misinformation can be defined as a type of information that is incorrect, unsubstantiated, imprecise, perceived as unclear in a specific circumstance or setting [4], or not supported

by proof, expert opinion, or evidence [5]. Rumors are often information whose accuracy is doubted [6]. Fake news differs in format from misinformation and usually refers to the news [6]. Disinformation refers to the process of spreading inaccurate data with the intention to mislead, whereas misinformation is inaccurate information that does not intend to harm [7].

To face the spread of misinformation within social media and online communities, corrections from users prove to be an effective approach [8]. Still, one notable obstacle to stopping the spread of misinformation is the lack of action taken by people who receive it to confront those who share it [6]. Chen, et al. [9] identified six main types of factors that impact the spread of misinformation within social media: emotions, cognition, personality traits, demographics, motivations, and worldviews. The authors also addressed a research gap concerning the relationship between these factors. Identifying the factors that hinder users from challenging misinformation [6] and the relationships between these variables is crucial for facing its spread [9], given the significant harm it causes and the proven effectiveness of social corrections in countering it [8].

The purpose of this study is to investigate the impact of several factors on people's willingness to challenge others who post misinformation on social media sites. Using a sample of social networking users, we investigate the factors that impact people's willingness to challenge misinformation; focusing on empathy as a main factor and the need for cognition, perspective-taking, and relationship cost as mediators.

Mediation in the context of our study refers to the extent to which the effect of empathy on willingness to challenge is explained by the set of intermediate variables (Relationship Costs, Perspective Taking, and Need for Cognition), referred to as the indirect effect [10].

The rest of this paper is structured as follows; Hypotheses Development is presented in Section 2, Study Design is presented in Section 3, Empirical Results are presented in Section 4, Discussion is elaborated in Section 5, Research Contribution, Limitations, and Future Work are elaborated in Section 6, and Section 7 concludes the study.

2. Hypotheses Development

Empathy indicates the ability to notice and respond to the feelings of other people, which is frequently combined with a desire to take care of the well-being of others [11]. Empathic individuals are more inclined to foster and sustain their connections, facilitating the adoption of social interaction strategies such as emotional expression, understanding others' emotional states, and recognizing the influence of one's actions on others [12]. Empathic individuals are also more willing to defend vulnerable from harm [13] and aid others [14]. As empathy has been linked to positive pro-social behaviors in the literature in several contexts [15], we hypothesize that:

H1: *Empathy has a positive impact on the Willingness to Challenge*

Perspective-taking is the ability to accept the other's standpoint of view and attribute their ideas and emotions to them [16]. Perspective-taking is an intellectual procedure involving observers' willingness to see the world from others' perspectives as well as understanding their emotions or mental states [17]. Perspective-taking is an activity that requires information as well as cognitive picturing [18]. Despite their close association, perspective-taking and empathy are considered separate concepts. In contrast to

the cognitive orientation of perspective-taking, empathy is focused on the emotional reactions to others, including feelings such as warmth, compassion, sympathy, and worry [19]. In several studies, perspective-taking is considered an intellectual and logical procedure that involves examining another person's experiences, while empathy is a more feelings-driven response [20]. Perspective-taking is essential to positive social interactions [21], prosocial behavior [22], and morality [23]. Hence, we argue that empathetic individuals with the ability to take others' perspectives are more willing to confront challenging situations and suggest that:

H2: *Perspective Taking mediates the relationship between Empathy and Willingness to Challenge*

Need for Cognition (NFC) refers to a person's inclination to participate in cognitive functions, such as examining problems critically [24]. Individuals with high levels of NFC are more motivated to look out for and analyze information in a deliberate and organized manner [25]. NFC has been associated with reduced bias in decision-making across a variety of domains [26]. When challenged with difficult activities, individuals with high levels of NFC demonstrate more optimistic mindsets and emotions [27]. Thus, the next hypothesis is presented as follows:

H3: *The Need for Cognition mediates the relationship between Empathy and Willingness to challenge*

Building on the research by Gurgun, et al. [28], we explore the perceived influence on individuals' relations as an important factor that determines their readiness to dispute misinformation. Individuals might hold off sharing disagreeing viewpoints or criticizing others owing to worries about hurting their connections [29]. They might perceive the interpersonal consequences of disputing misinformation, assuming that challenging misinformation will elicit negative reactions and damage their connections [30]. Based on that, we present the following hypothesis:

H4: *Relationship Cost mediates the relationship between Empathy and Willingness to challenge*

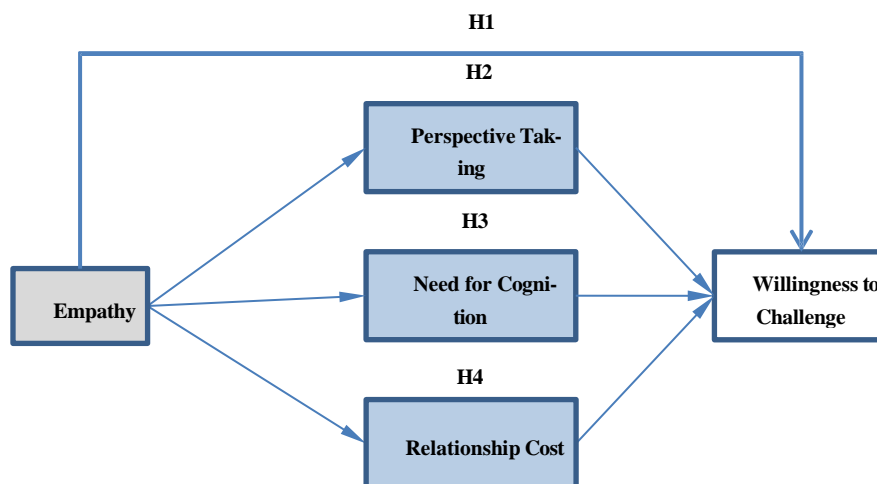


Fig. 1. The Initial Research Model

3. Study Design

3.1. Survey Development

To make sure that participants understood important concepts we gave descriptions for key terms like "misinformation" and "challenging". We deliberately provided the respondents with a question about challenging acquaintances. We clarified that acquaintances are contacts in the territory between strangers and intimates on Facebook, such as previous colleagues, neighbors, or anyone you know from a group on Facebook. This clarification was necessary because research reveals that individuals' behaviors differ when they deal with acquaintances compared to full foreigners. Given the possibility of influence on their social relationships, people may be more inclined to confront misinformation supplied by acquaintances.

The questionnaire measured participants' perceptions of how other people would react when being challenged, which we refer to as "Relationship Cost" throughout the paper. This part included measurements of the perceived relationship costs [31]. Relationship cost was rated on a 7-point Likert scale from Strongly Disagree to Strongly Agree. Sample items include "They would think that I am not empathetic", "They would think that I am aggressive", and "They would think that I am unfriendly". We are referring to the six items used for evaluating the relationship cost, denoted as RC1 through RC6.

Empathetic concerns and perspective-taking were measured using the scale by Davis [32]. Sample items of empathetic concerns include "I feel kind of protective toward them", "I sometimes don't feel very much pity for them", and "I often have tender, concerned feelings for people less fortunate than me". We are referring to the seven items used for evaluating the empathetic concerns, denoted as EMPC1 through EMPC7. Sample items of perspective-taking include "Before criticizing somebody, I try to imagine how I would feel if I were in their place", and "When I'm upset at someone, I usually try to "put myself in his shoes" for a while". We are referring to the seven items used for evaluating the perspective taking, denoted as PERST1 through PERST7. The need for cognition was measured using the scale by Thompson [33]. The scale contains six items such as "I would prefer simple to complex problems" and "Thinking is not my idea of fun". We refer to these items in this study by symbols that range from NFC1 to NFC6. Only one self-report item was used to assess the tendency of participants to challenge ("Think about a specific time when you saw misinformation on your Facebook feed, shared by an acquaintance in your Facebook network." "How likely were you to challenge the misinformation in a way that others could see?" [34]), using a 7-point scale from Extremely unlikely to Extremely likely.

3.2. Data Collection Procedure

The research received ethical approval from the university's research ethics committee. The survey was designed and conducted online using Qualtrics. Participants were informed regarding the research objectives and required to provide consent before proceeding. Data collection took place between May 31st and July 7th, 2022, through ProlificTM (www.prolific.co), a well-established online platform for recruiting participants for research studies.

3.3. Participants

From 323 responses, a total of 250 participants were selected for this study. In the size of the sample, we followed the 10 times rule of thumb by Barclay, et al. [35], which indicates that the sample size should be equal to the larger of 10 times the largest number of structural paths directed at a particular construct in the structural model. This is equivalent to saying that the minimum sample size should be 10 times the maximum number of arrowheads pointing at a latent variable anywhere in the PLS path model. We excluded participants who failed to answer two attention-check questions correctly, provided nonsensical responses to open-ended questions, completed the survey too quickly, or provided uniform responses to questions where such uniformity was implausible due to the contradictory nature of the items. They were selected based on specific criteria: being 18 years or older, actively using Facebook with their identity (not anonymously), and having encountered misinformation on the platform. £4 compensation was provided for their participation in the survey.

3.4. Pilot Study

A pilot test was conducted before starting the actual data collection. An initial questionnaire was prepared and circulated to students and their networks for feedback. 19 participants completed the pilot questionnaire. Several changes in terms of language were made to make the items clearer. Face validity was assessed by prompting participants to share their thoughts and provide feedback for further refinement. The questionnaire's clarity and effectiveness were further verified by having multiple participants review it and explain their understanding of the questions, ensuring that the questions accurately reflected our intended purposes.

4. Results

4.1. Demographic Results

Participants were asked to specify their gender, age, and degree of education (Table 1). A total of 250 participants completed the online survey, with the majority of participants being females, in the age interval of 25-34 years old, and having a university degree.

4.2. PLS-SEM analysis

Partial Least Square Structural Equation Modelling (PLS-SEM) is a method of statistical analysis employed to examine structural models and investigate complex interactions between many elements. PLS-SEM enables the evaluation of both measurement models (reflective and formative measurement) and structural models (path analysis and hypothesis testing). The variables and pathways of the research model were assessed using SmartPLS 4 to determine the validity and reliability of the model and the level of significance of the hypothesized pathways [36]. The results of the PLS algorithm and bootstrapping technique are reported in detail in the following subsections.

Table 1. Demographic Data

Factor	Item	Frequency	Percentage (%)
Gender	Female	143	57.2
	Male	104	41.6
	Others	3	1.2
Age	18-24 years old	44	17.8
	25-34 years old	92	37.2
	35-44 years old	66	26.7
	Over 45 years	45	18.2
Education	University	157	62.8
	College	57	22.8
	Secondary	36	14.4

4.2.1. Outer Model Assessment

Convergent validity (CV), Internal Consistency (IC), and Discriminant Validity (DV) are the three fundamental assessments that must be carried out in order to examine the study factors along with their linked indicators through SmartPLS 4 to make sure that the responses to the questionnaire have produced reliable and valid results.

Table 2 contains the findings of the CV analysis, in which we inspect the outer loading values and the AVE test. According to Hair et al. [37], the outer loading values refer to the level to which an indicator corresponds to other indicators in the same factor. The rule of thumb in this context is accepting outer loading values above 0.7 [38]. Outer loading values less than 0.4 need to be omitted, while the values that equal or above 0.4 but less than 0.7 should be inspected and considered for deletion if doing so will enhance the values of Composite Reliability or Average Variance Extracted (AVE) [38]. Still, obtaining values of outer loading that are less than 0.7 is common, particularly in social sciences research [37].

Based on the above, we deleted two indicators from Perspective Taking; PERST2 and PERST5. In terms of the Need for a Cognition factor, we deleted the NFC1 from the variable. Following that we examined the values of the AVE, and based on that we deleted EMPC3, EMPC4, and EMPC7 from the empathetic concern variable to improve the AVE value. Hence, we obtained values of AVE that met the threshold of 0.5 [38] for all research constructs. The second test is the IC, which is examined by values of Composite Reliability and Cronbach's alpha values, in which both tests met threshold values of 0.7 [36].

The degree of differentiation between the model's variables was assessed using a discriminant validity analysis. Heterotrait-Monotrait Ratio (HTMT) was used to assess the discriminant validity of the outer model (Table 3). Based on the HTMT values in the table being below 0.85 [39], there is evidence to support discriminant validity between the constructs, suggesting that they are distinct and measure different underlying constructs.

Table 2. Constructs' Reliability and Convergent Validity Test (N= 250)

Construct	Indicator	Outer Loadings	Cronbach's alpha	Composite Reliability	AVE
Empathy Concern (EMPC)	EMPC1	0.693	0.679	0.805	0.508
	EMPC2	0.651			
	EMPC5	0.748			
	EMPC6	0.755			
Need for Cognition (NFC)	NFC2	0.784	0.774	0.84	0.515
	NFC3	0.694			
	NFC4	0.652			
	NFC5	0.805			
Perspective Taking (PERST)	PERST1	0.778	0.807	0.866	0.565
	PERST3	0.771			
	PERST4	0.733			
	PERST6	0.767			
	PERST7	0.707			
Relationship Cost (RC)	RC1	0.803	0.926	0.942	0.73
	RC2	0.885			
	RC3	0.917			
	RC4	0.866			
	RC5	0.861			
	RC6	0.787			

Table 3. Heterotrait-Monotrait Ratio

	EMPC	NFC	PERST	RC	WTC
Empathy					
Need for Cognition	0.235				
Perspective Taking	0.605	0.29			
Relationship Cost	0.232	0.135	0.163		
Willingness to Challenge	0.176	0.176	0.227	0.226	

4.2.2. Inner Model Assessment

The first stage in the assessment of the inner mode is to evaluate the model against collinearity issues using values of the Variance Inflation Factor (VIF). Hair Jr, et al. [38] suggest that a research model with values of VIF less than 5 is free of any multicollinearity issue, which was supported in this study. Common method bias [40] was also assessed using the VIF measures within the inner model. Values below 3.33 are typically considered indicative of the absence of common method bias, a conclusion that was confirmed by the analysis results. To examine hypotheses and determine the significance of correlations between study variables, the bootstrapping technique was used [37]. To evaluate the significance of the paths, we used p values, which refer to the probability of erroneously rejecting a true null hypothesis [38]. A p-value below 0.05 is considered significant in most settings [38]. As shown in Table 4, the Willingness to Challenge is strongly impacted by three variables included in our model

(Perspective taking, Need for Cognition, and Relationship Cost). On the other hand, empathy influences the three factors (Perspective taking, Need for Cognition, and Relationship Cost). Table 5 presents the values of Q^2 and RMSE. The rule of thumb suggests that a Q^2 value greater than zero for a specific endogenous variable confirms the predictive relevance of the path model for that variable [38].

Table 4. Path Coefficient Analysis

Type of Effect	Hypothesis	Inner (VIF)	β	p-value
Direct Effect	Empathy -> Willingness to Challenge	1.301	0.025	0.639 ns
	Empathy -> Perspective Taking	1.000	0.461	0.000***
	Empathy -> Need for _Cognition	1.000	0.187	0.000***
	Empathy -> Relationship Cost	1.000	-0.182	0.000***
	Perspective Taking -> Willingness to Challenge	1.321	0.138	0.009**
	Need for _Cognition -> Willingness to Challenge	1.079	0.115	0.025**
	Relationship Cost -> Willingness to Challenge	1.040	-0.19	0.000***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, ns = not supported ($p > 0.05$)

Table 5. Prediction Summary

	Q^2 Predict	RMSE
Need for Cognition	0.027	0.992
Perspective Taking	0.201	0.898
Relationship Cost	0.028	0.989
Willingness to Challenge	0.016	0.995

4.2.3. Mediation Analysis

The mediation effect occurs when a mediator factor intervenes between two relevant factors. The analysis of the mediation effect follows a specific rule of thumb according to Hair, et al. [37]. The total indirect impact is a combination of the specific indirect impacts in the mediation study, whereas the total effect is the combination of the direct impact plus the total indirect impacts. The product of coefficients method is commonly used in PLS-SEM for estimating indirect impacts. To calculate the indirect impact, the route coefficients of the factors included in the mediating pathway are calculated.

To explain the concept of mediation, we consider M_i and M_j as mediators, the IV as the independent variable, and the DV as the dependent variable. For instance, the specific indirect effect reflects the potential of M_i to mediate the impact of IV on DV contingent on the presence of other mediators in the model [41], which is quantified as $p_1 \cdot p_2$, where p_1 and p_2 are the path coefficients from the IV to M_i and the M_i to the DV, respectively. Besides, p_3 represents the direct effect between the IV and the DV. Similarly, if p_4 and p_5 are the path coefficients from the IV to M_j and the M_j to the DV, respectively, the total indirect effect is the sum of the specific indirect effects (i.e., $p_1 \cdot p_2 + p_4 \cdot p_5$). The total effect of IV on DV is the sum of the direct effects and the total indirect effects (i.e., $p_3 + p_1 \cdot p_2 + p_4 \cdot p_5$) [38].

According to the results, the mediated impacts of perspective taking, need for cognition, and relationship cost are all substantial, while the direct influence of empathy

on the willingness to challenge is not. This means that the mediator factors fully explain the connection between the exogenous factor (empathy) and the endogenous factor (willingness to challenge). Full mediation refers to the case in which the direct impact from the IV to the DV is not supported but the mediated impact is, hence the relationship between the IV and the DV is entirely explained by the mediator variable [42].

The results of the analysis of the specific indirect effects (see Table 6) supported the positive influence of empathy on willingness to challenge through perspective-taking ($\beta = 0.064$, $p = 0.011$). The outcomes also supported the positive impact of empathy on willingness to challenge through the need for cognition ($\beta = 0.022$, $p = 0.048$). Besides, the results of the analysis supported the positive influence of empathy on willingness to challenge through relationship costs ($\beta = 0.035$, $p = 0.003$). The total effect (Table 7) of empathy on the willingness to challenge was significant ($\beta = 0.145$, $p = 0.002$).

Table 6. Specific Indirect Effects

Specific Indirect Effects	β	p-value	95% Confidence Interval	
			Lower	Upper
H2: Empathy -> Perspective Taking -> Willingness to Challenge	0.064	0.011*	0.014	0.114
H3: Empathy -> Need for Cognition -> Willingness to Challenge	0.022	0.048*	0.003	0.046
H4: Empathy -> Relationship Cost -> Willingness to Challenge	0.035	0.003**	0.016	0.061

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, ns = not supported ($p > 0.05$)

Table 7. Results of Total Effect and Direct Effect

Type of Effect	Hypothesis	β	p-value
Total Indirect Effect	Empathy -> Willingness to Challenge	0.12	0.000***
Direct Effect	Empathy -> Willingness to Challenge	0.025	0.639 ns
Total Effect	Empathy -> Willingness to Challenge	0.145	0.002**

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, ns = not supported ($p > 0.05$)

5. Discussion

The study explored the mediation influences of three factors; need for cognition, perspective taking, and relationship costs on the relationship between empathy and willingness to challenge. In the following, we will discuss the results in detail.

First, the study rejected the direct impact of empathy on the willingness to challenge misinformation (H1). This result contradicts the outcomes presented by several studies that have demonstrated a strong link between empathy and pro-social behavior and attitudes [15, 43-45]. However, the result runs with the outcomes by Kim, et al. [46], in

which affective empathy did not impact pro-social behavior. The authors justified this outcome by suggesting that the presence of both positive and negative emotions within affective empathy might have led to an insignificant impact on prosocial behavior.

Second, the study emphasizes the significance of perspective-taking as an essential factor through which empathy promotes people's willingness to reject and confront misinformation (H2). Embracing the viewpoint of others involves considering the impact of an event on them, which allows perspective-takers to establish a deeper connection with others [47]. This explains the robust connection between perspective-taking and pro-social behavior [48]. Referring to Ku, et al. [49], perspective-taking helps individuals deal with scenarios characterized by a mix of competing interests or motives. Referring to the study by Galinsky, et al. [50], individuals with high perspective-taking skills have an enhanced capacity to identify hidden agreements and secure valuable resources during negotiations. This effect can be linked to the idea that perspective-taking negotiators can strategically build arguments that allow them to claim more value for themselves by attempting to grasp their opponent's point of view [50]. By diving into their opponent's perspective, they get insight into what is important to the other party and can modify their negotiating strategy to grasp a larger portion of the resources. In the same study [50], it was evident that empathy had limited effectiveness in helping individuals identify hidden agreements and optimize their individual gains. In another study by Gilin, et al. [51], in the context of complex competitive situations, the authors indicated that individuals with high levels of perspective-taking excel through cognitive analysis of interpersonal interactions. This enables them to develop effective strategies for both cooperation and competition and to choose when to implement them [51]. In another study by Wang, et al. [52], the findings indicated that perspective-taking reduced stereotyping for both positively and negatively stereotyped groups.

Third, the results supported the full mediation influence of the individual's need for cognition on the relationship between empathy and willingness to challenge (H3). Challenging behavior isn't just defined by one's motives or desires; it is also influenced by the belief that one possesses the necessary skills to engage in such behavior [6]. This belief is particularly prevalent among individuals with a high need for cognition. According to Day, et al. [53] individuals with a strong desire for cognition tend to actively seek and analyze information and engage in complex learning practices. They focus on the process rather than on the outcome [54], including reasoning methods and steps involved in a task or decision-making process [53]. Nussbaum [55] further supports this argument and indicates that individuals with a high need for cognition place greater emphasis on the quality of reasoning when evaluating messages, as opposed to peripheral indicators such as message length or the opinions of others. As a result, these individuals spend more time and effort on intellectual activities, which helps them acquire advanced argumentation skills. Previous research has also shown that individuals with a high need for cognition analyze media content more attentively and critically [56]. They also employ rational and analytical thinking skills when consuming media content [57]. Our result also endorses the outcomes by Su, et al. [58], which indicates that the need for cognition serves as a significant factor in mitigating the spread of conspiracy beliefs during the COVID-19 pandemic.

Finally, the study endorsed the full mediation influence of individuals' perceptions of relationship costs on the path between empathy and willingness to challenge (H4).

This result runs with the outcome by Gurgun, et al. [6], which identified social concern as one of the barriers to challenging misinformation on social media. Individuals use social media to sustain positive connections [59]. Hence, when they are worried about the negative effects of correcting misinformation, they would rather avoid challenging others [6]. We further refer to the spiral of silence theory to explain why and how people choose to speak up or keep silent [60]. The basic premise of the theory suggests that individuals tend to retain their opinions and become more silent, as they perceive that societal opinion differs from their opinions. This theory proposes that fear of isolation is the main driver of this tendency. The theory also specifies the one's reference group as a small circle of people that includes friends and relatives. The perceptions of this reference group have a significant impact on an individual's tendency to express their thoughts [61]. Oshagan [61] suggests that reference groups have a more significant impact on individuals' willingness to express themselves compared to the influence of societal opinion.

5.1. Research Implications

The results of this study can guide platform design decisions targeted at reducing the spread of misinformation on social media. Platforms can, for instance, include elements that promote perspective-taking before users share information. Policymakers can integrate effective communication strategies, tailored to various cognitive and emotional abilities, to accommodate diverse viewpoints in the design of these platforms. Consequently, there is an opportunity to create educational interventions and training programs focused on enhancing perspective-taking skills, promoting critical thinking, and fostering active participation in the fight against internet misinformation.

Challenging misinformation is an individual decision-making process that is impacted by several drivers and barriers. People's perceptions of others' opinions affect their decisions to speak up or stay silent within or outside these communities [62]. Effective decision-making necessitates individuals to evaluate various choices and anticipate their potential consequences, which demands structured thinking and resistance to persuasion [63]. Effective decision-making involves both cognitive and emotional elements [57], which requires a thorough exploration of the interplay among different possible outcomes [64]. Therefore, when designing social media platforms, it is crucial to integrate features that support these aspects of decision-making, creating an environment where challenging misinformation is not only possible but also a facilitated and encouraged activity.

5.2. Limitations

This research holds a few limitations that we will highlight briefly. First, the sample in this study consists of 250 respondents from the UK. This demographic might not precisely mirror the attitudes and behaviors found within diverse populations and cultures. To enhance the robustness of our findings, future investigations could delve into the same variables using more representative samples. This would help us explore the potential variations in perceptions and attitudes toward challenging misinformation across various cultures. Second, it is worth noting to emphasize that the variables examined within our study represent only a fraction of the exhaustive array of potentially influential variables. While our study sheds light on these important variables, there is a

need for further comprehensive research to obtain a more nuanced understanding of the complex interplay between attitudes, behaviors, and cultural factors in challenging misinformation. The study employed a survey-based data collection approach, a method that comes with inherent limitations. Referring to Grimm [65], in survey-based studies people might tend to respond according to societal expectations instead of expressing their true feelings, as described by social desirability bias. The bias is more pronounced when it comes to socially sensitive issues, including politics, religion, environment, and personal factors.

6. Conclusion and Future Work

Preventing the spread of misinformation on social media is essential, yet numerous factors often deter people from actively challenging it. This study underscores the importance of expanding awareness and fostering a more cohesive social media environment. By doing so, it aims to create a setting where individuals feel empowered and unencumbered to tackle misinformation.

Future research can incorporate the level of media literacy and its impact on the individual's willingness to challenge misinformation. Understanding how media literacy affects user engagement with misinformation on social media could help in addressing it. The study focused on the willingness to challenge misinformation with a concentration on the individual's oriented variables, future studies can incorporate the impact of organizational-based factors. Such as the study by Bautista, et al. [66], which examined the impact of organizational support on the intention to correct misinformation in the medical field. The importance of diving into the function of organizational-based issues arises in this context, as it provides an additional level of depth to our understanding of how corrective measures against misinformation are implemented within a larger framework. One of the major threats associated with misinformation spreading is the risk of it becoming an established norm among communities. Individuals who embrace false news and receive backing from other individuals who match their views via social media will be more encouraged to spread misinformation. This is because they sense reinforcement and affirmation from others. More research should be conducted to determine why helpful interaction actually hinders or disempowers one's inclination to speak up in a social media situation.

Data availability

The raw data required to reproduce the above findings are available at: https://osf.io/uny7g/?view_only=365026b20d134902b6e23b4c98b16007

Acknowledgment

This publication was made possible by the NPRP 14 Cluster Grant Number NPRP14C-37878-SP-470 from the Qatar National Research Fund (a member of Qatar Foundation). The results herein reflect the work and are the sole responsibility of the authors.

References

- [1] Z. Barua, S. Barua, S. Aktar, N. Kabir, and M. Li, "Effects of misinformation on COVID-19 individual responses and recommendations for resilience of disastrous consequences of misinformation," *Progress in Disaster Science*, vol. 8, p. 100119, 2020.
- [2] N. Belloir, W. Ouerdane, O. Pastor, É. Frugier, and L.-A. de Barmon, "A conceptual characterization of fake news: a positioning paper," in *International Conference on Research Challenges in Information Science*, 2022: Springer, pp. 662-669.
- [3] L. Wu, F. Morstatter, K. M. Carley, and H. Liu, "Misinformation in Social Media: Definition, Manipulation, and Detection," *SIGKDD Explor. Newsl.*, vol. 21, no. 2, pp. 80–90, 2019, doi: 10.1145/3373464.3373475.
- [4] N. A. Karlova and K. E. Fisher, "A social diffusion model of misinformation and disinformation for understanding human information behaviour," 2013.
- [5] B. Nyhan and J. Reifler, "When Corrections Fail: The Persistence of Political Misperceptions," *Political Behavior*, vol. 32, no. 2, pp. 303-330, 2010/06/01 2010, doi: 10.1007/s11109-010-9112-2.
- [6] S. Gurgun, D. Cemiloglu, E. A. Close, K. Phalp, P. Nakov, and R. Ali, "Why do we not stand up to misinformation? Factors influencing the likelihood of challenging misinformation on social media and the role of demographics," *Technology in Society*, vol. 76, p. 102444, 2024/03/01/ 2024, doi: <https://doi.org/10.1016/j.techsoc.2023.102444>.
- [7] B. C. Stahl, "On the difference or equality of information, misinformation, and disinformation: A critical research perspective," *Informing Science*, vol. 9, p. 83, 2006.
- [8] L. Bode and E. K. Vraga, "See something, say something: Correction of global health misinformation on social media," *Health communication*, vol. 33, no. 9, pp. 1131-1140, 2018.
- [9] S. Chen, L. Xiao, and A. Kumar, "Spread of misinformation on social media: What contributes to it and how to combat it," *Computers in Human Behavior*, vol. 141, p. 107643, 2023/04/01/ 2023, doi: <https://doi.org/10.1016/j.chb.2022.107643>.
- [10] N. Grubic *et al.*, "Mediators of the association between socioeconomic status and survival after out-of-hospital cardiac arrest: A systematic review," *Canadian Journal of Cardiology*, 2024/01/10/ 2024, doi: <https://doi.org/10.1016/j.cjca.2024.01.002>.
- [11] J. Decety and K. J. Michalska, "A developmental neuroscience perspective on empathy," in *Neural circuit and cognitive development*: Elsevier, 2020, pp. 485-503.
- [12] X. Li *et al.*, "Indirect aggression and parental attachment in early adolescence: Examining the role of perspective taking and empathetic concern," *Personality and Individual Differences*, vol. 86, pp. 499-503, 2015.
- [13] M. H. Davis, "23 Empathy, Compassion, and Social Relationships," *The Oxford handbook of compassion science*, vol. 299, 2017.

- [14] A. C. Hafenbrack, L. D. Cameron, G. M. Spreitzer, C. Zhang, L. J. Noval, and S. Shaffakat, "Helping people by being in the present: Mindfulness increases prosocial behavior," *Organizational Behavior and Human Decision Processes*, vol. 159, pp. 21-38, 2020.
- [15] W. Fu, C. Wang, H. Chai, and R. Xue, "Examining the relationship of empathy, social support, and prosocial behavior of adolescents in China: A structural equation modeling approach," *Humanities and Social Sciences Communications*, vol. 9, no. 1, pp. 1-8, 2022.
- [16] J. Decety, "Dissecting the neural mechanisms mediating empathy," *Emotion review*, vol. 3, no. 1, pp. 92-108, 2011.
- [17] A. D. Galinsky, G. Ku, and C. S. Wang, "Perspective-taking and self-other overlap: Fostering social bonds and facilitating social coordination," *Group processes & intergroup relations*, vol. 8, no. 2, pp. 109-124, 2005.
- [18] G. G. Cole and A. C. Millett, "The closing of the theory of mind: A critique of perspective-taking," *Psychonomic bulletin & review*, vol. 26, pp. 1787-1802, 2019.
- [19] C. D. Batson, S. Early, and G. Salvarani, "Perspective Taking: Imagining How Another Feels Versus Imaging How You Would Feel," *Personality and Social Psychology Bulletin*, vol. 23, no. 7, pp. 751-758, 1997, doi: 10.1177/0146167297237008.
- [20] L. Myyry, S. Juujärvi, and K. Pessa, "Empathy, perspective taking and personal values as predictors of moral schemas," *Journal of Moral Education - J MORAL EDUC*, vol. 39, pp. 213-233, 06/01 2010, doi: 10.1080/03057241003754955.
- [21] J. Decety, "Perspective taking as the royal avenue to empathy," *Other minds: How humans bridge the divide between self and others*, vol. 143, p. 157, 2005.
- [22] C. K. Tamnes *et al.*, "Social perspective taking is associated with self-reported prosocial behavior and regional cortical thickness across adolescence," *Developmental psychology*, vol. 54, no. 9, p. 1745, 2018.
- [23] J. Decety and J. M. Cowell, "The complex relation between morality and empathy," *Trends in cognitive sciences*, vol. 18, no. 7, pp. 337-339, 2014.
- [24] Y. Zhang, Y. Tian, L. Yao, C. Duan, X. Sun, and G. Niu, "Teaching presence promotes learner affective engagement: The roles of cognitive load and need for cognition," *Teaching and Teacher Education*, vol. 129, p. 104167, 2023.
- [25] J. Lavrijsen, F. Preckel, and K. Verschueren, "Seeking, mastering, and enjoying cognitive effort: Scrutinizing the role of need for cognition in academic achievement," *Learning and Individual Differences*, vol. 107, p. 102363, 2023/10/01/ 2023, doi: <https://doi.org/10.1016/j.lindif.2023.102363>.
- [26] K. S. Double and M. Cavanagh, "Need for cognition predicts the accuracy of affective forecasts," *Personality and Individual Differences*, vol. 216, p. 112399, 2024/01/01/ 2024, doi: <https://doi.org/10.1016/j.paid.2023.112399>.
- [27] J. T. Cacioppo and R. E. Petty, "The need for cognition," *Journal of personality and social psychology*, vol. 42, no. 1, p. 116, 1982.

- [28] S. Gurgun, E. Arden-Close, K. Phalp, and R. Ali, "Online silence: why do people not challenge others when posting misinformation?," *Internet Research*, no. ahead-of-print, 2022.
- [29] R. B. Cialdini and M. R. Trost, "Social influence: Social norms, conformity and compliance," 1998.
- [30] S. Gurgun, D. Cemiloglu, E. Arden-Close, K. Phalp, P. Nakov, and R. Ali, "Challenging Misinformation on Social Media: Users' Perceptions and Misperceptions and their Impact on the Willingness to Challenge," *Available at SSRN 4440292*, 2023.
- [31] Z.-X. Zhang, Y. Zhang, and M. Wang, *Harmony, illusory relationship costs, and conflict resolution in Chinese contexts*. Cambridge University Press, 2011.
- [32] M. H. Davis, "A multidimensional approach to individual differences in empathy," 1980.
- [33] M. E. Thompson, "The impact of need for cognition on thinking about free speech issues," *Journalism & Mass Communication Quarterly*, vol. 72, no. 4, pp. 934-947, 1995.
- [34] E. L. Cohen *et al.*, "To correct or not to correct? Social identity threats increase willingness to denounce fake news through presumed media influence and hostile media perceptions," *Communication Research Reports*, vol. 37, no. 5, pp. 263-275, 2020.
- [35] D. Barclay, C. Higgins, and R. Thompson, *The partial least squares (PLS) approach to casual modeling: personal computer adoption and use as an Illustration*. 1995.
- [36] J. F. Hair, C. M. Ringle, and M. Sarstedt, "PLS-SEM: Indeed a Silver Bullet," *Journal of Marketing Theory and Practice*, vol. 19, no. 2, pp. 139-152, 2011, doi: 10.2753/MTP1069-6679190202.
- [37] J. Hair, G. T. M. Hult, C. M. Ringle, and M. Sarstedt, *A Primer on Partial Least Squares Structural Equation Modeling*. Thousand Oaks, United States: SAGE Publications Inc, 2013, pp. 184-185.
- [38] J. Hair Jr, J. F. Hair Jr, G. T. M. Hult, C. M. Ringle, and M. Sarstedt, *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications, 2021.
- [39] L. A. Clark and D. Watson, "Constructing validity: Basic issues in objective scale development," 2016.
- [40] N. Kock, "Common method bias in PLS-SEM: A full collinearity assessment approach," *International Journal of e-Collaboration (ijec)*, vol. 11, no. 4, pp. 1-10, 2015.
- [41] Y. Xie, M. Siponen, G. Laatikainen, G. D. Moody, and X. Zheng, "Testing the dominant mediator in EPPM: An empirical study on household anti-malware software users," *Computers & Security*, vol. 140, p. 103776, 2024/05/01/2024, doi: <https://doi.org/10.1016/j.cose.2024.103776>.
- [42] C. Nitzl, J. Roldán, and G. Cepeda-Carrion, "Mediation Analysis in Partial Least Squares Path Modeling: Helping Researchers Discuss More

- Sophisticated Models," *Industrial Management & Data Systems*, vol. 116, pp. 1849-1864, 10/01 2016, doi: 10.1108/IMDS-07-2015-0302.
- [43] J. Van der Graaff, G. Carlo, E. Crocetti, H. M. Koot, and S. Branje, "Prosocial Behavior in Adolescence: Gender Differences in Development and Links with Empathy," *Journal of Youth and Adolescence*, vol. 47, no. 5, pp. 1086-1099, 2018/05/01 2018, doi: 10.1007/s10964-017-0786-1.
- [44] V. K. Bohns and F. J. Flynn, "Empathy and expectations of others' willingness to help," *Personality and Individual Differences*, vol. 168, p. 110368, 2021.
- [45] B. N. Persson and P. J. Kajonius, "Empathy and universal values explicated by the empathy-altruism hypothesis," *The Journal of Social Psychology*, vol. 156, no. 6, pp. 610-619, 2016/11/01 2016, doi: 10.1080/00224545.2016.1152212.
- [46] E. K. Kim, S. You, and J. Knox, "The Mediating Effect of Empathy on the Relation Between Child Self-Expressiveness in Family and Prosocial Behaviors," *Journal of Child and Family Studies*, vol. 29, no. 6, pp. 1572-1581, 2020/06/01 2020, doi: 10.1007/s10826-019-01676-2.
- [47] C. Sassenrath, J. D. Vorauer, and S. D. Hodges, "The link between perspective-taking and prosociality — Not as universal as you might think," *Current Opinion in Psychology*, vol. 44, pp. 94-99, 2022/04/01/ 2022, doi: <https://doi.org/10.1016/j.copsyc.2021.08.036>.
- [48] M. Shih, E. Wang, A. Trahan Bucher, and R. Stotzer, "Perspective taking: Reducing prejudice towards general outgroups and specific individuals," *Group Processes & Intergroup Relations*, vol. 12, no. 5, pp. 565-577, 2009.
- [49] G. Ku, C. S. Wang, and A. D. Galinsky, "The promise and perversity of perspective-taking in organizations," *Research in Organizational Behavior*, vol. 35, pp. 79-102, 2015/01/01/ 2015, doi: <https://doi.org/10.1016/j.riob.2015.07.003>.
- [50] A. D. Galinsky, W. W. Maddux, D. Gilin, and J. B. White, "Why it pays to get inside the head of your opponent: The differential effects of perspective taking and empathy in negotiations," *Psychological science*, vol. 19, no. 4, pp. 378-384, 2008.
- [51] D. Gilin, W. W. Maddux, J. Carpenter, and A. D. Galinsky, "When to Use Your Head and When to Use Your Heart: The Differential Value of Perspective-Taking Versus Empathy in Competitive Interactions," *Personality and Social Psychology Bulletin*, vol. 39, no. 1, pp. 3-16, 2013, doi: 10.1177/0146167212465320.
- [52] C. S. Wang, G. Ku, K. Tai, and A. D. Galinsky, "Stupid doctors and smart construction workers: Perspective-taking reduces stereotyping of both negative and positive targets," *Social Psychological and Personality Science*, vol. 5, no. 4, pp. 430-436, 2014.
- [53] E. A. Day, J. Espejo, V. Kowollik, P. R. Boatman, and L. E. McEntire, "Modeling the links between need for cognition and the acquisition of a complex skill," *Personality and Individual Differences*, vol. 42, no. 2, pp. 201-212, 2007.

- [54] T. P. Novak and D. L. Hoffman, "The fit of thinking style and situation: New measures of situation-specific experiential and rational cognition," *Journal of Consumer Research*, vol. 36, no. 1, pp. 56-72, 2009.
- [55] E. M. Nussbaum, "The effect of goal instructions and need for cognition on interactive argumentation," *Contemporary Educational Psychology*, vol. 30, no. 3, pp. 286-313, 2005/07/01/ 2005, doi: <https://doi.org/10.1016/j.cedpsych.2004.11.002>.
- [56] X. Xiao, Y. Su, and D. K. L. Lee, "Who consumes new media content more wisely? Examining personality factors, SNS use, and new media literacy in the era of misinformation," *Social media+ society*, vol. 7, no. 1, p. 2056305121990635, 2021.
- [57] E. W. Austin, A. Muldrow, and B. W. Austin, "Examining how media literacy and personality factors predict skepticism toward alcohol advertising," *Journal of health communication*, vol. 21, no. 5, pp. 600-609, 2016.
- [58] Y. Su, D. K. L. Lee, X. Xiao, W. Li, and W. Shu, "Who endorses conspiracy theories? A moderated mediation model of Chinese and international social media use, media skepticism, need for cognition, and COVID-19 conspiracy theory endorsement in China," *Computers in Human Behavior*, vol. 120, p. 106760, 2021/07/01/ 2021, doi: <https://doi.org/10.1016/j.chb.2021.106760>.
- [59] P. B. Brandtzæg and J. Heim, "Why people use social networking sites," in *Online Communities and Social Computing: Third International Conference, OCSC 2009, Held as Part of HCI International 2009, San Diego, CA, USA, July 19-24, 2009. Proceedings 3*, 2009: Springer, pp. 143-152.
- [60] E. Noelle-Neumann, "The Spiral of Silence a Theory of Public Opinion," *Journal of Communication*, vol. 24, no. 2, pp. 43-51, 2006, doi: [10.1111/j.1460-2466.1974.tb00367.x](https://doi.org/10.1111/j.1460-2466.1974.tb00367.x).
- [61] H. Oshagan, "Reference group influence on opinion expression," *International journal of public opinion research*, vol. 8, no. 4, pp. 335-354, 1996.
- [62] J. W. Chun and M. J. Lee, "Understanding empowerment process of willingness to speak out on social media: Amplifying effect of supportive communication," *Telematics and Informatics*, vol. 66, p. 101735, 2022/01/01/ 2022, doi: <https://doi.org/10.1016/j.tele.2021.101735>.
- [63] M. Buijzen, E. A. Van Reijmersdal, and L. H. Owen, "Introducing the PCMC model: An investigative framework for young people's processing of commercialized media content," *Communication Theory*, vol. 20, no. 4, pp. 427-450, 2010.
- [64] J. Yiend, "The effects of emotion on attention: A review of attentional processing of emotional information," *Cognition and emotion*, vol. 24, no. 1, pp. 3-47, 2010.
- [65] P. Grimm, "Social desirability bias," *Wiley international encyclopedia of marketing*, 2010.
- [66] J. R. Bautista, Y. Zhang, and J. Gwizdka, "Predicting healthcare professionals' intention to correct health misinformation on social media," *Telematics and Informatics*, vol. 73, p. 101864, 2022.