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# JSOMER

The logo for JSOMER features the letters 'JSOMER' in a bold, white, sans-serif font. The 'J' is a simple outline, while the 'S', 'O', and 'M' are filled with a complex pattern of overlapping circles and lines in various shades of blue and green, creating a sense of depth and connectivity. The 'E' and 'R' are solid white. The background of the cover is a dark blue with a pattern of concentric circles and dots in lighter shades of blue and green, suggesting a network or data flow.

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## Aim and Scope

Journal of Social Media Research (JSOMER) is a multidisciplinary, blind peer-reviewed, open access, free of charge, international scientific academic journal published four a year (March, June, September, December) focusing on the social, cultural, educational, psychological, economic, technological, and sociological dimensions of social media. JSOMER is an interdisciplinary journal with a broad scope that *includes social sciences, humanities, arts, health, medicine, psychiatry, psychology, computational social sciences, artificial intelligence, and natural sciences, focusing on, or related to social media*. We are pleased to publish current and innovative research articles, reviews and argumentative essays focusing on social media. Articles published in JSOMER are expected to raise issues related to social media in various fields, open discussions about these issues, and propose different methods to address these issues or solve related problems. It is also hoped that the papers published in JSOMER will provide a basis for current debates on various areas of social media and guide innovative research and practice. JSOMER welcomes a variety of theoretical paradigms and methodologies and considers this as a scientific enrichment.

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## RESEARCH ARTICLE

## OPEN ACCESS

# Development and psychometric evaluation of a Turkish adaptation of the Social Media Flow Scale

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## Abstract

The present study adapted the Social Media Flow Scale (SMFS), developed by Brailovskaia et al. (2020), into Turkish and evaluated its psychometric properties. Data from 732 social media users ( $N = 732$ ; 65.4% female;  $M_{age} = 31.19$  years,  $SD_{age} = 11.13$ ) were collected by an online survey. A standard procedure, including forward and back translation, was used to ensure the linguistic validity of the Turkish SMFS. Confirmatory factor analysis supported the original five-factor structure, comprising focused attention, enjoyment, curiosity, telepresence, and time distortion. Fit indices revealed a good fit of the model (comparative fit index = .975, Tucker-Lewis index = .960, root mean square error of approximation = .066, and standardized root mean square residual =

- The Social Media Flow Scale (SMFS) was adapted into Turkish using confirmatory factor analysis.
- The scale confirmed a five-factor structure including focused attention, enjoyment, curiosity, telepresence, and time distortion.
- Flow dimensions showed strong concurrent validity with social media addiction and problematic smartphone use.
- The Turkish SMFS is a reliable tool for assessing multidimensional flow experiences and digital well-being.

.033). All subscales demonstrated acceptable to excellent internal consistency ( $\alpha = 0.789-0.888$ ;  $\omega = 0.791-0.942$ ). Convergent and discriminant validity of the SMFS were supported by average variance extraction, composite reliability, and heterotrait-monotrait ratio of correlations. Analyses of concurrent validity showed that total scores on the SMFS were significantly positively related to social media continuance, social media-related fear of missing out, social media addiction, and problematic smartphone use ( $r = .515$  to  $.689$ ). The findings suggest that flow in social media use acts as a double-edged sword by both maintaining engagement and being associated with problematic use. In sum, the results indicate that the Turkish SMFS is a reliable and valid instrument for assessing multidimensional flow experiences in social media contexts and can be utilized in research on digital well-being and addictive behaviors.

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## 1. Introduction

The technological revolution, particularly the widespread adoption of social media worldwide, has fundamentally changed how humans interact, consume information, and conduct their daily lives. According to the Digital 2026 report, the number of internet users has surpassed 6 billion (Kemp, 2026). Central to this digital world are social media platforms, which are utilized by a vast majority of the global population (Kemp, 2026). These figures demonstrate a new socio-technical reality that may profoundly affect individuals' psychological states, behavioral patterns, and overall well-being. The time spent on social media platforms underscores the importance of understanding the quality of experiences in digital spaces and the psychological processes underlying their use, both for academic research and public health (Singh, 2026).

One key psychological factor driving social media platforms' ability to generate high engagement in an optimal mental state is the experience of 'flow' (Brailovskaia et al., 2020). Flow theory, initially defined by Csikszentmihalyi (1990), describes an inherently ideal rewarding experience. In this ideal state, an individual becomes fully absorbed in an activity, loses awareness of time, experiences a sense of merging between action and consciousness, and derives deep enjoyment from the activity itself. Although initially developed for offline activities such as art, sports, and creative pursuits, this concept was successfully adapted to digital environments by Hoffman and Novak (1996) and has since become a key part of understanding social media use (Brailovskaia et al., 2020; Hoffman & Novak, 1996). However, the flow experience on social media is often described as a 'double-edged sword'; while it enhances positive experiences and engagement, it may also lead to adverse outcomes, such as problematic use or addiction (Brailovskaia et al., 2020; Zhao & Zhou, 2021). On the one hand, flow increases engagement, satisfaction, and platform loyalty (Kim et al., 2020; Pelet et al., 2017; Zhou et al., 2010), and can even promote commercial behaviors such as purchase intention (Hyun et al., 2022; Santamaría et al., 2024), producing desirable outcomes for such platforms. On the other hand, when combined with specific psychological predispositions and motivations, such as escapism from negative emotions, social media flow may lead to compulsive and/or addictive use (Brailovskaia et al., 2020; Miranda et al., 2023; Zhao & Zhou, 2021), and academic procrastination (Argiropoulou & Vlachopanou, 2021), posing serious psychosocial risks.

Such duality underscores the importance of empirically examining flow experiences. Given the widespread use of social media in Türkiye (Kemp, 2026) and the potential impact of flow experience, the lack of a culturally adapted, psychometrically validated measurement instrument available to Turkish researchers and clinicians may substantially limit research on the impact of social media flow. Therefore, the present study addressed this gap by adapting the Social Media Flow Scale (SMFS; Brailovskaia et al., 2020) – a widely used, robustly psychometrically validated measure of social media flow – into Turkish. In the following sections, the theoretical foundations and digital evolution of flow theory are discussed, followed by a detailed analysis of its dual outcomes within the context of social media. Finally, the rationale, purpose, and importance of the present study are outlined, emphasizing the current situation in Türkiye and the need for a valid psychometric assessment tool.

### 1.1. Flow: The Psychology of Optimal Experience

The concept of flow was developed through Csikszentmihalyi's (1990) research on human happiness, creativity, and life satisfaction. This research demonstrated that the moments when individuals feel most energetic, creative, and in sync with life reflect a unique state of consciousness known as 'flow'. Flow is an intense concentration on an activity that makes other elements of the external world less important, and the individual exists only in that moment (Csikszentmihalyi, 1990). This experience is characterized by the individual acting solely for the pleasure of the act, without expecting an external reward. In this respect, flow is defined as an "autotelic" experience, meaning the activity is both the goal and the reward in itself (Brailovskaia et al., 2018; Pelet et al., 2017). This theoretical framework explains that flow is not merely a transient state of pleasure but also a powerful source of intrinsic motivation, evoking a deep sense of meaning and engagement among individuals. According to Csikszentmihalyi (1990), achieving this universal psychological state is not accidental. It becomes possible when specific preconditions converge. In the literature, these conditions are addressed under three main headings: challenge-skill balance, clear goals, and immediate feedback (Novak et al., 2000; Pelet et al., 2017; Roberts & David, 2023).

First, a delicate balance must be established between the difficulty of the task individuals face and the skills they possess to perform it. If the task exceeds the individuals' skills, anxiety arises; if their skills far exceed what the task requires, boredom occurs. Flow occurs within an "optimal" channel between these two extremes, where individuals' skills are challenged yet remain attainable (Brailovskaia et al., 2018; Brailovskaia et al., 2020; Pelet et al., 2017).

Second, the activity in which the individual experiences flow must have clear and understandable goals. This clarity allows the person to direct mental energy toward action rather than struggling with uncertainty (Pelet et al., 2017; Roberts & David, 2023). Ultimately, receiving immediate, clear feedback on the outcomes of actions enables individuals to continuously adjust their performance and feel they are making progress toward their goals. This feedback loop keeps the individual's attention focused on the task and is crucial for maintaining the continuity of the flow state (Novak et al., 2000; Pelet et al., 2017).

When these preconditions are satisfied, individuals experience a deep and comprehensive subjective state that characterizes the flow experience (Csikszentmihalyi, 1990; Hyun et al., 2022). This theoretical model provides a solid foundation for understanding how social media platforms engage individuals (Kaur et al., 2016; Mauri et al., 2011; Zhou et al., 2010). Platforms artificially mimic the essential preconditions of flow by delivering content customized to each individual's interests and skill level through algorithms (challenge-skill balance) (Yang et al., 2023). They also maintain engagement by offering ongoing, achievable goals (for example, watching the following video or viewing the next post) via the infinite scroll feature (clear goals) (Miranda et al., 2023) and by providing real-time social cues such as likes, comments, and shares (immediate feedback) (Yao et al., 2023). Consequently, an individual's attention becomes highly focused on the activity, leading them to ignore distractions (Csikszentmihalyi, 1990; Lin et al., 2020). This intense focus and enjoyment may lead individuals to lose track of time (time distortion) (Kwak et al., 2014; Pelet et al., 2017; Roberts & David, 2023). Through this experience, individuals see the time they spend on the platform as an inherently satisfying and meaningful engagement (intrinsic enjoyment) (Pelet et al., 2017), which directly influences loyalty and their intention to continue (Chang & Zhu, 2012; Hyun et al., 2022; Yang et al., 2023). This phenomenon forms the psychological foundation for the addictive potential of flow, which is discussed in subsequent sections.

### 1.2. The Evolution of Flow into Digital Environments: From Hypermedia to Social Media

Flow theory was initially developed to describe offline activities that require both physical and mental skills, such as sports, art, and games. However, the power and universality of the concept made its adaptation to new environments inevitable as the digital age emerged. The most important milestone in this theoretical shift was reached through the work of Hoffman and Novak (1996). These studies positioned the idea of flow as a key theoretical framework for understanding human behavior in online environments, which were among the new communication technologies of the era (Hyun et al., 2022; Kaur et al., 2016). Hoffman and Novak (1996) argued that, unlike the one-way, passive one-to-many communication model of traditional media, such as television and radio, the internet offers a many-to-many interactive structure (Hoffman & Novak, 1996; Kaur et al., 2016). In this new model, an individual is no longer a passive recipient but an active participant who interacts with content and other individuals, even creating their own content. Therefore, the focus shifts to the experience between the individual and the "mediated environment", rather than the relationship between the individual and the broadcaster (Hoffman & Novak, 1996).

Hoffman and Novak (1996) proposed that flow theory offers an ideal framework for capturing the essence of this interactive experience and developed a definition of flow specific to the digital context. According to them, digital flow is “a state that occurs during navigation on the network; which is characterized by (1) a seamless sequence of responses facilitated by machine interaction, (2) intrinsically enjoyable, (3) accompanied by a loss of self-consciousness, and (4) self-reinforcing” (p. 57). This theoretical adaptation process brought about a reinterpretation of Csikszentmihalyi’s (1990) flow theory in the digital context. While some concepts from the original theory gained new layers of meaning specific to digital environments, the theoretical framework also added new components related to the nature of the digital experience. In this context, two concepts in particular play crucial roles in understanding the digital flow experience: interactivity and telepresence.

Interactivity describes an individual’s ability to engage in two-way, real-time communication with a digital system. This feature is closely linked to the capacity of digital interfaces to deliver instant feedback to an individual’s actions. Such a dynamic setup enhances the individual’s sense of control, facilitates achieving a flow state, and deepens the subjective experience of the digital environment (Brailovskaia et al., 2020; Kaur et al., 2016).

Telepresence is the most distinctive and defining part of the digital flow experience. This concept describes a perceptual illusion in which an individual feels mentally present in a virtual environment created by media, even though they are not physically present (Pelet et al., 2017; Brailovskaia et al., 2020). In this state, individuals become so absorbed in the digital world that they become mentally detached from the physical environment, and the virtual experience feels more dominant and convincing than the real one (Santamaría et al., 2024). This deep immersion means that individuals’ attention is entirely focused on the digital activity and greatly intensifies the flow experience (Brailovskaia et al., 2020).

The concept of telepresence can be viewed as a modern adaptation of Csikszentmihalyi’s (1990) original flow dimensions, which include ‘intense focus on the task’ and ‘loss of self-consciousness’. However, there is a key difference between them. In the original theory, a surgeon’s focus during surgery or a climber’s concentration while climbing a mountain are the result of active mental and physical effort to master a difficult task (Pelet et al., 2017). However, in digital settings, telepresence is often created and reinforced by a platform’s audiovisual design, immersive interface, and personalized content flow. Instead of an active state of ‘doing’, it may reflect a more passive condition of ‘being in’ or ‘being absorbed’. These differences are important for understanding why social media use can lead to both gratifying and problematic outcomes, such as passive consumption and escapism.

### 1.3. The Flow Experience in Social Media Use: “A Double-Edged Sword”

The flow experience when using social media platforms is not a naturally neutral phenomenon. It is a complex, bidirectional structure with important consequences for both individuals and platforms (Zhao & Zhou, 2021; Zhou et al., 2010). The literature consistently shows that this experience is a ‘double-edged sword’ (Kim & Davis, 2009; Miranda et al., 2023; Zhao & Zhou, 2021). While flow can foster positive outcomes such as increased engagement, loyalty, and satisfaction (Carlson et al., 2017; Kaur et al., 2016; Pelet et al., 2017; Zhou et al., 2010), it also has the potential to generate serious psychosocial risks such as problematic use, compulsive use, and addiction, related to overuse or fatigue (Brailovskaia et al., 2018, 2020; Gökalp et al., 2024; Lin et al., 2020; Roberts & David, 2023; Üztemur et al., 2025). This complex relationship between flow and addiction highlights the dual nature of flow, which requires ethical design and careful use (Saura et al., 2021).

The flow experience on social media platforms is a key outcome that helps individuals develop positive attitudes toward the platform (Kim et al., 2020). Flow is an inherently rewarding state where individuals become fully engaged in the activity they are doing (Csikszentmihalyi, 1975, 1990) and experience enjoyment, pleasure, and satisfaction (Hyun et al., 2022; Mauri et al., 2011; Pelet et al., 2017). The desire to repeatedly seek this intense and pleasurable experience (self-reinforcement) motivates individuals to return to the platform and continue their activities (Zhao & Zhou, 2021). While in a state of flow, individuals may experience time distortion and remain on the platform longer, thereby increasing the frequency and duration of social media use (Lin et al., 2020; Pelet et al., 2017). Consequently, the flow experience is crucial for continued intention (Chang & Zhu, 2012), subsequently contributing to habit formation. These positive interactions and satisfying experiences ultimately lead individuals to build strong loyalty toward the platforms (Hyun et al., 2022; Zhou et al., 2010).

Empirical research indicates that the flow experience is a significant predictor of satisfaction, loyalty, and engagement among social media users (Kim et al., 2020; Zhou et al., 2010). Individuals who experience flow tend to spend more time on the platform and participate more actively, such as engaging in brand-related activities or creating content (Brailovskaia et al., 2020; Chang et al., 2022). Additionally, individuals who

experience flow are more likely to recommend the platform to others (Brailovskaia et al., 2020). Social media use can sometimes result in negative experiences such as information overload and social media fatigue or burnout (Brailovskaia et al., 2020; Lin et al., 2020; Üztemur et al., 2025). In this context, the flow experience may act as a 'psychological buffer' against these harmful outcomes (Brailovskaia et al., 2020). The intrinsic satisfaction and enjoyment gained from flow significantly decrease individuals' likelihood of quitting or temporarily stopping their engagement with the platform despite such negative experiences (Brailovskaia et al., 2020). The state of flow provides a buffering effect by preventing the perception of mental resource depletion generated by overload and by keeping attention focused on the ongoing activity (Lin et al., 2020). This mechanism is considered a key factor in social media platforms' success in retaining use (Brailovskaia et al., 2020; Lin et al., 2020).

The catalytic effect of the flow state on commercial behaviors makes individuals more receptive and motivated to engage in commercial actions (Brailovskaia et al., 2020). Individuals in a positive emotional state and highly focused in online environments show a significant increase in interaction with brand content, product exploration, and purchase intention (Brailovskaia et al., 2020; Hyun et al., 2022). Flow functions, particularly in the context of social commerce (i.e., commerce mediated by social media platforms), reduce psychological barriers and increase trust, guiding consumers toward a purchase decision (Tuncer, 2021). For example, experiencing a flow state while conducting a social search on Instagram enhances consumers' purchase intentions (Cuevas et al., 2021). In general, the flow experience positively influences commercial behavioral intentions by increasing the impact on shopping (Brailovskaia et al., 2020; Hyun et al., 2022). On the other hand, the compelling, intrinsically rewarding nature of the flow experience enables individuals to achieve intense focus and high levels of satisfaction in digital environments. However, this powerful experience can also bring specific risks. While the intensity of flow may cause individuals to become deeply immersed in a digital activity, this situation can lead to a weakened sense of control and the emergence of behavioral addiction tendencies. These potential risks may become more pronounced and potent, particularly when interacting with an individual's motivational structure, psychological predispositions, and personality features (Roberts & David, 2023; Zhao & Zhou, 2021). Flow is considered as an important psychological factor associated with compulsive social media use and behavioral addiction (Brailovskaia et al., 2018; Roberts & David, 2023; Zhao & Zhou, 2021).

Flow may be particularly relevant for individuals who are motivated by escapism to consume social media (Brailovskaia et al., 2020; Miranda et al., 2023). Individuals experiencing high stress, anxiety, depression, or boredom (Brailovskaia et al., 2020; Zhao & Zhou, 2021) may use the deep absorption and telepresence brought by flow as a temporary coping strategy (Brailovskaia et al., 2018; Roberts & David, 2023). This intrinsically rewarding and immersive nature of flow (Csikszentmihalyi, 1990) may cause individuals to lose their perception of time (time distortion) (Lin et al., 2020; Pelet et al., 2017) and to stay on the platform longer. However, research emphasizes that this behavior is a dysfunctional coping strategy and, although it may provide short-term relief, it may lead to the avoidance of underlying problems, impaired control, and, consequently, addictive use of social media in the long-term (Brailovskaia & Margraf, 2024; Lin et al., 2020; Roberts & David, 2023). Following the "vicious circle" model of addictive social media, this mechanism may be particularly risky when individuals use social media to regulate their negative emotions (Brailovskaia, 2024).

Among the sub-dimensions of flow experience, telepresence may be a particularly important dimension in the development of social media addiction (Brailovskaia et al., 2018; Brailovskaia et al., 2020; Roberts & David, 2023). This dimension reflects an individual's deep immersion into the world created by the platform and the feeling of ignoring everything happening around them (Brailovskaia et al., 2018; Brailovskaia & Margraf, 2024; Pelet et al., 2017). The more intense the telepresence, the more likely an individual is to disengage from daily responsibilities and problems, viewing the virtual world as a refuge (Brailovskaia & Margraf, 2024; Pelet et al., 2017; Roberts & David, 2023). Research indicates that this heightened level of immersion is associated with higher likelihood of experiencing social media addiction, especially when individuals turn to social media to escape negative feelings (Brailovskaia et al., 2020; Zhao & Zhou, 2021). In fact, telepresence has been associated with lower psychological well-being (e.g., anxiety and depression), and is viewed as a less effective coping method (Roberts & David, 2023).

For potentially high-risk groups, such as university students, the flow experience on social media may lead them to avoid less enjoyable but important responsibilities, including academic tasks (Argiropoulou & Vlachopanou, 2021; Brailovskaia et al., 2020; Thatcher et al., 2008; Zhao & Zhou, 2021). The deep immersion and sense of telepresence created by flow (Roberts & David, 2023) may cause individuals to view the online world as a form of escape, helping them forget about their academic responsibilities and related stress (Brailovskaia et al., 2018; Brailovskaia et al., 2020; Roberts & David, 2023). The immersive nature of flow and

its time-distorting aspect (Lin et al., 2020; Pelet et al., 2017) may cause a session that starts with the intention of “just checking for five minutes” to stretch into hours (Pelet et al., 2017).

This pattern may encourage students to procrastinate academically, as more enjoyable online activities may reinforce the avoidance of less pleasant academic tasks (Argiropoulou & Vlachopanou, 2021; Kim & Seo, 2013). Academic procrastination has been identified as a mediating factor linking flow experiences to problematic internet use (Argiropoulou & Vlachopanou, 2021). Ongoing procrastination may sustain avoidance behaviors and impair control (Zhao & Zhou, 2021), creating a vicious cycle that leads individuals toward social media addiction (Brailovskaia et al., 2020; Lin et al., 2020). Indeed, when individuals use social media as a means of escaping from negative emotions, flow may increase their risk of developing addiction (Brailovskaia et al., 2020).

It is widely recognized in the extant literature that the phenomena of flow experience on social media and social media addiction are not entirely separate. Instead, flow acts as a key mediating mechanism in the development and persistence of addictive behaviors (Brailovskaia et al., 2020; Miranda et al., 2023; Roberts & David, 2023; Zhao & Zhou, 2021). Evidence shows that triggers, such as stress (Brailovskaia et al., 2020; Zhao & Zhou, 2021) or escapism from negative emotions (Brailovskaia et al., 2020; Miranda et al., 2023), may lead individuals into a flow state (deep absorption and enjoyment) through social media platform interaction (Brailovskaia & Margraf, 2024; Zhao & Zhou, 2021). The intrinsic reward (Brailovskaia et al., 2018) and immediate enjoyment (Pelet et al., 2017) from flow, combined with the relief from negative emotions (negative reinforcement) (Brailovskaia et al., 2020; Zhao & Zhou, 2021), may foster desires to repeat this immersive experience, even at a high cost (Brailovskaia et al., 2018; Csikszentmihalyi & Larson, 2014). This cycle eventually pushes individuals toward compulsive use (Lin et al., 2020) and impaired control. This, in turn, may ultimately lead to functional impairment (conflict) (Andreassen et al., 2017; Miranda et al., 2023; Zhao & Zhou, 2021) and behavioral addiction (Roberts & David, 2023). Therefore, studying social media flow is not merely about evaluating an “enjoyable experience,” but also about understanding and assessing the underlying psychological motivations of social media addiction.

#### 1.4. The Present Study

Importantly, flow has become a critical topic not only because of its motivational and engagement benefits but also due to its potential negative health consequences. Evidence shows that telepresence and time distortion intensify in visually rich, high-feedback environments, facilitating prolonged use and displacing offline contexts, which, in turn, are associated with stronger indicators of problematic or addictive social media use (Brailovskaia et al., 2018; Brailovskaia et al., 2020; Pelet et al., 2017). Studies further indicate that when flow co-occurs with belongingness and use motivations, tendencies toward social media addiction increase, and that well-being indicators such as depression and anxiety can differ across flow profiles, with telepresence-dominated profiles showing patterns close to burnout (Miranda et al., 2023; Roberts & David, 2023). Short-video ecosystems appear particularly potent in rapidly triggering such immersive states through algorithmic curation and social influence, amplifying both engagement and potential risk (Zheng, 2023). At the same time, there is emerging evidence that the pathway from fear of missing out (FoMO) to flow to addictive use may be attenuated by mindfulness, underscoring the importance of detecting and targeting the riskiest flow components in assessment and interventions (Brailovskaia & Margraf, 2024).

As of 2024, internet penetration in Türkiye had reached 88.8%, with 66.8% of the population using social media (Turkish Statistical Institute, 2024). Turkish individuals spend considerable amounts of time online, averaging 6 hours and 51 minutes daily on the internet, of which 2 hours and 37 minutes are spent on social media (Ministry of Transport and Infrastructure, 2024). Applications such as WhatsApp (86.9%), YouTube (71.3%), and Instagram (65.4%) are the most popular platforms in Türkiye (Kemp, 2024). The literature suggests that these platforms are highly effective at inducing flow due to features that enhance interactivity, visual engagement, and feedback loops (Csikszentmihalyi, 1990; Hoffman & Novak, 1996; Zhou, 2012). This widespread use highlights the need for a reliable and valid instrument to assess the potential impacts of flow experiences in Turkish society. However, directly translating and implementing a scale developed in Germany, such as the SMFS, involves methodological challenges. Cross-cultural adaptation requires ensuring that cultural meanings, conceptual frameworks, and experiential equivalents of items are understood similarly in the target culture (Beaton et al., 2000). Therefore, testing a scale’s psychometric properties in a new cultural setting is important for both scientific validity and local relevance (Beaton et al., 2000; Borsa et al., 2012). Consequently, the present study adapted the SMFS for Turkish culture and assessed its validity and reliability through thorough psychometric analyses, focusing on aspects identified in the literature as both engaging and

potentially health-related, especially telepresence and time distortion (Kaur et al., 2016; Pelet et al., 2017; Roberts & David, 2023; Zheng, 2023). Moreover, concurrent validity was evaluated by examining the relationships between scores on the Social Media Flow Scale (Brailovskaia et al., 2020) and the Social Media Continuance Scale (Han, 2018), the Social Media-Focused Fear of Missing Out Scale (Zhang et al., 2020), the Bergen Social Media Addiction Scale (Andreassen et al., 2016), and the Smartphone Application-Based Addiction Scale (Csibi et al., 2018).

## 2. Method

### 2.1. Participants and recruitment procedure

The present study was conducted to adapt the SMFS for use in Türkiye and comprised a sample of 732 participants. Details of the participants' demographic and social media use characteristics are presented in Table 1. Participants were recruited online through social networking sites using a survey hosted on Google Forms. Participants were included if they were 18 years of age or older, resided in Türkiye at the time of data collection, reported active SMU at least several times per week, had sufficient Turkish proficiency to complete the survey, provided informed consent, and completed the online survey. After data collection, a data cleaning procedure was applied. Participants who provided incomplete responses or did not meet the inclusion criteria were excluded, resulting in a final sample of 732 participants. Table 1 presents the demographics, daily smartphone use, and social media use of the sample investigated.

**Table 1.** Participants' characteristics (N = 732)

	Mean (SD) or n (%)
<b>Age</b>	31.19 (11.13)
<b>Gender</b>	
Female	479 (65.4%)
Male	253 (34.6%)
<b>Relationship status</b>	
Single	412 (56.3%)
Married	320 (43.7%)
<b>Educational level</b>	
High school	268 (36.6%)
Undergraduate	360 (49.2%)
Graduate	104 (14.2%)
<b>Smartphone use (daily use in hours over the prior seven days)</b>	5.65 (6.46)
<b>Time spent on social media (daily use in hours over the prior seven days)</b>	5.22 (9.66)

Note. SD = standard deviation

### 2.2. Measures

**2.2.1. Social Media Flow Scale (SMFS):** In the present study, the SMFS (Brailovskaia et al., 2020) was adapted for use in Türkiye. The SMFS consists of 11 items and five subscales: focused attention (e.g., "While using social media, I am immersed in the task I am performing"), enjoyment (e.g., "I enjoy using social media"), curiosity (e.g., "Using social media arouses my imagination"), telepresence (e.g., "While using social media, the world generated by the sites I visit is more real for me than the real world"), and time distortion (e.g., "Time flies when I am using social media"). Items are rated on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores indicate greater flow. Psychometric properties of the scale are presented in the Results section. For the adaptation of the SMFS into Turkish, ethical procedures were followed (i.e., permission was obtained from the scale developer via email, and then ethical approval was obtained from the Social Sciences Ethics Committee of Gaziantep University). The adaptation process followed the guidelines proposed by Beaton et al. (2000). First, two independent translators translated the scale into Turkish (forward translation). Then, a consensus version was created. Subsequently, a third independent translator, who had not seen the original scale, translated this Turkish version back into English (back translation). Finally, a committee reviewed all versions to ensure semantic, idiomatic, and conceptual equivalence.

**2.2.2. Social Media Continuance Scale (SMCS):** The four-item SMCS (Han, 2018; Turkish version: Üztemur et al., 2025) was used to assess individuals' intention to continue using a social media platform. Scale items

(e.g., “I will certainly keep my social media account”) are scored on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores indicate greater intention to continue social media use. In the present study, the internal consistency was very good (Cronbach’s  $\alpha = 0.881$ , McDonald’s  $\omega = 0.868$ ).

**2.2.3. Social Media-Focused Fear of Missing Out Scale (SMF-FoMOS):** To assess social media-related FoMO, the study employed the Turkish version of the Social Media-Focused Fear of Missing Out Scale (SMF-FoMOS). While the original scale was developed by Zhang et al. (2020), the Turkish adaptation by Çelik and Özkara (2022) specifically modified the items to align with the social media context. The scale comprises two subscales: personal FoMO (five items) and social FoMO (four items). For the specific purpose of this study, only the social FoMO subscale was utilized. Scale items (e.g., “When I am not active on social media, I feel ignored/forgotten by my social group”) are scored on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores indicate greater levels of social FoMO. In the present study, the internal consistency of the subscale was found to be excellent (Cronbach’s  $\alpha = 0.960$ , McDonald’s  $\omega = 0.948$ ).

**2.2.4. Bergen Social Media Addiction Scale (BSMAS):** The six-item BSMAS (Andreassen et al., 2016; Turkish version: Demirci, 2019) was used to assess social media addiction. Scale items (e.g., “You feel an urge to use social media more and more”) are scored on a 5-point Likert-type scale from 1 (*very rarely*) to 5 (*very often*). Higher scores indicate greater social media addiction. In the present study, the internal consistency was very good (Cronbach’s  $\alpha = 0.874$ , McDonald’s  $\omega = 0.875$ ).

**2.2.5. Smartphone Application-Based Addiction Scale (SABAS):** The six-item SABAS was used to assess problematic smartphone use (Csibi et al., 2018; Turkish adaptation: Gökler & Bulut, 2019). Scale items (e.g., “My smartphone is the most important thing in my life”) are scored on a 6-point Likert-type scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). Higher scores indicate greater problematic smartphone use. In the present study, the internal consistency was good (Cronbach’s  $\alpha = 0.791$ , McDonald’s  $\omega = 0.796$ ).

## 2.3. Data Analysis

Statistical analyses were conducted with Jeffrey’s Amazing Statistics Program (JASP), which is freely available. The original factor structure of the SMFS was evaluated using confirmatory factor analysis (CFA). The heterotrait-monotrait (HTMT) ratio method was employed to assess the discriminant validity of the SMFS. Additionally, concurrent validity tests were conducted in conjunction with internal consistency and external criterion measures. To identify whether the factor structure of the original SMFS was confirmed, the fit indices recommended by Byrne (2016) were used: comparative fit index (CFI) > 0.9, Tucker-Lewis index (TLI) > 0.9, normed fit index (NFI) > 0.9, root mean square error of approximation (RMSEA) < 0.08, and standardized root mean square residual (SRMR) < 0.08. Moreover, considering the adequate sample size ( $N = 732$ ), multi-group CFA was conducted to test the measurement invariance of the scale across gender groups. The invariance was tested through a hierarchical process: configural, metric, and scalar invariance. Following the recommendations of Chen (2007), the criteria for supporting the invariance between models were set as a change in CFI ( $\Delta\text{CFI}$ )  $\leq 0.010$  and a change in RMSEA ( $\Delta\text{RMSEA}$ )  $\leq 0.015$ . The factor loadings obtained from CFA for the SMFS were used in the HTMT method. Kline (2023) states that discriminant validity is supported when the HTMT ratio is lower than 0.85.

The SMFS, along with all its subscales, was analyzed for internal consistency using both Cronbach’s  $\alpha$  and McDonald’s  $\omega$ . The internal consistency coefficient value is characterized as good (0.70-0.80), very good (0.80-0.90), and excellent ( $\geq 0.90$ ) (Nunnally, 1978). In addition to the internal consistency coefficients, the average variance explained (AVE) and composite reliability (CR) were calculated for each factor in the scope of the reliability analyses. AVE values greater than 0.50 are acceptable threshold values for convergent validity, and CR values greater than 0.70 are acceptable threshold values for composite reliability (Fornell & Larcker, 1981; Psaila & Wagner, 2007). The entire SMFS, along with all its subscales, was examined for concurrent validity in relation to other measures (i.e., the SMCS, SMF-FoMOS, BSMAS, and SABAS). Pearson correlations ( $r$ ) were used for concurrent validity. The correlation coefficient is interpreted as weak if  $r$  ranges between 0.00 and 0.30, moderate if  $r$  ranges between 0.30 and 0.50, and strong if  $r$  ranges between 0.50 and 0.70 (Hemphill, 2003; Hinkle et al., 2003). Additionally, to address the potential for common method bias, Harman’s single-factor test was performed using principal component analysis. The results showed that a single factor accounted for 41.18% of the total variance, which is below the 50% threshold suggested by Podsakoff et al. (2003). This indicates that common method bias was not a significant concern for the present study.

### 3. Results

Table 2 presents the results of the internal consistency, construct validity, and discriminant validity analyses of the SMFS. The CFA results, which were generated to determine whether the original five-factor structure of the scale was confirmed, indicated that the model was robust, supported by all fit indices.

**Table 2.** Scale properties of the Social Media Flow Scale

	SMFS (Total Score)	Focused Attention (Subscale)	Enjoyment (Subscale)	Curiosity (Subscale)	Telepresence (Subscale)	Time-Distortion (Subscale)
<b>Cronbach's <math>\alpha</math></b>	0.888	0.879	0.869	0.813	0.789	0.793
<b>McDonald's <math>\omega</math></b>	0.942	0.879	0.869	0.813	0.791	0.795
<b>CFA</b>						
$\chi^2$ (df)	143.477 (34)	--	--	--	--	--
p-value	< 0.001	--	--	--	--	--
CFI	0.975	--	--	--	--	--
TLI	0.960	--	--	--	--	--
NFI	0.968	--	--	--	--	--
RMSEA	0.066	--	--	--	--	--
SRMR	0.033	--	--	--	--	--
<b>HTMT method</b>						
Focused Attention	--	1.000				
Enjoyment	--	0.468	1.000			
Curiosity	--	0.363	0.799	1.000		
Telepresence	--	0.746	0.555	0.451	1.000	
Time-Distortion	--	0.696	0.580	0.350	0.583	1.000
<b>AVE</b>	--	0.785	0.769	0.685	0.566	0.660
<b>CR</b>	--	0.879	0.873	0.810	0.792	0.793

Note. SMFS = Social Media Flow Scale; CFI = comparative fit index; TLI = Tucker-Lewis index; IFI = incremental fit index; NFI = normed fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; HTMT: heterotrait-monotrait ratio; AVE = average variance extracted; CR = composite reliability.

The SMFS had a very good internal consistency (see Table 2). When the internal consistency coefficients of the subscales were analyzed, focused attention, enjoyment, and curiosity demonstrated a very good internal consistency. The subscales telepresence and time distortion demonstrated a good internal consistency (see Table 2).

As shown in Table 2, AVE values for convergent validity and CR values for combined reliability were calculated within the scope of the reliability analyses. The CR values of all subscales (ranging from 0.792 to 0.879) exceeded the threshold value of 0.70, indicating acceptable combined reliability. Additionally, the AVE values of all subscales (ranging from 0.566 to 0.785) exceeded the acceptable threshold value of 0.50, supporting convergent validity. Moreover, an HTMT ratio below 0.85 indicated that discriminant validity was supported between the SMFS subscales (see Table 2).

**Table 3.** Concurrent validity of the Social Media Flow Scale

	Pearson correlation with an external criterion measure			
	Social Media Continuance Scale	Social Media Focused FoMO Scale	Bergen Social Media Addiction Scale	Smartphone Application-Based Addiction Scale
Social Media Flow Scale	.515**	.532**	.634**	.689**
Focused Attention	.338**	.414**	.531**	.586**
Enjoyment	.490**	.346**	.429**	.510**
Curiosity	.446**	.285**	.346**	.431**
Telepresence	.368**	.608**	.575**	.579**
Time-Distortion	.344**	.287**	.487**	.492**

Note. \*\* $p < .01$ . Harman's single-factor test was performed to address potential common method bias; a single factor accounted for 41.18% of the total variance, which is below the 50% threshold.

Table 3 presents the Pearson correlations of the SMFS and its subscales with four different external criterion measures (i.e., the SMCS, SMF-FoMOS, BSMAS, and SABAS). All correlation coefficients were significant at the  $p < .01$  level. The SMFS demonstrated positive and strong correlations with the four external measures examined. However, when the relationships of the subscales with the external criterion measures were analyzed, weak (e.g.,  $r = .285$  and  $r = .287$ ), moderate (e.g.,  $r = .338$  and  $r = .368$ ), and strong (e.g.,  $r = .608$  and  $r = .586$ ) positive relationships were observed (see Table 3).

**Table 4. Measurement Invariance of the Social Media Flow Scale Across Gender Groups**

Model	$\chi^2$	df	CFI	RMSEA	SRMR	$\Delta$ CFI	$\Delta$ RMSEA	Decision
Configural	198.075	68	.971	.072	.037	—	—	Supported
Metric	200.385	74	.971	.068	.038	.000	-.004	Supported
Scalar	205.046	80	.972	.065	.036	+.001	-.003	Supported

*Note.*  $N = 732$  (479 females and 253 males).  $\chi^2$  = chi-square; df = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual;  $\Delta$  = Change from the previous step. All  $\chi^2$  values are significant at  $p < .001$ .

Measurement invariance of the SMFS across gender groups (males and females) was tested using a hierarchical procedure. As shown in Table 4, the configural model demonstrated a good fit to the data, supporting the assumption that the basic factor structure is consistent across both groups. Metric invariance was confirmed because the changes in fit indices stayed well within the recommended thresholds ( $\Delta$ CFI = .000;  $\Delta$ RMSEA = -.004). Finally, scalar invariance was established, with the changes in CFI (+.001) and RMSEA (-.003) remaining well below the critical limits.

## 4. Discussion

The primary objectives of the present study were to (i) translate the Social Media Flow Scale (Brailovskaia et al., 2020) into Turkish, (ii) validate its psychometric properties, and (iii) consider the theoretical and practical implications. The results indicated that the Turkish version of the SMFS is valid and reliable, and that the flow experience in the social media context can be considered as a multidimensional construct. Similar to the original version, the CFA results supported the five-factor structure of the Turkish SMFS, with dimensions of focused attention, enjoyment, curiosity, telepresence, and time distortion. Therefore, flow in social media use may be experienced not only as a pleasant and intense cognitive state but also as a state in which an individual detaches from the offline context, is transported to the platform's environment, and loses a sense of time. These results are consistent with current social media environments, which include short videos, algorithmic content feeds, and continuous social feedback designs (Cuevas et al., 2021; Roberts & David, 2023; Yang et al., 2023; Zheng, 2023).

The Turkish version of the SMFS demonstrated a structure consistent and comparable with previous psychometric evaluations of the scale (e.g., Brailovskaia et al., 2018, 2020). It has been reported that the scale, initially developed in the context of Facebook, conceptualizes flow particularly along the axis of pleasure and concentration. In contrast, deep immersion components, such as telepresence and time distortion, were not as prominent (Kaur et al., 2016). The present study's confirmation of telepresence and time distortion as distinct factors suggests that the contemporary immersive nature of social media use was accurately captured. These results are consistent with findings that place the virtual environment overriding reality at the center of flow and report that flow is reinforced through telepresence (Miranda et al., 2023; Pelet et al., 2017; Zhao & Zhou, 2021).

The relationship between flow and social media addiction was also supported, aligning with previous research (Brailovskaia & Margraf, 2024; Zhao & Zhou, 2021). Previous studies have reported that flow is experienced more intensely when social media is used to escape from negative affect, stress, or boredom, and that this flow, in turn, may increase problematic use (Brailovskaia et al., 2018; Brailovskaia et al., 2020; Miranda et al., 2023). In the present study, the telepresence and time distortion dimensions also correlated with measures of social media addiction and problematic smartphone use. Therefore, the findings support the idea that risky aspects of social media use include not only its enjoyable nature, but also the state of intense immersion that can make individuals temporarily forget their real surroundings.

These concurrent validity findings are further strengthened by previous validity and reliability studies conducted in the Turkish context. More specifically, the strong psychometric properties of the Turkish adaptations of the Bergen Social Media Addiction Scale (Demirci, 2019) and the Smartphone Application-Based Addiction Scale (Gökler & Bulut, 2019) provide a solid methodological foundation for the present study's results. Additionally, the validated structures of the Social Media-Focused Fear of Missing Out Scale (Çelik & Özkara, 2022) and the Social Media Continuance Scale (Üztemur et al., 2025) within the national Turkish literature enabled a robust evaluation of these risky interactions within the Turkish context of the present study. Using these Turkish-validated psychometric measures helped confirm that the Turkish SMFS correlates strongly and in the expected directions with multidimensional digital well-being and addiction metrics, thereby firmly establishing its concurrent validity.

Another key finding of the present study was that social media flow was not exclusively associated with adverse outcomes. Previous research (Cuevas et al., 2021; Hyun et al., 2022; Wu & Tien, 2024) has emphasized that, in environments such as Instagram, higher levels of flow during social browsing and social commerce are associated with greater purchase and reuse intentions. The flow experience when using social media often relates to positive behavioral outcomes, such as purchase intention, continued usage intention, and loyalty (Tuncer, 2021). For instance, a study conducted among individuals in China who used social media found that the flow experience was positively related to satisfaction (Chang & Zhu, 2012). Another study examining individuals' use of social media on mobile devices found that flow is related to loyalty (Zhou et al., 2010). In the present study, the overall SMFS score was strongly and positively correlated with the intention to continue using social media. This finding extends the existing body of knowledge. Based on these results, it can be argued that the SMFS may not only identify individuals characterized by high levels of telepresence and time distortion (potential precursors to problematic use) but also detect groups experiencing high enjoyment and focused attention during social media interactions. In this regard, the SMFS appears to have the potential to bridge between the literature focused on online problematic use and that centered on social commerce, loyalty, and usage experience.

Previous studies focusing on short-video-based platforms have also supported the scope of the SMFS. It has been suggested that in environments where short, intensive content is presented with social effects, flow can be quickly triggered, and this may increase rewatching and participatory behaviors (Cuevas et al., 2021; Roberts & David, 2023; Yang et al., 2023; Zheng, 2023). Consequently, there is a need for scales that can simultaneously assess the components of the experience in environments where flow is experienced quickly and intensely. It should also be considered, in conjunction with previous studies, that as telepresence and time distortion scores increase, disengagement from offline responsibilities may become easier among individuals who use social media intensively and who also show tendencies toward academic procrastination, such as university students (Argiropoulou & Vlachopanou, 2021). This finding is consistent with research indicating that the combination of flow, belongingness, and motivation may increase the likelihood of social media addiction (Brailovskaia & Margraf, 2024; Miranda et al., 2023; Zhao & Zhou, 2021). Similarly, it has been reported that well-being indicators (e.g., depression, anxiety) differ when flow increases on visually rich, high-feedback platforms such as Instagram and TikTok, and that feelings close to burnout can be observed, particularly in flow profiles dominated by telepresence (Roberts & David, 2023). Moreover, cluster comparisons show higher depression/anxiety scores in the high-flow, high-telepresence group relative to lower-telepresence profiles, reinforcing the link between telepresence-heavy flow and poorer well-being (Roberts & David, 2023). Therefore, assessing social media flow may be important for early detection of use patterns that threaten well-being.

#### **4.1. Theoretical and Practical Implications**

The SMFS combines the main components of the flow experience (pleasure, attention, curiosity, telepresence, and time distortion) into a single framework, allowing these elements, often discussed separately in research, to be assessed together. Analyses of the Turkish sample show that the SMFS has a robust and reliable structure. This important finding demonstrates that assessment instruments, often developed with Western samples, can be successfully adapted to diverse cultural settings. The fact that the SMFS shows strong associations with continuance use intention, FoMO, social media addiction, and problematic smartphone use indicates that a single instrument can assess both opportunities and risks. Additionally, the ability to assess flexible areas, such as telepresence and time distortion, provides clear, measurable, and actionable results for digital well-being initiatives and usage-limiting strategies.

Moreover, the present study firmly places the Turkish adaptation of the SMFS within the broader literature on flow and addiction by showing that flow is not just an ideal user experience but a key mechanism mediating

problematic online behaviors. Beyond simply replicating the original scale methodologically, the present adaptation study offers new theoretical and practical insights. First, while earlier flow models, mainly developed for older platforms, focused on enjoyment and focused attention, the present study's findings show that today's social media environments, driven by algorithms, require capturing deep immersion. More specifically, telepresence and time distortion stand out as strong risk factors for addiction. Second, the present study explicitly connects two traditionally separate research areas: user engagement and behavioral addiction. By demonstrating that a single multidimensional framework can address both positive and negative aspects of social media use, the study provides a unified tool for future digital wellness research.

Finally, by validating this model in a highly active online population, the study offers solid evidence across cultures that the psychological factors linking flow to addiction are perhaps universal, therefore expanding the original construct's theoretical scope. Because this flow state can mediate social media addiction when combined with FoMO and escape motivation (Brailovskaia et al., 2018, 2020), these findings highlight the importance of fostering positive cognitive and emotional states, such as enjoyment, curiosity, and focused attention, in designing social media learning and marketing content.

Conversely, it suggests that excessively high levels of telepresence and distorted time perception can have adverse effects and should therefore be monitored. Although the goal of keeping individuals engaged with content is a common approach in platform design, decisions that may disrupt individuals' senses of time and disconnect them from offline responsibilities should be carefully considered. Because the process from FoMO to flow experience and then to social media addiction may be mitigated by protective factors such as mindfulness and self-control (Brailovskaia & Margraf, 2024), applying the SMFS in such mediation and moderation models appears to be appropriate and valuable.

#### 4.2. Strengths, Limitations, and Directions for Future Research

Given the relevance of flow to social media addiction, translating and validating the adapted Turkish version of the SMFS can be considered a strength of the present study. The validation of the Turkish SMFS, not only in terms of its psychometric properties but also regarding its relationships with expected external variables, enhances its validity and practical potential. By integrating research lines stemming from different theoretical approaches, a strong foundation is provided for the usability of the SMFS, both in studies addressing social media addiction (Miranda et al., 2023; Zhao & Zhou, 2021) and in research examining user engagement (Chang & Zhu, 2012; Yang et al., 2023; Zhou et al., 2010). Although a flow theory was initially developed in the context of offline activities, the present study provides empirical evidence for the transferability of this theoretical construct to digital and social media environments. Flow is defined as a multidimensional experience that essentially includes components such as enjoyment, intense concentration, challenge, a sense of control, and curiosity (Pelet et al., 2017; Zhou et al., 2010). The Turkish SMFS, with a valid and reliable structure, indicates that this phenomenon can be assessed within the Turkish cultural context, providing an important basis for cross-cultural research on social media flow.

Alongside its strengths, the present study also has some limitations. The cross-sectional design of the study precludes establishing causal relationships between variables. Similarly, the question of whether the flow experience precedes social media addiction or triggers such use warrants longitudinal research designs (Brailovskaia et al., 2018, 2020). The collection of data through self-report increases the risk of recall and social desirability biases, especially in the subjective components of flow such as enjoyment and telepresence. This issue has also been considered in previous studies examining the relationships between motivation, social belonging, and problematic use (Miranda et al., 2023; Roberts & David, 2023). Another limitation of the study was the reliance on online convenience sampling. Data were collected via social networking sites, which inherently introduces selection bias because only individuals active on these specific platforms and who were willing to participate in an online survey were reached. Moreover, the sample was predominantly female (65.4%) and highly educated (63.4% holding an undergraduate or graduate degree). Therefore, the sample was not representative of the broader, highly diverse population of Turkish social media users. These recruitment and sampling issues limit the generalizability of the findings.

Another methodological limitation of the present study was the reliance on a single dataset for validation. In psychometric research, it is recommended to use a cross-validation approach, such as splitting the total sample to analyze the factor structure in one subgroup and confirm it in another, to improve the methodological rigor of the results. Although the present study used a relatively large sample of 732 participants for a one-step confirmatory analysis, future research using split-sample validation or independent samples to assess the stability of the Turkish SMFS would further strengthen its validity.

Moreover, the SMFS was tested in only a single cultural context. Future cross-cultural studies are warranted. The study's lack of restriction to a specific social media platform makes it difficult to disentangle the effects of platform-specific interaction forms (e.g., social search on Instagram, shopping-oriented flow, or short-video scrolling behaviors) (Cuevas et al., 2021; Hyun et al., 2022; Roberts & David, 2023). Therefore, it is recommended that future research evaluate the SMFS using multi-group CFA on different platforms and monitor the momentary determinants of flow using time-sensitive methods (e.g., experience sampling or diary studies). Such designs could enable more robust testing of potentially causal relationships among rapidly triggered components, including those related to telepresence and time distortion (Brailovskaia & Margraf, 2024; Pelet et al., 2017).

In future research, the SMFS may be used to assess pre- and post-intervention changes in short-term digital well-being programs designed to reduce telepresence and time distortion. Cognitive-behavioral and mindfulness-based strategies designed to lower FoMO may be experimentally tested for their impact on risky aspects of flow. Additionally, assessing the factorial invariance of the scale across various social media types and age groups, as well as examining platforms that focus on short videos, image sharing, and text-based content separately, could enhance understanding of content-specific flow experiences. In this context, creating content designs that maintain positive flow components, such as enjoyment, curiosity, and focused attention, while minimizing telepresence and time distortion, and evaluating these designs with the SMFS, could lead to practical outcomes for promoting digital well-being.

## 5. Conclusion

In the present study, the SMFS, a five-dimensional, psychometrically robust scale with a validated nomological network, was translated to assess social media flow in a Turkish context. The results suggest that flow includes not only classic components such as enjoyment and focused attention, but also dimensions such as telepresence and time distortion, which may promote social media addiction. This finding, aligned with previous research, supports the idea that flow may facilitate problematic and escapism-driven social media use (Brailovskaia et al., 2018, 2020; Roberts & David, 2023). By demonstrating significant relationships with continuance intention, social-media-specific FoMO, and two different indicators of problematic use, the SMFS was shown to be a valid psychometric instrument (Cuevas et al., 2021; Hyun et al., 2022; Miranda et al., 2023). The findings demonstrate that the Turkish SMFS is a versatile instrument suitable for studies of social media addiction, as well as for investigations of use experiences and marketing research. Assessing the flow experience during social media use is not just a methodological detail but an important step in identifying both opportunities and risks.

### Statement of Researchers

#### Researchers' contribution rate statement:

**Conceptualization:** P.-C.H. JB, AG, SÜ, C.-Y.L. **Methodology:** P.-C.H. JB, KR, AG, MDG, MNP, SÜ, C.-Y.L. **Software:** P.-C.H. KR, AG, MNP, SÜ, C.-Y.L. **Validation:** P.-C.H. JB, AG, MDG, MNP, C.-Y.L. **Formal analysis:** P.-C.H. JB, KR, AG, SÜ, C.-Y.L. **Investigation:** P.-C.H. JB, KR, AG, SÜ. **Resources:** P.-C.H. JB, KR, AG, SÜ, C.-Y.L. **Data Curation:** P.-C.H. JB, KR, AG, MDG, MNP, SÜ, C.-Y.L. **Writing – original draft:** P.-C.H. JB, KR, AG, MDG, MNP, SÜ, C.-Y.L. **Writing – review & editing:** P.-C.H. JB, KR, AG, MDG, MNP, SÜ, C.-Y.L. **Visualization:** KR, AG, MDG, MNP, SÜ, C.-Y.L. **Supervision:** JB, MDG, MNP, SÜ, C.-Y.L. **Project administration:** C.-Y.L. All authors read and approved the final manuscript.

#### Conflict statement:

**Dr. Potenza** discloses the following. Dr. Potenza has consulted for *Opiant Therapeutics*, *Game Day Data*, *Boehringer Ingelheim* and *Idorsia Pharmaceuticals*; has been involved in a patent application with Yale University and Novartis; has received research support from Mohegan Sun Casino, Children and Screens and the Connecticut Council on Problem Gambling; has participated in surveys, mailings or telephone consultations related to drug addiction, impulse-control disorders or other health topics; has consulted for and/or advised gambling and legal entities and non-profit organizations on issues related to impulse control, internet use and addictive disorders; has performed grant reviews for research-funding agencies; has edited journals and journal sections; has given academic lectures in grand rounds, CME events and other clinical or scientific venues; and has generated books or book chapters for publishers of mental health texts. **Chung-Ying Lin** is the editor-in-chief of the *Journal of Social Media Research*. However, he had no role in the review process of this paper; this paper went through rigorous peer review and revision. **Servet Üztemur** is the executive editor of the *Journal of Social Media Research*. However, he had no role in the review process of this paper; this paper went through rigorous peer review and revision. All other authors declare that they have no conflict of interest.

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## Appendix

### English and Turkish Version of Social Media Flow Scale

Factors (Faktörler)	Items (English)	Maddeler (Turkish)
Focused Attention (Odaklanmış Dikkat)	While using social media, I am deeply engrossed.	Sosyal medya kullanırken, derin bir şekilde kendimi kapırıyorum.
	While using social media, I am immersed in the task I am performing.	Sosyal medya kullanırken, yaptığım işe dalıp gidiyorum.
Enjoyment (Keyif)	Using social media provides me with a lot of fun.	Sosyal medyayı kullanırken çok eğleniyorum.
	I enjoy using social media.	Sosyal medya kullanmaktan keyif alıyorum.
Curiosity (Merak)	Using social media arouses my imagination.	Sosyal medya kullanmak hayal gücümü harekete geçirir.
	Using social media excites my curiosity.	Sosyal medya kullanmak merakımı uyandırır.
Telepresence (Televarlık)	Using social media often makes me forget where I am and what currently happens around me.	Sosyal medya kullanırken çoğu zaman nerede olduğumu ve etrafımda neler olduğunu unutuyorum.
	Social media creates a new world for me, and this world suddenly disappears when I stop browsing.	Sosyal medya benim için yeni bir dünya yaratıyor ve gezinmeyi bıraktığımda bu dünya aniden yok oluyor.
	While using social media, the world generated by the sites I visit is more real for me than the real world.	Sosyal medya kullanırken, ziyaret ettiğim sitelerin yarattığı dünya benim için gerçek dünyadan daha gerçektir.
Time-Distortion (Zaman Bozulması)	Time flies when I am using social media.	Sosyal medya kullanırken zaman uçup gidiyor.
	I often spend more time on social media than I had intended.	Sosyal medyada genellikle planladığımdan daha fazla zaman geçiriyorum.

Note. Items rated on a 5-point Likert-type scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

## RESEARCH ARTICLE

## OPEN ACCESS

# Posting parenthood: Patterns of sharenting and their impact on parent-child relationships

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## Highlights:

- Sharenting is widespread, with most parents sharing children's lives on social media.
- Facebook and Instagram are the primary platforms parents use to post about children.
- Parents mainly post to connect with family and express pride in their children.
- Moderate sharenting is associated with greater parent-child closeness.
- Posting on TikTok and YouTube is linked to greater parent-child conflict.

## Abstract

The goal of this study is to understand the prevalence of sharenting, which refers to parents' posting their children on social media. Specifically, we identify what parents post about their children (ages 0 to 17) on social media, the frequency of posts about their children, why they post, and how these prevalence rates and motivations are associated with parent-child rapport. Data comes from parents who posted their children at least once a year on social media, recruited from Prolific (N = 470, 72.8% female). Parents were most likely to post their children on Instagram and Facebook, and least likely to post on TikTok and YouTube. Parents averaged posting about their children in approximately 2 of the last 7 days (1.86 of 7 days), and of their last 20 social media posts, approximately 7 contained at least one child (7.41 of 20 posts). Additionally, posting children on social media predicted increased parent-reported rapport between parents and children, as well as increased perceived conflict, particularly when children were posted on TikTok or YouTube. Suggestions for future research and implications for sharenting are discussed.

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## 1. Introduction

The majority of individuals use at least one social media platform (Pew Research Center, 2024), where they can connect with others, share information, and view content (Seidman et al., 2025). Many parents use social media to share pictures, videos, and other information about their children; in fact, this behavior is so common that it is colloquially called 'sharenting' (Cataldo et al., 2022; Fox & Hoy, 2019). The prevalence of parents posting their children is so common that the average 5-year-old has been shared on social media at least 1,500 times (Tosuntaş & Griffiths, 2024). However, little is known about the frequency of children being posted, the platforms on which they are posted, the content of these posts, and the motivations behind them. It would also be important to note if parents' posting their children online is associated with parents' relationships with their children, particularly since much of the information being posted online is not reviewed or approved by the children, who may be too young to give consent or unaware of how often information about them is shared on social media (Moser et al., 2017). On the other hand, children may feel that their parents are proud of them based on this behavior, which could be beneficial for these relationships.

The goal of this study is multifaceted. First, this study identifies the contexts and frequencies in which parents post their children on social media. Next, it investigates the motivations behind parents' posting children on social media, and finally, this study explores how this posting behavior relates to parent-child relationship quality. Achieving these goals has many benefits. First, it can track societal norms (in the U.S.) around parenting and technology use. These frequencies can also be used to understand what drives parents to engage in this behavior, and it can inform conversations about potential benefits of use and digital boundaries within families. Information from this study could also be used to understand the unintended consequences – both good and bad – of parents posting their children on social media.

### 1.1. Literature Review

The term sharenting, a combination of sharing and parenting, has come into use in the digital age to describe parents or guardians habitually using social media to share updates and images of their children. This practice, defined as the habitual use of social media to share news and photos of one's children (Fox & Hoy, 2019), includes both active, intentional sharenting and invisible sharenting, which often happens without the child's knowledge or consent (Ong et al., 2022). Sharenting has grown more common, with 75% of parents sharing photos, videos, and stories of their children on social media. Social media has become a vital part of daily life, transforming into a virtual space where connections extend beyond close circles. In this digital environment, sharenting has become a growing trend, involving the online sharing of personal details about one's child (Cataldo et al., 2022). One survey found that, on average, parents post nearly 1,500 photos of their children online before they turn five (Tosuntaş & Griffiths, 2024). The increasing practice of sharenting is an effective way to connect with family and friends. For some parents, it is a creative outlet that lets them express themselves, document their family's life, build communities with other parents, and share memorable moments of their child (Tosuntaş & Griffiths, 2024).

Parents' motivation to share pictures and information about their children on social media has limited theoretical support. Lending support from Erikson's (1963) psychosocial development theory, it is possible that adults post their children to address their generativity needs. This theory proposes that during adulthood (ages 30 to 60), individuals seek to contribute to the world, create something lasting, and determine if they have made significant contributions to future generations. To avoid stagnation, this theory of development proposes that adults want to feel as though they are contributing to the society in which they belong. In essence, posting children to social media could be one way that adults are sharing their legacy – they are showing their children's successes and that they are contributing to the world by helping develop the next generation of adults. This social gratification from sharenting could lead to more posting behavior to fulfill generativity needs, thereby addressing this psychosocial conflict.

On the other hand, parents may simply be motivated by the gratification of posting children online, which could lead to more online responses in the form of comments and likes. As proposed by Katz et al. (1973) and further described by Ruggiero (2000), the uses and gratifications theory offers a comprehensive understanding of online behavior. This theory suggests that individuals utilize media to meet specific needs, such as establishing connections with others (Ruggiero, 2000). When parents share information about their children on social media, they effectively fulfill their social connection and relationship-building needs, a finding bolstered by various studies on posting behaviors (Langlais & Elias, 2025; Whiting & Williams, 2013). Additionally, many parents use social media to share family updates with distant relatives or connect with others (Langlais et al., 2024; Stone et al., 2022). Positive recognition, in the form of likes, comments, and shares, may be a factor

explaining parental sharing behavior on social media. When parents receive such positive attention, they may feel gratified, which in turn motivates them to share more.

There is some empirical support for understanding parents' social media behaviors. Parents have many reasons for using social media, such as seeking support online, presenting themselves to their social network, and feeling validated. Studies have identified several motivations for parents posting about their children online, including maintaining relationships, seeking affirmation and advice, expressing pride in their children's achievements, creating memories, and building connections with others (Ong et al., 2022). These behaviors are often driven by intrinsic motivation (Brosch, 2018). Fox and Hoy (2019) found that the rise of social influencers has led many parents to be attracted to the instant gratification gained from increased followers, likes, and online attention. Sharenting by millennial parents is motivated by multiple pro-social reasons, such as seeking affirmation, social support, participating in social groups, and documenting their children (Latipah et al., 2020). With the surge in social media use, gratification has become a way to fulfill materialistic desires, shape identities, and navigate social relationships within a materialistic society. Sharing about children online has become more common and socially accepted. As social media has become an integral part of daily life, many parents post about their children to experience the joy of friends and family engaging with them virtually—an act that, in many ways, has become a social norm (Cataldo et al., 2022; Fox & Hoy, 2019).

Despite how common this behavior is, there are worries about the loss of privacy or digital exhibitionism, and parents have to find a balance between sharing and protecting privacy. The public sharing of children on social media at a young age—before they have the mental ability to understand or question it—raises serious concerns (Ågren, 2023). Sharenting isn't a new trend, and many children who were shared online by their parents are now teenagers. Some of these teenagers see their parents' perceptions of them as more positive than their own view, while others report conflicts because the adolescent had little control over how they were seen online (Peleg et al., 2025). Children and teenagers are beginning to voice their concerns about social surveillance as they face the challenges of social media and online privacy practices, which have become a normal part of growing up (Ribak, 2025).

## 1.2. The Present Study

Although significant shifts in social norms and the digital landscape have become part of culture, many studies rely on limited, quantitative data with preconceived ideas about parent posting behaviors. Furthermore, more research has focused on why parents post rather than what they post. Additional information is needed on how parents share content to better understand the consequences of this behavior. If parents post about their children's achievements driven by parental pride, sharenting behaviors may be best explained by Erikson's (1963) psychosocial theory of development. Conversely, if parents share content to inform friends, family, and their social network, sharenting might be best explained by uses and gratifications theory (Katz et al., 1973). Additionally, since some studies have raised ethical concerns about sharenting, especially regarding children's privacy, this behavior likely affects the parent-child relationship. Some reviewed information suggests that children and teenagers may feel uncomfortable not having control over what their parents post (Peleg et al., 2025). Studies also indicate a possible link between parents' sharenting and young children's social anxiety (Langlais & Elias, 2025). More data is necessary to confirm the relationship between parents posting their children on social media and parent-child rapport. Therefore, the current study proposes the following research questions:

- Research question 1 (RQ1): What are the prevalence rates of parents posting their children on social media?
- Research question 2 (RQ1): What do parents post of their children on social media?
- Research question 3 (RQ1): To what extent is parents' posting their children on social media related to parent-child rapport (as measured by closeness and conflict)?

## 2. Method

### 2.1. Procedures

Data for this study were collected from parents who were 18 or older and had at least one child between the ages of 0 and 17 that they posted on social media (N = 470). These participants were recruited through Prolific, a platform that connects potential participants who can sign up if they qualify. Qualified participants received information about the study and then decided whether to participate. Those who chose to take part

completed an online survey, which took approximately 15 minutes. The survey asked about how often they posted their children online, which platforms they used, and their motivations for posting. Additionally, parents reported their level of rapport with their children. Before starting the survey, participants saw an informed consent form. Only those who consented could review and answer the survey questions. After completion, the surveys were reviewed by the Principal Investigator to ensure they met the inclusion criteria and that the responses were complete and of quality. Once verified, participants received \$10 for their participation. All procedures for this study were approved by the relevant institutional review board.

## 2.2. Participants

Data for this study come from 470 parents who posted their child (ages 0 to 17) on social media. The majority of these parents were mothers (72.8%), with the rest being fathers (27.2%). The ethnic composition of parents, ranging from most to least prevalent, included: white (70.1%), black or African American (15.8%), Hispanic (7.0%), Asian or Pacific Islander (3.6%), other (3.2%), and Middle Eastern (.4%). Most participants were married (69.6%), with others reporting they were single (13.2%), living with a romantic partner but not married (11.3%), seriously dating but not living together (3.6%), or other (2.3%). These parents either had one child (28.4%), two children (40.1%), three children (19.6%), four children (7.7%), or five or more children (4.3%). The average age of participants was 38.60 (SD = 7.95; range 22 to 76). The average age of the oldest child was 11.51 (SD = 7.16), and the average age of the youngest child was 6.48 (SD = 4.95). Most participants had a full-time job (56.1%), followed by a part-time job (18.6%), or no job (25.4%). Those who worked averaged 37.08 hours a week (SD = 10.71). Participants' education was as follows: .6% less than high school diploma, 14.1% high school diploma, 22.2% some college, 10.2% Associate's degree, 32.6% Bachelor's degree, 1.9% some graduate school, 15.4% Master's degree, and 3.0% advanced degree (such as LD, MD, or PhD). The mean income for participants was between \$70,000 and \$74,999, and the mode was \$100,000 or more (34.3%). Participants had an iPhone (58.7%) or an Android (41.1%); one participant (.2%) reported "other".

## 2.3. Measures

### 2.3.1. Frequency Use

First, participants reported how often they posted about each of their children (up to five children, from oldest to youngest) on social media, using a scale of 1 (not at all) to 7 (multiple times a day). Second, participants reviewed their social media posts from the past seven days and indicated how many included at least one of their children. They also reviewed their last 20 posts and noted how many featured at least one child. Third, participants were asked to identify the child they posted about the most and then specify how frequently they posted about this child on Facebook, SnapChat, X (formerly Twitter), Instagram, TikTok, YouTube, or other platforms.

### 2.3.2. Posting Behaviors

Using information from qualitative studies (Langlais & Elias, 2025), participants were asked to identify what they posted on social media about their children using the following checklist: school milestones, child birthdays, family outings, holiday events, the child acting silly, child accomplishments, or family pictures. Participants could select multiple responses to this question.

### 2.3.3. Posting Motivations

Using information from previous studies (Langlais & Elias, 2025; Langlais et al., under review), participants identified from a list of potential motivations for posting their children on social media: to update family members, to update friends, to share their day-to-day activities, to share child accomplishments (such as success with a sport), to share momentous occasions of their child (such as their first day of school), taking pride in their children, athletic recruitment, to get advice from other parents, and archive family memories.

### 2.3.4. Parent-child rapport

Participants reported their rapport with their children using the 30-item Child-Parent Relationship Scale (CPRS; Pianta, 1992), which has demonstrated acceptable construct validity (Dyer et al., 2017). This measure is comprised of two subscales: parent-child closeness and parent-child conflict. An example from each subscale includes, "My child easily becomes angry with me" (conflict) and "I share an affectionate, warm relationship with my child" (closeness). Responses for each item ranged from 1 (definitely does not apply) to 5 (definitely

applies). The internal consistency for each subscale was acceptable (McDonald's Omega = .90 for conflict, and .73 for closeness).

## 2.4. Data Analysis

To analyze data for this study, descriptive statistics were conducted using version 29 of the Statistical Package for Social Sciences (SPSS). Additionally, correlations were examined to assess the relationship between posting frequency, behaviors, motivations, parent-child closeness, and parent-child conflict. Third, path analyses were performed using Mplus v. 8 (Muthén & Muthén, 1988-2025). Mplus handles missing data with full maximum likelihood (FIML), which allows the covariance structure to fit the data for each participant without relying on pairwise or listwise deletion, making it preferable for generalizing results to the study population using all available data (Kline, 2011). This approach also enables the assessment of the magnitude and significance of relationships among all study variables (Stage et al., 2004). Two separate path models were conducted: first, parents' posting frequency of their children (averaged across all children), the number of posts including their children during the last seven days, and the ratio of the last 20 posts that included at least one of their children were used to predict closeness and conflict with a target child as reported by parents; second, the frequency with which parents posted their children across six social media platforms (Facebook, Snapchat, Instagram, X, TikTok, and YouTube) served as predictors of the same variables of closeness and conflict. Control variables—parents' age, children's age, child's gender (dichotomized), and education—were regressed on the independent variables but were not significant and thus not included in the final models.

## 3. Results

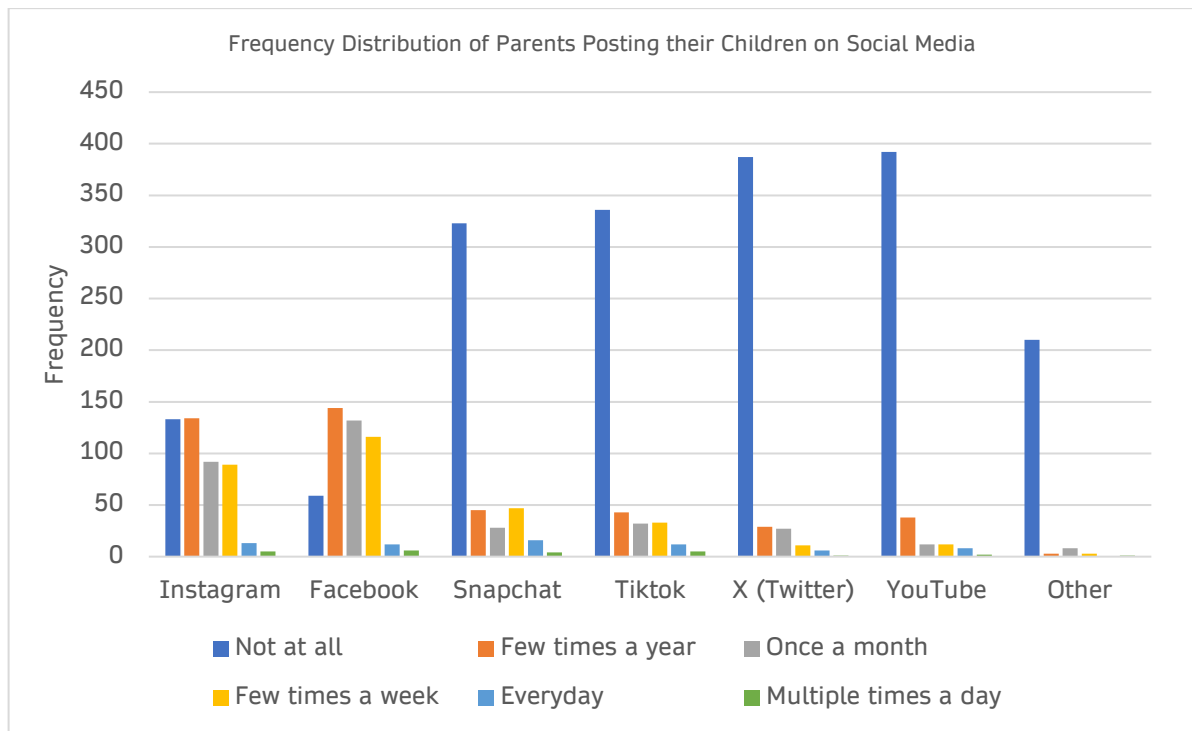
The first research question was to examine how common it is for parents to post their children on social media. Table 1 shows the average and standard deviation of how often parents believe they posted each child online. The average is just below the midpoint of the scale (4), where 'not at all' equals 1 and 'all the time' equals 7. Using this same scale, the averages based on the number of children are: oldest child (3.40), child 2 (3.34), child 3 (3.52), child 4 (3.65), and child 5 (3.96). The typical frequency of parents posting their child online was 3.57, with parents in the sample posting their youngest child most often at 3.96. Parents reported how many posts in the past seven days included one or more of their children, with an average of 1.86 (SD = 5.87; range 1-120). Of parents' last 20 posts, 7.41 included at least one child (SD = 5.85; range: 0 to 20).

**Table 1.** Means, standard deviations, and correlations for study variables.

Variable	Mean	SD	n	1	2	3	4	5	6	7
<b>1. Oldest Child</b>	3.40	1.63	457	---	.73**	.56**	.60**	.40*	.08	.33**
<b>2. Child 2</b>	3.34	1.66	332		---	.69**	.64**	.52**	.16**	.32**
<b>3. Child 3</b>	3.52	1.73	146			---	.80**	.60**	.23**	.29**
<b>4. Child 4</b>	3.65	1.61	60				---	.81**	.16	.12
<b>5. Child 5</b>	3.96	1.99	32					---	.15	.23
<b>6. Posts last 7 days</b>	1.86	5.88	470						---	.17**
<b>7. Last 20 posts</b>	7.41	5.85	470							---

*Note:* The scale for posting children ranges from 1 (*not at all*) to 7 (*all the time*). Posts last 7 days is the number of posts that parents posted of their children over the last seven days. The last 20 posts is the ratio of posts that included their children out of their last 20 posts.

Parents in this study used at least one of the following social media platforms: Instagram, Facebook, Snapchat, TikTok, X, and YouTube (with some reporting "other"). Figure 1 shows how often parents posted about their children, broken down by platform. Using the same Likert scale as before (from 1 to 7, with higher numbers indicating more frequent posting), Facebook was the most common platform where parents posted their children (M = 3.65, SD = 1.34), followed by Instagram (M = 3.14, SD = 1.58). On Facebook, 59 parents (12.6%) did not post their child at all, 144 (12.6%) posted a few times a year, 132 (30.7%) posted at least once a month, 116 (28.1%) posted a few times a week, 12 (2.6%) posted daily, and 6 (1.3%) posted multiple times daily. On Instagram, 133 parents (1.3%) did not post at all, 133 (28.5%) posted a few times a year, 92 (28.8%) posted once a month, 89 (19.7%) posted a few times a week, 13 (2.8%) posted daily, and 5 (1.1%) posted multiple times a day.



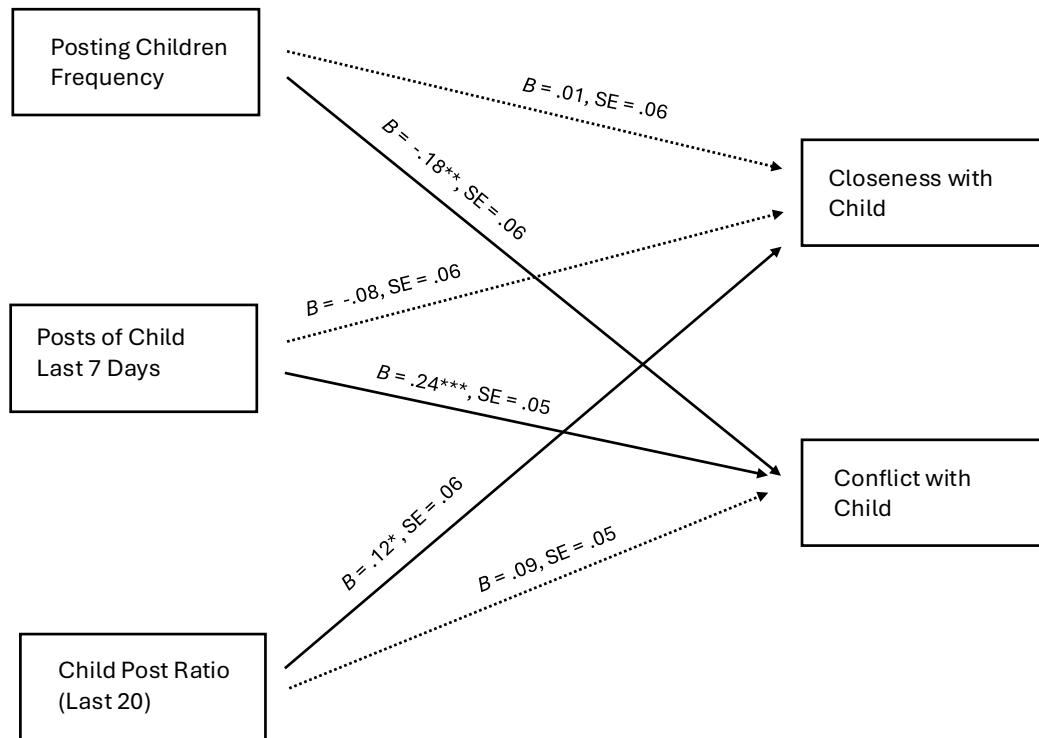
**Figure 1.** Frequency distribution of parents' posting their children based on social media platform.

On social media platforms, Snapchat: 323 parents didn't post their child at all (69.8%), 45 posted their child a few times a year (9.7%), 28 posted once a month (6.0%), 47 a few times a week (10.2%), 16 daily (3.5%), and 4 multiple times a day (.9%). TikTok: 336 parents didn't post their child (72.9%), 43 a few times a year (9.3%), 32 once a month (6.9%), 33 a few times weekly (7.2%), 12 daily (2.6%), and five multiple times a day (1.1%). X: 387 parents didn't post their child (83.9%), 29 a few times a year (6.3%), 27 once a month (5.9%), 11 a few times weekly (2.4%), six daily (1.3%), and one multiple times daily (.2%). YouTube: 392 parents didn't post their child (84.5%), 38 a few times a year (8.2%), 12 once a month (2.6%), 12 a few times weekly (2.6%), eight daily (1.7%), and two multiple times daily (.4%). Regarding other platforms, 210 parents didn't post their child at all (93.3%), three a few times a year (1.3%), eight once a month (3.6%), and three a few times weekly (1.3%), with zero posting daily and one multiple times daily (.4%).

Table 2 lists the frequency distribution of what parents post about their children on social media. The most common information that parents posted was family outings and activities (82.6%), followed by the child's birthday (82.3%), general family photos (70.4%), holiday events (68.9%), child accomplishments (61.5%), school milestones (56.2%), and silly child behaviors (50.4%). The motivations for posting children on social media, as presented by Langlais and Elias (2025), are shown in Table 3. The most common motivation for parents posting their children was to update and stay connected with family (91.1%), followed by update and stay connected with friends (79.8%), taking pride in their children (68.1%), share child momentous events (57.2%), share child accomplishments (56.0%), share day to day life (26.4%), archiving memories (49.6%), get advice about parenting (8.5%), and athletic recruitment (6.6%).

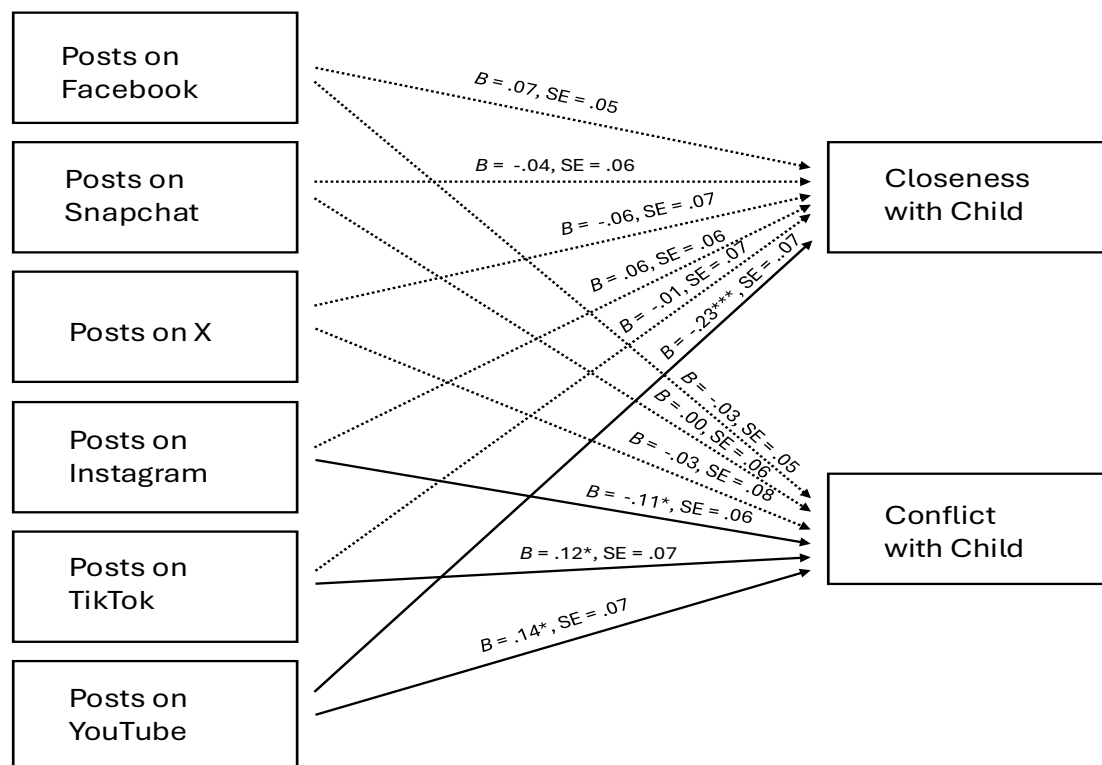
**Table 2.** Frequency distribution of posting variables from parents (N = 470).

Parents posting reasons	Yes	No
School milestone	264	206
Child birthdays	387	83
Family outings and activities	388	82
Holiday events	324	146
Silly child behaviors	237	233
Share child accomplishments	289	181
General family pictures	331	139



**Figure 2.** Path model predicting parent-child rapport from sharenting behaviors.

Note: Data is presented as standardized beta coefficients with standard errors. B = Standardized beta coefficients; SE = Standard Error. \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ .



**Figure 3.** Path model predicting parent-child rapport from social media sources of sharenting behaviors. Note: Data is presented as standardized beta coefficients with standard errors. B = Standardized beta coefficients; SE = Standard Error. \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ .

**Table 3.** Frequency distribution of motivation variables from parents' postings (N = 470)

Parents posting motivations	Yes	No
Update and stay connected with family	428	42
Update and stay connected with friends	375	95
Share day-to-day life with social network	124	346
Share child accomplishments	263	207
Share child momentous events	269	201
Taking pride in children	320	150
Athletic recruitment	31	439
Give advice about parenting	40	430
Archiving memories	233	237

Next, we explored the relationship between parents' posting behaviors involving their children and parents self-reported rapport with their children, represented by closeness and conflict. First, a path model predicting closeness and conflict was analyzed with three independent variables: parents' average posting frequency of all of their children, the number of times they posted their children over the last seven days, and the ratio of posts including children from the last 20 posts. Results are presented in Figure 2. According to this model, the frequency of posting children on social media was negatively associated with conflict with children; posts of children over the last seven days were positively associated with conflict with children; and ratio of posts including children was positively associated with closeness with children. This path model was saturated ( $\chi^2 = 0$ ,  $df = 0$ ,  $CFI = 1.00$ ,  $TLI = 1.00$ ,  $RMSEA = .00$ ,  $SRMR = .00$ ).

Last, we examined how posting children on specific social media platforms predicted parents' reports of closeness and conflict with their children. Results of this analysis are presented in Figure 3. According to this figure, posting on YouTube was negatively associated with closeness with children and positively associated with conflict. Additionally, posting on Instagram was negatively associated with conflict with the child and posting on TikTok was positively associated with conflict with the child. Posting on Facebook, Snapchat, and X was not associated with closeness or conflict with the child. This path model was also saturated ( $\chi^2 = 0$ ,  $df = 0$ ,  $CFI = 1.00$ ,  $TLI = 1.00$ ,  $RMSEA = .00$ ,  $SRMR = .00$ ).

#### 4. Discussion

The present study set out to identify the context and frequency of parents' social media posts about their children, examine their motivations for sharing, and explore how these practices relate to parent-child relationship quality, as perceived by parents. By addressing these goals, this research clarifies how sharenting is woven into everyday parenting, what drives parents to engage in it, and how it may shape rapport with their children. In the sections that follow, we discuss these findings in relation to prior research and consider their broader implications for family dynamics and digital boundaries.

The context of parents' sharenting practices in this study reveals that posting is primarily centered around milestones and celebrations, everyday family life, and humorous or candid moments that capture their children's personalities. As shown in Table 2, over 80% of parents reported sharing content about family outings and activities (82.6%) and their child's birthday (82.3%), emphasizing the importance of documenting both significant celebrations and routine experiences. Additionally, general family pictures (70.4%) and holiday events (68.9%) were highly prevalent, suggesting that social media has become a primary venue for storing moments that contribute to an ongoing story of family life. Posts highlighting children's accomplishments (61.5%) and school milestones (56.2%) further show how parents use social media to recognize their child's development and success in more formal settings. Candid or lighthearted content, such as silly child behaviors (50.4%), was frequently posted, reflecting parents' desire to showcase their children's personalities and everyday humor.

Taken together, these patterns highlight that sharenting is not limited to isolated special occasions but is instead integrated into the daily practices of parenting in the digital age. What is particularly unique about social media platforms, unlike private digital archives or closed messaging applications, is that they are designed for public sharing, engagement, and ongoing visibility. By posting both milestones and ordinary moments in these networked spaces, parents create an ongoing, often widely accessible digital archive that shapes how family and friends perceive their children, as well as how broader audiences they may not know personally perceive them. This normalization of sharing aligns with prior work (Cataldo et al., 2022; Fox & Hoy, 2019), suggesting that social media has evolved into an extension of the family album, but with fundamentally different properties: posts are algorithmically amplified, easily redistributable, and shaped by norms of audience interaction. These findings highlight a cultural shift in which public sharing has become an expected element

of parenting, raising important questions about privacy, consent, and the long-term implications for children's developing sense of self in a digital world that is inherently more public and persistent than previous forms of online communication.

Our findings showed that the most frequently used social media platform for parents to post about their children on was Facebook, followed closely by Instagram. The average age of parents in this study was 38.6 years, placing them squarely within the millennial generation. Given these data points, it is reasonable to conclude that Facebook and Instagram were the top platforms of choice, as they were the primary social media spaces that millennials adopted during their young adulthood. This generational familiarity likely shaped their posting behaviors. In contrast, Snapchat, TikTok, X, and, to an extent, YouTube had over 70% of parents reporting no usage for posting about their children. Snapchat and TikTok are primarily oriented toward short-form video content rather than photos with captions. Although Instagram and Facebook now offer these video features, their origins were primarily image-based, reinforcing their appeal for parents accustomed to photo sharing. X is fundamentally a text-focused platform where visual content is secondary to commentary and microblogging, making it less intuitive for sharing family imagery. YouTube, on the other hand, is designed around long-form video content, which is often geared toward lifestyle vlogging or influencer-driven content rather than everyday family updates. These platform distinctions align with uses and gratifications theory (Katz et al., 1973; Ruggiero, 2000), suggesting that parents select platforms that best satisfy their needs to document family milestones and maintain social ties within familiar online spaces.

The motivations behind parents' sharenting practices in this study mainly focused on staying connected and expressing pride in their children. As shown in Table 2, the most common reasons parents gave for posting were to update and stay connected with family (91.1%) and friends (79.8%). This suggests that many parents rely on social media as their primary way of maintaining relationships and sharing family milestones with loved ones and their social circles. This aligns closely with uses and gratifications theory (Katz et al., 1973; Ruggiero, 2000), which proposes that people use media to fulfill social connection and identity needs. Parents are not just passively consuming content; they are actively shaping their family's story to feel more connected to others. Besides connection, many parents also mentioned motivations related to identity expression and positive self-presentation. Over two-thirds posted because they were proud of their children (68.1%) and about half shared their children's accomplishments (56.0%) or significant moments (57.2%). These reasons reflect how sharenting can serve as a way for parents to present themselves as caring, engaged, and successful in their parenting. This finding supports Erikson's (1963) psychosocial theory of development, which emphasizes adults' need for generativity, or the desire to leave a lasting and meaningful impact on the world. In this case, sharing children's achievements and milestones on social media helps parents build a digital legacy that affirms their identity and purpose.

In addition to these relational and identity-based motivations, it is important to consider how parents curate the images and stories they share. While this study did not directly measure how many photos parents take versus what they post, previous research suggests that sharenting often involves selective presentation, where parents choose moments that reflect positively on their family or align with culturally idealized visions of parenthood (Fox & Hoy, 2019). This practice can contribute to what some call a 'highlight reel' effect—showing only milestones, achievements, and joyful moments while omitting the more mundane or challenging aspects of parenting. In this way, sharenting becomes not just a way to document but also a method of crafting an image of family life that may resemble an Instagram-perfect ideal rather than the more complex reality. This curation can also intersect with social comparison processes, where parents feel pressure to demonstrate that they are keeping up with peers in their children's development, activities, or accomplishments. Such dynamics may reinforce the motivation to post selectively and to portray family life as consistently happy, successful, and connected. It is also important to note that motivations like archiving memories (49.6%) are quite common, suggesting that social media also functions as a modern family scrapbook. Conversely, fewer parents reported sharing everyday activities (26.4%), indicating a tendency to curate content that highlights more significant or positive experiences rather than daily life. Only a small percentage used social media for more practical reasons, such as seeking parenting advice (8.5%) or supporting athletic recruitment (6.6%). Overall, these patterns show that while sharenting serves multiple purposes, it is primarily a relational and expressive practice rather than purely informational.

The relationship between parents' posting behaviors and their reported rapport with their children offers important insights into the ways sharenting can shape family dynamics. Rapport in this study was measured using subscales capturing closeness (warmth and positive connection) and conflict (tension and disagreements). The path analyses revealed a nuanced pattern, where overall posting frequency was linked to lower conflict,

while recent high-frequency posting over the past seven days was associated with higher conflict. Additionally, a higher proportion of posts about children in the last twenty posts predicted greater closeness. These findings suggest that when posting is integrated into a family's routine in a moderate and ongoing way, it may help parents feel more connected and engaged with their children. However, when posting becomes more intense or concentrated in a short period, it may contribute to tension, potentially because children perceive this as intrusive or feel they have less control over their representation. This finding is consistent with prior work suggesting that children and adolescents may experience discomfort or conflict when they feel that their privacy is not respected or when their parents share personal content without their consent (Peleg et al., 2025; Ribak, 2025).

Platform-specific relationships further emphasize that not all sharenting has the same relational impact. In this study, posting on Instagram was linked to less conflict, possibly because parents view Instagram as a familiar or controlled space where they can showcase positive family moments for a known audience. Conversely, posting on TikTok and YouTube was associated with increased conflict, and, in the case of YouTube, reduced closeness. One reason TikTok and YouTube may be linked to more conflict is the generational context of these platforms. TikTok, in particular, is mainly used by younger users, and children might feel that their parents sharing content there encroaches on a space they see as their own. The visibility of these platforms among peers could increase feelings of embarrassment or loss of control. Additionally, both TikTok and YouTube are more closely tied to viral content and influencer culture, which can make children feel that their lives are being shared in a more performative or public manner compared to platforms like Facebook or Instagram. This distinction between platforms highlights how the visibility and perceived audience of sharenting content significantly influence children's reactions to being shared. Therefore, sharenting isn't inherently positive or negative but depends on factors like how often, when, and where sharing occurs, as well as family expectations and comfort levels. As social media becomes more integrated into daily parenting, these findings underscore the importance of open communication and clear boundaries regarding what is shared, where it's shared, and how it aligns with children's privacy and autonomy. These dynamics can also shape how children view themselves over time, as repeated sharing may lead to a feeling that their identity is being shaped or performed for others rather than owned by them.

#### **4.1. Limitations and directions for future research**

Several limitations should be considered when interpreting these findings. First, all data were based on parent self-reports, which may be subject to recall biases and social desirability effects. Although parents were asked to reflect on recent posts, their estimates of frequency and motivations may not fully align with actual behavior. Second, the sample primarily included middle-income, millennial parents, most of whom identified as White, which may limit the generalizability of the results to more diverse cultural or socioeconomic contexts. Third, while this study examined parent-child rapport in terms of closeness and conflict, it did not directly measure children's own perceptions or long-term outcomes such as social anxiety, self-concept, or feelings of harm. Future research should consider integrating children's perspectives and longitudinal designs to better understand how sharenting evolves over time and its influence on developmental outcomes. Additionally, as social media platforms and norms continue to shift, further work is needed to explore how platform affordances, privacy settings, and cultural expectations interact to shape family dynamics. Finally, these findings highlight the importance of considering ethical questions about children's digital privacy and autonomy, suggesting a need for clearer guidelines and policy discussions about appropriate boundaries in online sharing.

### **5. Conclusion**

Overall, this study contributes to a growing understanding of how sharenting is embedded in contemporary parenting practices. By examining what parents share, why they share it, and how these behaviors relate to their relationships with their children, the findings offer important insights into the social and relational dynamics of family life online. While sharenting often fulfills positive needs for connection and memory-keeping, certain patterns of frequent or highly public posting were linked to increased conflict and decreased closeness, suggesting that these practices can also create tension around privacy and control. As social media becomes an increasingly central part of family life, supporting parents in making informed and reflective decisions about sharing will be essential to balancing connection with respect for children's developing sense of self.

### Statement of Researchers

**Researchers' contribution rate statement:** **Conceptualization:** M.L. and B.M.; **Data curation:** M.L.; **Formal analysis:** M.L. and C.J.; **Funding acquisition:** M.L. and B.M.; **Investigation:** M.L.; **Methodology:** M.L. and B.M.; **Project administration:** M.L.; **Writing – original draft:** M.L., C.J., and B.M.; **Writing – review & editing:** M.L., C.J., and B.M.

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## RESEARCH ARTICLE

## OPEN ACCESS

# Reflexive thematic analysis of 'GlassChildren' Reddit posts by siblings of autism

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## Highlights:

- "Glass children" (siblings of autistic individuals) frequently report feeling overlooked and neglected by parents.
- Having an autistic sibling profoundly altered participants' personal development, mental well-being, and life trajectories.
- Participants commonly reported experiencing intense negative emotions, including sadness, anger, guilt, and future-related fears.
- Targeted interventions like parental education and therapeutic support are critically needed to prevent isolation.

## Abstract

This study examined the experiences of individuals with autistic siblings who self-identify as "glass children," feeling overlooked or invisible due to their sibling's needs. 593 statements drawn from relevant threads by 53 individuals from the online forum R/GlassChildren were analysed following six phases of Reflexive Thematic Analysis: familiarization with the data, generating initial codes, producing themes, reviewing potential themes, defining themes, and producing the report. Themes suggested that many participants felt neglected by their parents, experienced tumultuous sibling relationships, and had life trajectories profoundly altered by this, including their mental health and wellbeing. Participants primarily used the forum for support, solidarity, and advice, which led to a strong emphasis on their sharing a wide range of negative emotions, including sadness, anger, guilt, blame, and embarrassment, as well as fears about the future. Limitations include the lack of data verification and the representativeness of siblings as a whole. Though this study did not aim to quantify the prevalence or degree of such self-identification among siblings, the results clearly highlight a critical need for more accessible, targeted interventions, including parental education, therapeutic support, and peer networks, to help prevent feelings of neglect and isolation among these siblings.

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## 1. Introduction

In a 2010 TED Talk, the entrepreneur Alicia Maples coined the term "glass child" to encapsulate the experience of siblings of individuals who require high levels of care and attention due to complex needs (TEDx Talks, 2010). The term reflects the feeling of invisibility, with the interests and difficulties of individuals often overlooked in favour of their siblings. These experiences are typically negative, stemming from feelings of neglect or burden, particularly by parents. While the term can apply to siblings of individuals with any condition, it mainly refers to those with siblings who have chronic illnesses or disabilities (Hanvey et al., 2022). Notably, Maples herself identifies as a glass child due to her experience of having an autistic brother.

Autism Spectrum Disorder (ASD: DSM-5) is characterized by persistent deficits in social communication and social interaction across multiple contexts, alongside restricted, repetitive patterns of behavior, interests, or activities, which may include inflexible adherence to routines and heightened or reduced sensitivity to sensory input (American Psychiatric Association, 2013). Notably, autistic individuals experience differences in social interaction, communication, and sensory processing, which can influence their experiences across social, familial, academic, and personal domains (WHO, 2018). Global autism prevalence is currently estimated at 1 in 100 individuals (WHO, 2023), with a significant rise in diagnoses in recent decades (Onaolapo & Onaolapo, 2017). A range of studies suggest that the presence of neurodiversity within families can bring both advantages and challenges to family systems (Macks & Reeve, 2007; Cridland et al., 2014). While the present study focuses on siblings who self-identify as glass children, this is set against the background of the broader context of how family dynamics are shaped by the presence of autism. Much of the initial family-based research in this area focuses on parents, with Woodgate et al. (2008) finding that many parents of autistic individuals experience isolation and challenges with vigilant parenting, maintaining family well-being, and navigating the family system. Giallo et al. (2013) similarly found social isolation to be a key factor in this population, with additional research finding that parental physical and mental wellbeing and family coherence are impaired (Davis & Carter, 2008; Schieve et al., 2007). In a systematic review of 26 studies, Saccà et al. (2019) found that heightened parental stress was the primary issue associated with having an autistic child, compromising coping strategies and problem-solving abilities in both parents and children. Similarly, a systematic review (Vasilopoulou & Nisbet, 2016) reported that parents of autistic children reported a lower quality of life compared to the general population.

Early research in this field overlooked siblings' experiences (Watson et al., 2021). In fact, Green (2013) found that sibling relationships in autism are often the longest-lasting in a person's life, with siblings frequently acting as early teachers, role models, and companions. Furthermore, growing up with an autistic sibling offers a unique chance for emotional, psychological, behavioral, and social growth (McHale et al., 2012). As a result, it is not surprising that having a neurodivergent sibling can influence individuals' life paths, including their social, family, and psychological development (Lovell & Wetherell, 2016). More recent research shows that typically developing (TD) siblings of autistic individuals tend to have poorer emotional, behavioral, social, and psychological outcomes compared to their peers (Shivers et al., 2019). Mandleco and Webb (2015) compared TD siblings of autistic individuals with siblings of those with Down Syndrome (DS). Their study found that children with autistic siblings reported less prosocial behavior, more negative perceptions of their sibling, and experienced higher stress and negative impacts on their friendships due to their sibling than those with DS siblings. Leedham et al. (2020) analyzed 18 qualitative studies on siblings' experiences of autism across the lifespan. Their findings included both feelings of affection, empathy, and love toward their siblings, as well as expectations for TD siblings to assume specific responsibilities, which significantly affected some individuals' mental health later in life. In their systematic review focusing on adult siblings, Watson et al. (2021) emphasized that interactions with their autistic siblings can both positively and negatively influence self-identity, personal development, social interactions, and coping strategies.

Accounts of the lived experience of younger siblings included being expected to take on mature responsibilities, such as caring for their autistic siblings and helping with household tasks (Gorjy et al., 2017; Cridland et al., 2016; Mascha & Boucher, 2006); while also fearing for the future of themselves and their siblings (Benderix & Sivberg, 2007; Tsai et al., 2018; Petalas et al., 2012). Additionally, many reportedly faced unpredictable behaviors, including aggression and meltdowns, which negatively impacted their well-being. Common emotions included embarrassment, guilt, anger, and social isolation, with some reluctant to invite friends over or disclose having an autistic sibling due to receiving negative comments from others (Benderix & Sivberg, 2007; Mascha & Boucher, 2006; Gorjy et al., 2017; Pavlopoulou & Dimitriou, 2020). Notably, individuals reported differing parenting approaches, including higher expectations and less attention (Costa & da Silva Pereira, 2019; Cridland et al., 2016; Chan & Goh, 2014; Ward et al., 2016; Tsai et al., 2018). Negative coping

strategies also emerged, with some feeling isolated due to fear of their sibling's violence, while others felt compelled to appease their sibling to avoid conflict and spare their parents' stress (Angell et al., 2012; Tsai et al., 2018). This aligns with the findings of Hayes and Watson (2013), whose research highlighted that parenting stress in parents of autistic individuals is substantial enough to require attention and intervention to support family functioning. These findings imply that siblings not only encounter direct challenges from having an autistic sibling but are also affected by the stress experienced by their parents.

While siblings may encounter challenges, they often also report positive effects including a sense of pride and growing empathy, better coping and compromising skills, and greater acceptance over a lifetime (Angell et al., 2012; Corsano et al., 2017; Chan & Goh, 2014; Ward et al., 2016). Additionally, several siblings expressed a desire to use their role to promote acceptance and awareness of autism (Hwang & Charnley, 2010; Gorjy et al., 2017). Regarding sibling interactions, many individuals shared feelings of admiration for their sibling and enjoyed their companionship (Angell et al., 2012; Petalas et al., 2009; Pavlopoulou & Dimitriou, 2020; Mascha & Boucher, 2006; Costa & da Silva Pereira, 2019; Ward et al., 2016; Gorjy et al., 2017). Others expressed gratitude for the support they received from friends and extended family, especially in situations where parental support was lacking (Petalas et al., 2012; Cridland et al., 2016). Although the existing literature on siblings covers outcomes consistent with the experience of being a glass child, their lived experiences have not been well documented to date. The total number or proportion who identify with this lived experience or consciously adopt this identity remains unknown, but research into the lived experiences of siblings of people with disabilities or chronic illnesses (Hanvey et al., 2022) suggests it is likely to be common.

### 1.1. Online forums as a source of data on sibling experiences

A large portion of the population now spends much of their lives online, with online time continually increasing (Suler, 2004; Odgers & Jensen, 2020). It is also notable that many young people now turn to online resources for support, as offline help-seeking is often hindered by stigma and individuals' desire to handle problems on their own (Pretorius et al., 2019). There has been a significant rise in studies using online forums: internet pages designed for diverse groups to discuss a variety of topics and seek emotional and informational support (Hsiung, 2000). Notably, online forums can provide safe environments for individuals to share personal issues (Campbell et al., 2001) and have been recognized as valuable sources of data for qualitative research (Im & Chee, 2012). Forums related to autism include both charity-run forums and general social media sites. Various fora run by the National Autistic Society (National Autistic Society, 2021), for example, provide anonymity for participants and allow individuals who are directly or indirectly affected by autism to discuss issues, share stories, and ask for advice. Online forums can also be found on social media sites such as Facebook, which allows the creation of both public and private groups, such as "Autism Parents Support Group" (Facebook, 2024). The online site Reddit also provides widely distributed forums known as "subreddits" that promote open conversation about nearly any subject. One notable study that used Reddit to explore the experiences of individuals with autistic siblings is that of Dansby et al. (2017), who examined support-seeking by neurotypical (NT) siblings of autistic individuals in the subreddit R/Autism (Reddit, 2024b). The findings aligned well with previous literature, revealing unique family dynamics, a broad emotional spectrum including guilt, anger, love, and pride, and insight into how autistic siblings influenced the life trajectories of their NT siblings, such as their career choices. The study also identified a spectrum of coping strategies, both negative (such as blaming others or substance abuse) and positive (such as seeking peer support or therapy). In the ten years since Dansby et al. (2017) collected data, the scale and diversity of content across platforms, and perhaps on Reddit in particular, have increased exponentially, making it an ideal context for further study.

### 1.2. Aims

We aimed to investigate the experiences of siblings of autistic individuals who self-identify as glass children, using qualitative data obtained from the subreddit page R/GlassChildren (Reddit, 2024a), which is described as "a community meant for people who have siblings who take up a disproportionate amount of their parents' time and energy". This forum provides a space for siblings to discuss their experiences of having disabled siblings and explore the glass child identity. The primary aim was descriptive, though of course, we aim to have implications for the practical application of our results.

Reddit was chosen as the primary platform for data collection over forums like Facebook groups or the National Autistic Society's (NAS) discussion pages (National Autistic Society, 2021) due to its ability to provide a more extensive and cohesive dataset on the glass child experience related to autism. Unlike the NAS platform, where each post forms an isolated chat with few replies, Reddit's subreddit structure allows for continuous

threads within a central forum. Additionally, the subreddit format arguably encourages deeper community engagement than forums such as Facebook, with posts often receiving multiple responses that generate dynamic, multi-perspective discussions. Furthermore, Reddit's robust search and tagging functions streamline the identification of relevant posts, further enhancing its value as a data source.

**Positionality:** The researcher is a sibling of an autistic individual, which informed engagement with the data and sensitivity to participants' accounts. This personal experience influenced the analysis by increasing awareness of participants' experiences, particularly regarding themes of emotional strain and long-term wellbeing, while care was taken to ensure that interpretations were guided by the data rather than the researcher's own assumptions. Importantly, reflexive awareness was maintained throughout to consider how the researcher's position shaped interpretation during theme development.

## 2. Method

### 2.1. Participants

Participants were selected based on their posts between August 2023 and 6th June 2024. This 10-month period was selected to maximize data inclusion while maintaining accurate chronology because, after a year has passed since a post was made, 'month of posting' information is removed. Posts in which individuals explicitly stated they had an autistic sibling were included in the dataset. The dataset comprised a total of 50 main posts and 19 comments responding to these posts, contributed by 53 participants identified by their usernames, with two having their identities replaced by "[deleted]" after anonymization, linked to a post. Seven of these participants posted twice, two posted three times, and one posted five times within the selected time frame. Demographic information was based on participants' explicit responses. Of 27 individuals who provided their age, the range was 18-39 (M=28.5). Participants were excluded if they identified as being under 18 years old. The sample included 12 women, 4 men, 1 transgender man, and 39 who did not specify. Six self-identified as neurodivergent; two with attention deficit hyperactivity disorder (ADHD), one with co-occurring ADHD and ASD, and three with ASD. Participants described themselves as from Australia, America, and France, though most did not specify a location. Cultural background, race, or ethnicity were rarely reported and are therefore not included and may not be reliable.

### 2.2. Ethical Procedures

Data were not collected in real time, as no new posts were created or monitored. As such, formal ethics approval was not required for this study (Proferes et al., 2021), though ethical consideration and consultation were undertaken. With regard to consent, publicly available data does not require user consent for use in research; indeed, seeking consent could have interrupted online discussions, driven users from the subreddit, and consequently deprived individuals of support (Smedley & Coulson, 2021). Instead, the researchers prioritised participant anonymity by drawing on ethical advice (Van Den Hoonaard, 2003) and employing robust anonymisation techniques using Artificial Intelligence (AI) tools (Zimmer, 2010). All quotations presented were paraphrased for anonymity using QuillBot (Learneo Inc., 2024) and ChatGPT (OpenAI, 2024). All quotes were processed through QuillBot twice to ensure thorough anonymity. QuillBot offers the option to edit specific words from a drop-down list, further helping ensure all quotes are thoroughly and fairly altered. This option also helped to preserve the original phrasing as closely as possible to enhance validity. Subsequently, each quote was rephrased a third time using ChatGPT with the prompt, "Please could you paraphrase this '[quote]'?" to refine fluency and tone. Finally, all modified quotes were checked with Google Search to confirm that they could not be traced, ensuring complete anonymity.

Additional steps that ensured the project's ethical integrity included excluding all data from individuals who explicitly stated they were under 18, in the interest of safeguarding minors from potential distress and addressing consent issues related to data use. No other data exclusions were made, ensuring a diverse dataset that includes various genders, populations, and both neurodivergent and neurotypical individuals.

### 2.3. Data Analysis

This study employed Reflexive Thematic Analysis as outlined by Braun and Clarke (2006; 2020). A constructionist epistemology was adopted to account for the social and cultural influences in online interactions (Schwandt, 1998), in line with the view that experiences shared virtually may reflect broader social constructions rather than objective realities. Furthermore, analysis was primarily inductive, allowing themes to emerge

naturally, however discoveries established by existing literature such as that of Watson et al. (2021) and Dansby et al. (2017) were also used deductively to frame and refine findings.

Braun and Clarke's (2006; 2020) six phases include familiarization with the data, generating initial codes, producing themes, reviewing potential themes, defining themes, and producing the report. The first author initially familiarized herself with the data by repeatedly reading the posts, taking notes to highlight key patterns. The initial codes were systematically generated from significant data features using an inductive approach, allowing the data to guide initial analysis rather than personal bias or pre-conceived ideas from the existing literature. NVivo software (Lumivero, 2023) was used to efficiently organize and manage these codes, allowing all data items with the same code to be formatted in a single document when required.

Initially, inductive analysis explored novel patterns or themes in the data. Subsequent deductive analysis verified how the emerging findings fit established theories and further refined the framework. This mixed strategy aimed to produce codes that were rigorous and comprehensive, ensuring that findings were grounded in the data while also contributing to theory testing and development. These codes were then organized into potential themes by identifying common connections between them. This procedure was somewhat iterative, requiring frequent rearrangement to best organize data into comprehensive theme groups. All researchers reviewed and refined the themes to ensure they accurately captured the depth of the data, using deductive reasoning informed by previous literature to aid the process.

### 3. Results

Five hundred and ninety-three significant statements were extracted and assembled into 45 codes, resulting in five key themes: (1) Atypical Family Relationships; (2) Autistic Siblings Impacting Personal Development; (3) Autistic Siblings Impacting Life Trajectories; (4) Complex Emotional Dynamics; (5) The Form and Function of the Reddit Forum. Codes are shown for each theme in quotation.

#### 3.1. Theme I: Atypical Familial Relationships

Participants shared experiences of growing up in families where the presence of an autistic sibling significantly shaped relationships, responsibilities, and emotional wellbeing. These accounts revealed patterns of feeling emotionally overlooked by parents, navigating fraught and sometimes distressing sibling interactions, and, for many, ultimately distancing themselves from family as a means of preserving their mental health and identity.

##### 3.1.1. *Feeling Overlooked by Parents*

A recurring sub-theme was the feeling that their needs were overlooked by parents in favour of their autistic sibling: "My parents were more concerned about my sisters, so I was unable to even talk about how I felt," and "I attempted to discuss painful experiences in my childhood with my mother, but she was preoccupied with my sibling." One participant remarked, "I don't recall ever being asked what I wanted. It was always my sibling's way." Some participants also reported feeling negatively compared to their siblings, with achievements undervalued. Statements like, "My brother's much lesser accomplishment will always be interpreted as more," and "I detest that his achievements will always be valued more highly than my own," illustrate this frustration. Additionally, several participants described their parents' troubled relationships, often marked by frequent arguments or separation, which impacted the family dynamic, particularly for the autistic sibling. One participant noted, "My brother would get overwhelmed, scared, and confused when they were in the midst of an intense argument". As a result, many felt pressured to take on an emotionally supportive role, as reflected in comments like, "My parents used me for emotional support," and "This 'broken family' is only partially held together by me."

##### 3.1.2. *Disconnection and Conflict in Sibling Relationships*

Many participants reported experiencing physical abuse from their autistic siblings, with statements such as, "My brother has always injured me while pursuing food," and, "He acts aggressively towards me, causing bruises and bleeding." Struggles with sibling relationships were common, with some participants feeling emotionally distant or wishing they were only children. One participant shared, "I didn't feel I had a sibling," while another admitted, "I faked being an only child to partners." Emotional detachment was evident in comments: "I don't consider my sibling to be my sibling,"; "I don't feel anything when I interact with my sibling." Dislike for their siblings was also common: "I'm not sure I have any affection for my sister,"; "I can't love somebody if they haven't improved my life in any way". Relationship complexity led to a sense of struggle: "My

emotions are still complex towards him,"; "It's difficult to build any kind of relationship with somebody who is unable to comprehend or interact with you." While no one shared wholly positive experiences with their autistic sibling, one participant did express gratitude for growing closer to their other siblings, stating, "Having something approaching an affectionate brotherly relationship-something I never really expected to have- makes me really happy".

### 3.1.3. *Choosing Distance as a Form of Self-Preservation*

Due to these tumultuous familial relationships, many felt the need to distance themselves from family members. Participants shared sentiments like, "To live my own life, I have no choice but to break away from my sister" and "This experience pushed me to relocate and cut off communication." Others echoed, "My life has improved by avoiding them; it was liberating and therapeutic," while some explained, "I barely interact with my mother and have severed ties with my autistic sibling without regret."

## 3.2. Theme II: Impact on Personal Development

This theme captures the profound and lasting effects that growing up with an autistic sibling had on participants' sense of self, emotional wellbeing, and everyday life. From internalising pressure to be the "good" or independent child, to navigating environments marked by unpredictability and emotional intensity, participants described how these dynamics shaped their behavior, self-expression, and psychological health.

### 3.2.1. *Pressure to be the 'Good' or Independent Child*

Many individuals felt pressured to be the 'good' or independent child, as reflected in statements like, "Being self-sufficient and mature early, I became the 'good' child," and "Since I wasn't disabled, I was expected to be superior". They often had to suppress their feelings to take on this role, with one noting, "I was expected to be a role model because I was 'mature,' but it was more about not being allowed to be a typical kid". This pressure seemed to stem more from a lack of alternatives than from genuine intent. Participants found this role challenging: "I could never meet my family's standards"; "I apologize to those who felt as isolated as I did from being pressured to be the 'easy' child".

### 3.2.2. *Silencing of Self-Expression*

Due to these pressures, many participants described limiting their self-expression, fearing reprimand, feeling guilty about being a burden, or believing no one would help. One participant mentioned, "I was afraid of my parents getting angry, so I didn't tell them I felt overwhelmed"; "I kept my needs and feelings secret so I wouldn't bother anyone". Some felt expressing themselves was pointless: "I stopped talking to people about my issues because I had no one to ask for help"; "I realized my parents couldn't support me anyway, so there was no point asking for help".

### 3.2.3. *Sibling-Defined Identity*

Participants often felt their identity was overshadowed by their autistic sibling, with one saying, "I've spent a lot of time trying to keep from letting being my sibling's brother define who I am." Even when proud of this relationship, it was still reported to limit self-development, as one individual shared, "Who I am is built around being her brother. I don't feel I have an identity without her."

### 3.2.4. *Stressful Home Environment*

Autistic siblings' behaviors contributed to abnormal home environments, making it difficult to relax. Participants described issues like noise, with one stating, "Having a peaceful household is impossible with my sister." Disruptive behaviors, including stimming and emotional outbursts, were common, as one participant shared, "They are always stimming with screams, yells, and groans," while another contributed, "I share accommodation with my brother who stims verbally to fall asleep." Beyond stimming, behaviors like indecent exposure, self-injury, and emotional outbursts added to the abnormal home environment. One participant shared, "I entered the living room not knowing my sibling was wandering around naked," while others described situations of shrieking, biting, and violent outbursts, comparing the sounds to "someone being murdered." These reports should be seen as a forum for sharing problems, not as representative of siblings' experiences in the wider context.

### 3.2.5. *Mental Health Struggles*

Many participants reported mental health struggles, including suicidal ideation, self-harm, eating disorders, depression, and anxiety. One individual shared, “I have experienced extreme anxiety since childhood, along with depression and suicidal thoughts,” with another claiming “Self-harm, anxiety, depression, and a suicide attempt were major struggles I faced growing up.” The severity of these problems is demonstrated as one person posted “Assuming I would have committed suicide, I did not believe I would receive my high school diploma.” Many specifically linked their mental health issues to formative experiences, with one person stating, “These early life events account for a great deal of my anxiety”.

## 3.3. Theme III: Impact on Life Trajectories

This theme explores how growing up with an autistic sibling can shape an individual's long-term life decisions, relationships, and roles. Participants described how caregiving responsibilities, social isolation, and concerns about their own future families influenced their education, careers, and personal choices. The theme also reveals how these experiences set the stage for future relationships, with individuals often navigating complex challenges that significantly impact their adult lives.

### 3.3.1. *Becoming a Caregiver*

Many participants reported taking on caregiving roles, with statements like “I have lived my whole life as a carer” and “I was the second mother.” This often stemmed from parental pressure, with one noting, “My parents depended on me for entertainment, tutoring, babysitting, and disciplinary issues for my siblings.” This responsibility influenced future decisions, as shown by one participant who said, “I know I need to live long enough to support my sibling, so I never take any chances,” illustrating the impact on life trajectories.

### 3.3.2. *Impact on Education and Career*

Caregiving roles were also reportedly associated with reduced education and career advancement. Some claimed missed classes and exams due to caregiving duties, with one participant saying, “I missed multiple final exams as I was caring for my sibling,” whilst another added, “The faculty encouraged me to miss lessons to spend time with my sibling and deal with her behaviors.” Most markedly perhaps, “My parents can't afford care, so I can't work because I have to stay at the house and do it instead.” Several felt that life trajectories were also affected by career decisions shaped by these experiences in contrasting ways. Some reported entering medical or care fields: “Because of my sibling, I recently completed my education as a nurse.” Conversely, others avoided such careers, with one noting, “I had no interest in a profession that involved helping those in need or the disabled”.

### 3.3.3. *Social Impact of Having an Autistic Sibling*

Social roles and relationships were widely reported: “I have been putting my friendships at risk to be with my sibling.” A majority of participants felt unable to engage in typical social activities due to their sibling's needs: “We frequently had to leave locations that demanded stillness because she cannot be silent” and “There are several places that we can't go or stay at because we need a certain degree of quiet, such theatres, movies, or certain restaurants.” Perhaps encapsulating this perceived consequence: “My sibling's autism caused my household to become reclusive”. Social isolation and ridicule were also common, with one participant saying, “Because my sister had autism, I was bullied in high school,” and another noting, “Their erratic behavior caused me to lose many relationships.” This social judgment led to feelings of hostility and fear of judgment, as one person shared, “My sibling's severe public tantrums and the critical looks have made me believe there is basic hostility in the world.

### 3.3.4. *Reproductive Choices and Family Planning*

Experiences with autistic siblings made many fearful of having children. Participants expressed concerns like, “My fear of becoming pregnant and bearing a disabled child is overwhelming,” and “I am terrified to have my own children, considering the hereditary elements of autism.” One participant shared that even after becoming pregnant, “My pregnancy consumed me with fear that my child would have autism.”

### 3.4. Theme IV: Navigating Intense and Complex Emotions

This theme explores the wide range of intense and often conflicting emotions experienced by participants as they navigated their relationships with their autistic siblings. Emotions such as sadness, anger, guilt, embarrassment, and fear were prevalent, often intertwined with feelings of frustration, helplessness, and powerlessness. Participants frequently described emotional responses tied to their siblings' behaviors, the pressures of caregiving, and their uncertain futures. This theme highlights how complex emotional experiences shaped their identity, coping mechanisms, and overall mental health.

#### 3.4.1. Negative Emotions and Inner Conflicts

**Sadness.** Participants attributed their sadness to a range of childhood experiences ("I'm so sorrowful about my early years"), feeling powerless to help family members ("Being unable to support my other siblings made me feel so sad"), contemplating the impact on their life trajectory ("There are moments when seeing pictures from others showing off their kids' milestones makes me sad"), and experiencing pervasive sadness without a clear cause ("My sadness never goes away").

**Anger.** Many participants expressed anger about their childhood, with statements like, "I'm so angry about my upbringing," and "The fact that my parents brought me into this world fills me with anger." Some used anger as a coping mechanism, noting, "I frequently seek out things that make me angry because it helps me feel I have more power." Anger was also directed at their sibling's behavior, for example, "Her behavior makes me angry because it puts her in danger," as well as at others who were compassionate towards their sibling; "They deserve better; this infuriates me even more."

**Guilt.** Guilt was a prevalent emotion for participants, arising in various contexts. Many felt guilty for disliking their sibling, with statements like, "I really hate my sister, but I feel terrible for it," and "I hate my sibling, but it feels immoral." This guilt often led to self-reproach, as seen in comments such as, "I feel guilty about things I posted about my sister" and "I believe I am evil. Participants also experienced guilt over choosing independence over caregiving, expressed in statements like, "I felt tremendous guilt for moving out and leaving my sibling" and "I'm ashamed I don't want to be his caregiver." Additionally, guilt arose from not being able to support other family members, with one saying, "I feel shame for not helping my other siblings," and another noting, "I didn't end my life because I felt too guilty to leave my parents".

**Embarrassment.** In addition to sadness, guilt and anger, embarrassment about a sibling's behavior was common, particularly concerning the social impact of their behaviors. Indeed, participants reported feeling, "My autistic sibling makes me feel ashamed," and "I don't want people to make fun of me for the way my sibling behaves anymore."

#### 3.4.2. Fear and Anxiety About the Future

A significant emotional experience was that of fear for the future. Indeed, many expressed anxiety, particularly concerning the possibility of becoming their sibling's caregiver. One individual said, "The thought of potentially becoming my sibling's caregiver has always scared me," while another worried about the monetary burden, stating, "I'm constantly worried that I won't receive any financial support to help care for my sibling." One participant demonstrated these fears, saying, "Everything will come on too soon. As soon as I gain my freedom, these pressures will find me and overwhelm me. I'm not prepared."

#### 3.4.3. Perceptions of Accountability

Blame manifested in three main ways; blaming parents for siblings' negative behaviors, believing siblings act intentionally harmfully, and attributing familial dysfunction to the sibling. Indeed, many participants felt their parents enabled negative behaviors, with comments like, "My parents' incompetence led to my sibling's behaviors being tolerated and encouraged." Others attributed negative behaviors to their parents' passivity, claiming, "My brother became an entitled jerk because of my parents." Such language suggests glass children believe their siblings' behaviors stem from their parents' inaction.

In addition, many used language which suggested that they believed their sibling's behavior was purposefully harmful. Indeed, they described their siblings as "egocentric," "manipulative," "greedy," and "lacking any compassion for the suffering they inflicted upon my family." Furthermore, many attributed responsibility to their siblings in phrases such as "He just chooses to get angry or upset over stuff". Finally, many accounted for their family's dysfunction as due to the presence of their autistic sibling: "After my autistic

brother was born, things in our family began to fall apart;” “I can only spend time with my mom when I can tolerate being around my autistic sibling.”

### 3.5. Theme V: Form and Function of the Reddit Forum

The final theme explores the reasons individuals engage with the Reddit forum. This theme was deemed integral to the study's purpose, as it sheds light on the type of support that such individuals seek. It highlights the community's role in providing emotional and practical support, which can inform the development of psychological care and interventions. Two key motivations emerged: seeking advice and seeking solidarity.

#### 3.5.1 Advice Seeking

Many participants posted on the subreddit with a clear request for guidance, often ending their posts with requests like “Please share any advice you may have” or “Guidance is always appreciated.” Many used emoticons like “:)” to indicate their openness to feedback and suggestions. Users were looking for tangible advice that could help them navigate their complex situations. The desire for actionable recommendations was a central element of their participation in the community, showing a need for external perspectives or solutions to specific problems they faced.

#### 3.5.1. Solidarity Seeking

In addition to seeking practical advice, many individuals turned to a subreddit for emotional support, particularly to combat feelings of isolation. Posts like “I’m here to find solidarity” and “Reading posts reminds me I’m not alone” reflect a deep desire for connection. The sense of belonging to a community of individuals in similar situations seemed to lead to expressions of relief and gratitude for shared experiences, such as “This forum shows I’m not alone; discovering it saved me” and “Sharing your experiences made me feel less isolated, for which I am so grateful.” The forum thus became a space where users could find solidarity and emotional validation that was not readily available in other aspects of their lives, both online and in person.

## 4. Discussion

Utilising data collected from the online subreddit forum R/GlassChildren (Reddit, 2024a), this project aimed to investigate the experiences associated with having an autistic sibling, as perceived and reported by self-identifying glass children. Reflexive Thematic Analysis (Braun & Clarke, 2006; 2020) was employed to conduct inductive analysis of the dataset, with five key themes coming to light. *Theme 1* described strained dynamics with parents and siblings, often marked by emotional neglect. *Theme 2* highlighted disrupted identity formation and limited self-expression. *Theme 3* showed how caregiving responsibilities shaped participants' education, career paths, and decisions about future family life. *Theme 4* revealed ongoing struggles with negative emotions and internal conflicts. *Theme 5* illustrated how participants used the Reddit platform to seek advice and emotional solidarity. The findings of this study reinforce existing literature on the psychological and developmental impact of growing up alongside an autistic sibling, particularly in the context of glass child experiences. Echoing prior research, participants described heightened emotional burdens – including sadness, guilt, fear, and anger – stemming from caregiving roles, parental neglect, and unpredictable family dynamics. These factors align with reports of increased stress, impaired social functioning, and disrupted identity development among typically developing siblings (Shivers et al., 2019; Leedham et al., 2020). The expectation to mature quickly, suppress personal needs, and support family functioning often came at the cost of personal growth and mental wellbeing, reflecting themes found in studies by Cridland et al. (2016) and Watson et al. (2021).

One of the most prominent findings across both the present study and the existing literature is concern about the future, particularly regarding care for both the autistic sibling and oneself. As Watson et al. (2021) note, this fear is a common theme in much of the previous research on siblings of autistic individuals. However, unlike many previous studies, this research found few reports of positive experiences. Notably, existing literature suggests that individuals with autistic siblings often express increased empathy, pride, and acceptance over time (Chan & Goh, 2014; Angell et al., 2012; Corsano et al., 2017). In addition, positive sibling relationships and feelings of connection were frequently highlighted by previous work (Angell et al., 2012; Petalas et al., 2009; Pavlopoulou & Dimitriou, 2020). These positive impacts, however, were not prominent in the current dataset.

These minimal positive experiences could suggest that some self-identifying glass children view their experiences as overwhelmingly negative. However, it is also possible that participants did not feel compelled to share positive experiences on the forum. Indeed, due to the nature of the subreddit R/GlassChildren (Reddit,

2024a), this outcome was expected, prior to undertaking analysis. Indeed, the forum is specifically designed for discussions about being a glass child, particularly the experience of feeling neglected by guardians due to their sibling's needs. As this occurrence can be considered negative, it is perhaps unsurprising that the forum tends to focus predominantly on negative experiences. An additional explanation may be that the forum provides an outlet for individuals to share negative sentiments and opinions that are otherwise forbidden by their real-life community (Campbell et al., 2001), with many reporting feeling an inability to express themselves due to fear of reprimand. In keeping with this, participants predominantly used the forum to seek advice and solidarity. Indeed, such forms of support are likely driven by challenges rather than positive experiences (Wright, 2016; Campbell et al., 2001). This support-seeking behavior may have skewed the data towards negative experiences, as individuals generally do not seek help for positive events.

An additional explanation for the strong negative sentiment bias could be the online disinhibition effect, whereby people feel more comfortable sharing negative or sensitive experiences in anonymous settings, which may have contributed to the focus on hardships (Suler, 2004). One might also consider the recent rise of "trauma dumping" (Fenwick, 2022), where individuals share traumatic experiences publicly as part of online trends, which could additionally have contributed to the increase in people sharing more negative experiences than positive ones. In this way, there are a multitude of reasons which could explain why the dataset revealed a significantly large proportion of negative experiences.

Although positive experiences were sparse in the current study, it is important to note those that were reported, some of which echoed the findings of previous literature. For example, Cridland et al. (2016) and Petalas et al. (2012) found that individuals with autistic siblings often articulate gratitude for external support, a sentiment that was mirrored in this study as glass children expressed appreciation for the solidarity they found on the subreddit. Similarly, Hwang and Charnley (2010) and Gorjy et al. (2017) noted that some individuals assume advocacy roles because of their siblings' autism, a theme reflected in participants who reported choosing caregiving or healthcare careers based on their experiences.

However, despite these purportedly positive experiences, it is important to question whether they are truly constructive for this population of self-identifying glass children. Indeed, while expressing gratitude for external support might seem positive, it could also underscore the lack of adequate parental or institutional support. Similarly, participants who chose caregiving careers because of their family circumstances might have felt compelled by necessity, rather than personal choice. In this way, whilst these outcomes are framed positively, they could highlight the burden of responsibility that children with autistic siblings may carry and the restrictions it can place on their autonomy.

It is essential to critically examine how participants' descriptions of their autistic siblings may reflect broader societal and environmental failures rather than intrinsic traits of autistic individuals. Behaviors of autistic siblings described by participants can more accurately be understood as expressions of unmet needs or responses to distress, sensory overwhelm, or communication barriers - challenges often exacerbated by inflexible environments or inadequate support (Chapman, 2021). Framing the autistic sibling as the source of distress risks reinforcing deficit-based narratives and obscuring the structural factors - such as overstretched educational systems, limited access to specialist support, or ableist assumptions within families - that contribute to these outcomes (Botha & Frost, 2020). Behaviors labelled as "challenging" are often reactions to environments that fail to accommodate different ways of processing the world. In this light, the emotional toll described by glass children may be better understood because of an ecosystem that neither adequately supports autistic individuals nor equips families with the understanding, resources, and systemic compassion to navigate neurodivergence. Indeed, parents, educators, and healthcare providers may unintentionally neglect the needs of lower-needs siblings, leading to feelings of isolation, resentment, and frustration, such as those detailed in this study. In this way, education on how to provide the support needed could improve the experiences of these individuals: indeed, the fifth key theme regarding the function of the Reddit forum format effectively outlined the type of support that self-identifying glass children may seek, as many reported finding it beneficial. In line with this, RCT evidence suggests that comprehensive sibling support delivered in a group format improves sibling mental health outcomes (Jones et al., 2020). In addition, providing accessible education for parents of individuals diagnosed with autism on how to balance the needs of all children, as well as offering professional therapeutic interventions to address tumultuous family dynamics, could prevent many of the negative outcomes experienced by glass children (Fong et al., 2021). Indeed, such interventions could ensure that all children feel empowered to express themselves and receive validation from their family or community, addressing findings that many glass children restricted their self-expression and felt neglected due to their unique circumstances.

### 5.1. Limitations and directions for future research

While this study offers valuable insights, it is crucial to acknowledge its limitations. First, much of this research depends on trusting that the posts accurately depict truthful experiences. Since the authenticity of the posts cannot be confirmed, many data points may be fabricated without the researcher's knowledge, which could invalidate many of the results. This dependence on user-provided data also restricts demographic insights, as not all participants shared clear information about their age, gender, nationality, or potential neurodivergence. Additionally, because shared information cannot be verified, the demographic data may not represent the entire sample accurately. Relying on self-reported online data also limits the depth of analysis, as non-verbal cues and opportunities for clarification are missing. The fact that 593 statements were derived from only 53 users raises concerns about data concentration and repetition. Moreover, the extensive use of AI tools like QuillBot and ChatGPT for paraphrasing quotations repeatedly introduces the risk of altering meaning and losing semantic accuracy.

Despite these concerns, the main issue with the data source is the high number of negative experiences shared compared to positive ones. On one hand, using an online forum provided valuable insights into the unfiltered experiences of glass children, adding to its ecological validity; the posts reflect what individuals chose to share without prompts, arguably capturing their most authentic concerns. However, because the data were collected from a public forum, the lack of positive experiences might be explained by the subreddit's structure and purpose, which encourage users to share challenges rather than positive stories. In contrast, face-to-face research could allow for a wider range of experiences, as direct questioning might elicit more balanced responses, including positive ones. Therefore, interviews instead of online data collection could offer a more nuanced understanding of the emotional spectrum experienced by glass children.

## 5. Conclusion & Practical Implications

The findings reinforce existing literature on the negative aspects of growing up with an autistic sibling, such as feeling overlooked, experiencing family tensions, and being burdened with future care responsibilities. However, the study also highlights the limited availability of positive experiences for this population, possibly because the forum's focus is on encouraging users to seek advice and solidarity in response to their challenges. Notably, while the study sheds light on the difficult realities faced by individuals with autistic siblings, it also suggests that with sufficient support, these challenges can be mitigated. Indeed, the lack of balanced support for self-identifying glass children emerged as a significant issue, suggesting that it is not solely the sibling's autism that causes hardship, but the failure of support systems to address the needs of all family members. This points to a critical need for more accessible and targeted interventions, including parental education, therapeutic support, and peer networks that can help prevent feelings of neglect and isolation in these siblings. Future research could monitor the efficacy of such interventions by examining the extent to which individuals identify as a "glass child", with positive support potentially associated with a lower identification rate. Despite its limitations, this research contributes to the literature by illuminating a novel concept and capturing experiences that are of evident importance to this population. Consequently, these findings represent part of the story of glass children's experiences with autistic siblings and are valuable for informing therapeutic interventions and guiding future research in this area.

#### Statement of Researchers

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**Author Biographies**

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The authors declare that they have no conflict of interest.

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Katharine Starling conducted research as part of postgraduate study at the University of Surrey.

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# The vax files: Social media reactions to pandemic plotlines

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- Conspiracy theories increase engagement in largest public anti-vax group on alt-tech SNS Gab Social
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## Abstract

Conspiracy theories are a fact of contemporary online life, and their prevalence poses a significant concern, as conspiracy theory ideology nearly always correlates with increased support for, and participation in, political violence. However, not all conspiracy theories are created equal, and the less popular conspiracy theories tend to have a stronger association with political violence. Because of this tendency, anti-vaccination conspiracy theories are especially interesting, as their adherents tend to cross standard social and political divides, which enables more mundane anti-vax conspiracy theories to function as a sort of “gateway conspiracy theory” to more fringe theories. This study analyzes three anti-vaccine conspiracy theories, each representing a different level of popularity, within the largest public anti-vax group on the alt-tech social media platform Gab Social. The findings indicate that, in general, the more fringe a conspiracy theory is, the lower the level of user engagement it receives. Engagement is assessed through Gab’s unique set of reaction options, including like, dislike, haha, angry, honk, love, salute, and pray. These results are cautiously encouraging, suggesting that more extreme conspiracy theories may not be gaining substantial traction among the broader anti-vax community on the platform.

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## 1. Introduction

Social media platforms are used daily by millions of individuals not only to access news but also to foster social connections. Among users who primarily rely on social media for both information and interpersonal engagement, particularly those predisposed to conspiratorial thinking, which is strongly associated with heightened perceptions of danger and threat, there is a documented link between social media usage and the endorsement of conspiracy theories and misinformation (Bowes et al., 2023; Enders et al., 2023). Although the overall prevalence of conspiracy beliefs has remained relatively stable since 2012 (Uscinski et al., 2022), such beliefs continue to pose a significant concern. This is underscored by findings indicating that nearly all conspiracy theories examined (42 out of 44) are positively correlated with increased support for, and participation in, political violence (Enders et al., 2024). Notably, the strength of this correlation is inversely related to the popularity of the belief: more obscure or fringe conspiracy theories tend to have a stronger association with political violence, whereas widely held beliefs, such as the theory surrounding President John F. Kennedy's assassination, exhibit minimal or no such correlation. While acts of political violence are statistically rare and no single belief can predict such outcomes, even marginal increases in violent support or action are cause for concern, given that significant harm can be perpetrated by a lone actor or a small group, as evidenced by incidents such as the Tree of Life Synagogue shooting, the Tops Friendly Markets shooting, and the El Paso Walmart attack.

This study investigates how various anti-vaccination conspiracy theories influence engagement with related content on social media. Per-post reaction, comment, and share counts are standard measures of public engagement (Wukich, 2025), and this study examines user reactions to posts in particular (like, dislike, haha, angry, honk, love, salute, pray; comment and share counts were zero for the vast majority of the dataset) on the page of the group "ANTI-VAXX" on Gab Social to enhance understanding of how different types of conspiracy narratives elicit distinct affective responses in digital environments. Disinformation and misinformation rooted in fringe or conspiratorial thinking remain pressing challenges for social media platforms, researchers, users, and policymakers. Grounded in social identity theory, particularly frameworks of intergroup interaction and identity formation (Tajfel & Turner, 1979), and drawing on the concept of affective publics (Papacharissi, 2015), this research also incorporates scholarship on the role of rumor and religion in amplifying conspiratorial thinking (Andrade, 2020). Through this interdisciplinary lens, the project examines the relationship between conspiracy theory content and patterns of user engagement in online communities. This project aims to answer the following research question:

RQ: What is the effect of conspiracy theory type, (i) vaccines are inadvertently harmful, (ii) vaccines are bioweapons, or (iii) pandemic-related mandates are harmful, on the number of reactions to social media posts from Gab Social's ANTI-VAXX group page?

### 1.1. Fringe and Conspiracy Theories

Conspiracy theories attempt to explain an event or set of circumstances as the result of a secret plot, usually by powerful conspirators, even when a more plausible and less malicious explanation is available (Douglas et al., 2019; Harambam & Aupers, 2021). The spread of a conspiracy theory depends on affect-driven faith in its themes rather than on fact-based evidence (Douglas et al., 2019). This faith-based approach renders retractions of the theory practically impossible, creating a cycle of circular thinking that reinforces itself and rejects any evidence to the contrary (Barkun, 2011; Lewandowsky et al., 2013).

Conspiracy theories are a common aspect of human society, found throughout history and often driven by the human need to form communities. They are enhanced through actions such as rumor and religion (Andrade, 2020). In modern times, these beliefs have been used to justify violent attacks, war, and a holocaust on civilians and marginalized peoples (Douglas et al., 2019; Frankfurter, 2021; Goertzel, 2010; Tollefson, 2021), such as the January 6th 2021 Insurrection, led by members of the QAnon conspiracy theory; WWII-era Nazi party agenda; the 9/11 attacks on the World Trade Center; and the Oklahoma City bombing. Many of the groups that formed around these beliefs, as well as those formed around more benign conspiracy theories, such as New World Order and Moon landing conspiracy theorists, have created affect-laden communities around their cause, which focus on an outside, all-powerful, sinister central authority that is trying to or is actually controlling the world.

This all-powerful authority, posing a threat to society, distinguishes conspiracy theories from other false or fringe theories. Fringe theories, in general, encompass ideas that diverge from mainstream beliefs and do not necessarily begin as or evolve into conspiracy theories. Many fringe groups do, however, initially rally around non-conspiratorial beliefs and then adopt conspiracy narratives to sustain their identity, leading to an "us vs

them” narrative. The perceived threat is often a faceless entity, such as a government or faction of a government (e.g., the “deep state”); a group of people (e.g., the Jews, the Democrats, etc.); or a well-known public figure (e.g., Bill Gates, George Soros, etc.). Further complicating the study of conspiracy theories, it is also not uncommon for those who promote one conspiracy theory to also promote other theories that may or may not be related. For instance, Flat Earth proponents often also promote White nationalist and anti-feminist conspiracy theories (e.g., “tradlife,” which glorifies 1950s-era notions of the nuclear family with emphasis on the role of women as wives and mothers serving their husbands). This can result in such narratives weaving together, even when it seems the aspects of the two narratives are in opposition to one another. (Robins-Early, 2021).

News media and academic research typically approach fringe groups with conspiracy theories from psychological and cognitive perspectives. This can lead to discounting the beliefs held by these groups as myths, rumors, or simply “misinformed,” rather than engaging in the more nuanced study of how and when those beliefs form and change. Conspiracy theories in particular attract research focused on how to debunk and/or point out the potential dangers of spreading the conspiracy theory beliefs, which tends to overlook the way conspiracy theories do and do not drive group rhetorics and beliefs (Davidson, 2017; Larson, 2023; Lewandowsky et al., 2012; Lubrano, 2019; Pertwee et al., 2022; Swingle, 2018; Ullah et al., 2021; Wardle and Derakshan, 2017). Because conspiracy theories are characterized by a belief in a central authority or power intentionally controlling people or events, differentiating between these and other fringe beliefs is important. One can, for instance, believe that vaccinations cause autism without believing that vaccinations were created by a government to gain world domination by making everyone autistic.

This distinction becomes especially important when studying the role of conspiracy theories within online anti-vaccination communities. The implications for actions, interactions, and change are different in such scenarios. Often, individuals find common ground through shared fringe beliefs—beliefs that do not align with mainstream society or a “respected minority”—and form a community (Jasanoff, 1992). At first, these fringe communities and social movements may believe in ideas that seem outlandish to greater society, but they do not hold narratives that pit themselves against greater society or anyone else who is in opposition to their beliefs. Those with beliefs in astrology or clairvoyance are an example of such groups (Mermelstein and German, 2021). However, when these communities deviate far enough from the norm and/or are disregarded and judged by mainstream society, they sometimes introduce an “us vs. them” narrative (this ingrouping/outgrouping dynamic is discussed further in Section 2.3) in order to maintain their convictions, community, and sense of identity. This leads the group to view and describe those opposed to them as conspiring against them (Bartlett, 2021; Clark, 2018; Harambam, 2021; Islam et al., 2021; Loxton, 2018; Olshansky et al., 2020; Paolillo, 2018). In the case of the anti-vaccination community, for instance, it is the scientific community, the government, Big Pharma, and mainstream society that are conspiring against them. This type of fringe narrative, portraying a powerful outgroup(s) as conspiring against the less powerful ingroup, is the definition of a conspiracy theory. Unlike other fringe beliefs, conspiracy theories introduce fear and distrust of others into the community paradigm and are known to negatively affect both inter- and intra-community relationships, communication, and interactions, at times leading members of the community to cause harm to themselves or others (Jolley et al., 2022).

## 1.2. Cognition, Conspiracy, and Fringe Beliefs

Social identity theory explains that the social groups and movements that we belong to can be more important to our identity and self-esteem than our individual beliefs and characteristics (Tajfel & Turner, 1979). The social ties within a group are strengthened by creating and maintaining “us vs. them” territory lines, defining the ingroup in contrast to outgroups (Gaertner & Dovidio, 2005; Tajfel & Turner, 1979). This dynamic can be seen between conflicting Christian sects (Catholics and Protestants), religions (Hindus and Muslims), and racial and ethnic groups (white supremacy towards the BIPOC community). These groups draw territory lines using ideology and ethnicity to decide who can take membership and who cannot. The actions of this racial and religious us vs. them dynamic have been used to justify numerous incidences of genocide, ethnic cleansing, and political/religious wars (e.g. the Holocaust, the Rwandan genocide, the Crusades, the Tulsa Massacre, etc.).

These social movements, both online and offline, use a variety of tools to draw such boundaries, but online spaces are fundamentally different from offline spaces, and the boundary-setting between ingroups and outgroups is also fundamentally different online. For this reason, social identity theory on its own does not provide a comprehensive theoretical basis for understanding how conspiracy theories contribute to the dynamics of online social movements. To fully understand the role and function of conspiracy theories in online

social movements, it is necessary to recognize that these movements form affective publics, in which emotional affect is the driving force rather than notions of truth and facts (Papacharissi, 2014).

By way of drawing ingroup/outgroup boundaries, the use of harmful discourse, whether true (malinformation) or false (disinformation), is used to discredit the opposition. However, mal- and disinformation can often mutate rhetorically and spread stereotypes and/or misinformation about the outgroup, which can, in turn, lead to the formation of prejudices and/or conspiracy theories. Because these online social movements form affective publics, driven by affect rather than fact, disinformation is no less effective than malinformation for drawing boundaries. When this disinformation comes to be believed by members of the ingroup, it becomes misinformation—information that is factually incorrect but sincerely believed by the group members and harmful to the outgroup—which those ingroup members then repeat and spread (Gaertner & Dovidio, 2005; Wardle & Derakshan, 2017). There are some exceptions to this general statement, as digital grifters and leaders with narcissistic or sociopathic tendencies, who stand to gain power, influence, and/or money, will knowingly spread disinformation about an outgroup to discredit them. The majority of the members of these conspiracy theory-based social movements, however, believe the information they are being given and then spreading.

Since 2016, conspiracy theories, misinformation, and disinformation have become hot-button topics within public and scholarly discussion. On a daily basis, news outlets report on people subscribing to misinformation, and social media platforms now place warning labels on posts that convey misleading or false information, including conspiracy theories. However, susceptibility to misinformation is not a new monster created by the introduction of digital spaces; it is an intricate cognitive response that reflects the human need to establish ingroups and outgroups. Taber & Lodge (2006), for instance, describe a study in which participants were given the option of viewing arguments from various organizations about gun control or affirmative action, and their choices tended to track their group identification, rather than objective fact-seeking: They tended to choose arguments from organizations they were likely to agree with, depending on their ingroup's view rather than relying on their own; when reading arguments that conflicted with their views, they spent more time than they did on arguments that agreed with their views; and they spent more time constructing arguments against and finding problems with those arguments, reinforcing outgroup division and ingroup solidarity.

As conspiracy theories both develop within and contribute to affective publics, helping to establish, maintain, and strengthen ingroup identities, they become woven into ingroup members' senses of identity and purpose, and therefore are exceedingly difficult to dismantle. Any attempt to replace false, emotionally charged beliefs requires a carefully executed step-by-step retraction process, which still often meets with only limited success (Bail et al., 2018; Chan et al., 2017; Lewandowsky et al., 2012; Yzerbyt and Corneille, 2005).

### **1.3. Affective Publics and Online Fringe Communities**

As briefly explained above, social movements that coalesce in digital spheres around emotion-driven, socio-political topics are termed affective publics—online communities that evoke and foster feelings of emotional engagement (Papacharissi, 2014; Dean, 2010; Gregg, 2011; Karatzogianni & Kuntsman, 2012; van Dijck, 2013). The more general notion of networked publics characterizes platforms structured by networked technologies for individuals to convene for social, cultural, and civic purposes, expanding their connections beyond immediate circles of friends and family (boyd, 2010). Affective publics are then defined as those networked publics that are “rendered out of ... the sharing of opinions, facts, sentiment, drama, and performance” (Papacharissi, 2014). Papacharissi (2014) underscores the diverse manifestations of affective publics across different social media platforms and their reliance on the digital tools, ideologies, cultures, and goals of the groups involved. Within these publics, members support connective, but not necessarily collective, actions, which allow for interaction without the need for deep ideological engagement or explanation. This phenomenon is particularly relevant in the context of conspiracy theory-driven groups responding to moral or fact-based information with short, sarcastic insults, rather than deep discussion.

Crucial to the concept of an affective public, especially in the context of conspiracy theories' role in online fringe communities, is the notion that they are driven by affect-laden statements of both fact and opinion, and that the distinction between these two types of statements is not important. The affective character of these statements creates an emotional response within the online user(s), which is then recognized as being shared, and this shared emotional response, or affective undercurrent, encourages engagement and connects diverse publics to an evolving event or issue. The communities that assemble around these affective undercurrents form affective publics.

In online conspiracy theory-driven publics, the affective statements and narratives are distributed on a mass digital scale, and they have the potential to “produce disruption/interruptions” among mainstream

discourse, giving voice to the narratives and opinions of fringe social movements. A social movement is a collective effort by a large group of people or organizations to bring about, resist, or undo social, political, economic, or environmental change. Unlike short-term trends, social movements are typically sustained over time and are driven by shared goals, values, or grievances (Merriam-Webster, n.d.; Opp, 2009; Scott & Marshall, 2009). In digital spaces, social movements, including fringe movements, often use social media technologies to form communities around their cause and organize actions, such as protests and public awareness campaigns. The impact of these publics is symbolic, which can encourage “revolutionary” change, whether the change shifts publics or society toward fact or fiction (Papacharissi, 2014).

A large portion of the literature that uses the theoretical approach of affective publics focuses on narrative storytelling in online spaces and on online social, political activism, movements, and groups; for the most part, this research does not address conspiracy theories (Adlung et al., 2021; Dawson, 2020; Hautea et al., 2021; Lünenborg, 2019; Papacharissi & Trevey, 2018; Papailias, 2016). The few pieces of literature on online fringe groups and conspiracy theory rhetoric that treat them as affective publics mostly focus on either ingroup-outgroup dynamics or the affective responses to specific fringe and/or conspiracy theories (Lee, 2022; Song & Gruzd, 2017). One notable exception is Farokhi (2022), who describes the function of these groups’ rhetorical approaches in maintaining and encouraging group membership. However, Farokhi’s explanations suggest that the affect behind these groups’ rhetoric is inauthentic, rendering their intentions deceptive rather than sincerely grounded in authentic fear and a desire to protest, inform, and maintain their positionality. Without viewing fringe groups’ affect and rhetoric as genuine and a phenomenon to be taken seriously, it is difficult to understand the role they play in those groups’ functioning.

#### **1.4. Conspiracy Theories across Social Media Platforms**

Digital spaces play a crucial role in the creation and spread of affective publics. Before the widespread use of the internet, affect-driven communities, such as those based on conspiracy theories, could connect with other believers only through local meetups, conferences, or traditional mail. The speed and breadth of online communication, however, change the relational processes of community formation. Social information processing theory suggests that relationships that are established and conducted in digital spaces are just as intimate, if not more so, than face-to-face relationships, but that digital relationships may take longer to cultivate (Walther, 1992). In addition, digital spaces provide a public platform for subcultures and marginalized voices to engage with public discourse and debate. Digital spaces frequently form “subaltern counterpublics”—spaces where people from marginalized communities discuss their experiences, while also creating and promoting narratives that challenge mainstream perceptions towards their “identities, interests, and needs” (Fraser, 1990, p. 67). These publics enable those opposed to mainstream opinion to find and engage both opposing and complementary opinions, sharing and debating their social and political views. Subaltern counterpublics can be seen in the development of both social media subcultures, such as Black Twitter, and entirely new social media platforms, such as Gab, Telegram, and Truth Social.

The proliferation of social media platforms further diversifies the digital landscape, offering users unique experiences characterized by different functionalities, communication tools, and levels of anonymity. Each platform shapes the behavior and interactions of digital groups, reflecting the diverse nature of online social spaces. Engagement metrics such as retweets and reposts contribute to individuals’ sense of belonging, reinforcing ingroup ties and solidifying group identity. This phenomenon aligns with the social identity model of deindividuation (SIDE theory), which suggests that individuals place greater importance on group identity and norms in digital contexts, expanding on the concepts of group identity and individuality from social identity theory (Postmes et al., 1998). Group norms sometimes even override individual attitudes and beliefs, leading to a transformation of individual behavior within online communities, such as when group members collectively rally against a social media platform that censors the group’s discourse and rhetoric. This group behavior can include criticizing, negatively reviewing, and speaking out against the platform, as well as leaving the platform altogether to join or create one with fewer content restrictions and guidelines (BBC News, 2021), such as the aforementioned Gab, Telegram, and Truth Social.

#### **1.5. Boosting Conspiracy Theories with Social Media Technologies**

Social media platforms feature unique interfaces that provide users with various digital tools and technologies, including images, internet memes, animated GIFs, videos, hashtags, posts, comments, links, emojis, and likes. When fringe social movements congregate in social media spaces, they use the platform’s tools to spread their ideologies, identify and engage with members of their ingroup, and identify and attack

their outgroups. The tools serve as casual communication tools across digital spaces, used to communicate ideas that may attract like-minded people and thereby grow and strengthen one's ingroup (Hornsey, 2008). The creation of digital spaces and their technologies has allowed group members to organize, network, and expand their communities all over the world (Howard & Hussain, 2013; Papacharissi, 2014), connecting like-minded people to one another without the work of physically seeking each other out and giving movements easily accessible places to congregate. Hashtags in particular, #itsflat, #tradlife, #fakedemic, etc., serve as group-affirming catchphrases that tie affective publics together.

Among the various social media platforms, some tools dominate or are intended to be used over others. For example, although X (formerly Twitter) can support video and image posts, the majority of the expression is done through written words and emojis, while platforms such as Instagram and TikTok are designed for users to share and post using video- and image-based content. Even within individual platforms, the technologies offered can achieve a variety of communicatory outcomes. The use of reactions and emojis, for instance, adds layers of emotional expression to posts, conveying affect in a nuanced manner that words alone may miss (Arafah & Hasyim, 2019). Similarly, platforms such as Instagram, TikTok, and Snapchat allow users to incorporate still images, GIFs, videos, and internet memes into their posts, providing diverse means of expression and communication. The addition of music to visual content can alter its reception and impact, illustrating the dynamic interplay between technology and content creation in digital spaces. Overall, these technologies not only facilitate expression but also foster unique online cultures and communities, reflecting the evolving landscape of digital communication and interaction.

## 1.6. Gab Social

The Gab Social interface, established in 2016 by Andrew Torba, offers several tools and features. The platform functions and tools include individual and group pages; a news feed; text, image, and video posts; comments, reposts, quotes, reactions, emojis, hashtags, links, and user and group tags; and the ability to mute and block other users (Gab AI, Inc., 2025). Torba coined the platform's catchphrase "where free speech reigns" as a direct response to the "free-speech restrictive" guidelines of platforms such as Facebook, Instagram, and (at the time) Twitter. Gab's community guidelines state that users cannot engage in the act of harming minors, violating or breaking any "federal, state or local laws," and that all users must stay within the protected "free speech" laws granted to them by the First Amendment to the United States Constitution (Gab AI, Inc., 2024).

For the purposes of this study, the anti-vaccination community group page "Anti-Vaxx" on Gab was analyzed to access the largest number of public posts within the anti-vaccination community. Gab was selected for this study because it is one of the longest-running and currently one of the most high-traffic "alternative" social media platforms in the world. Unlike Telegram, another long-standing "alternative" social media platform with high traffic, Gab offers group pages and mimics a Facebook-like interface. Similar to Facebook, Gab offers a view into how the anti-vaccination community communicates with one another and with others in a high-traffic digital space that can potentially reach large numbers of new followers. Gab, however, is an alternative social media platform rather than the mainstream Facebook and lacks the restrictive guidelines surrounding mis- and disinformation, allowing users to employ different, less restrained rhetoric. Finally, while there is significant existing research on community-building and anti-vax content and conspiracy theories on Gab (Berlinski et al., 2025; Collins, 2025; de Winkel et al., 2024; Fritz & Smith, 2025), this study fills a gap in the literature by examining the effect on engagement of conspiracy theories of varying extremity.

## 1.7. Hypothesis

Integrating concepts from social identity theory and affective publics, which highlight the importance of group identity and affect for online communities, the current project examines the influence of conspiracy theories on the anti-vaccination community on Gab. This investigation developed from a broader research project, and the theoretical basis described above grounded the ten a priori categories used in that project, which are presented in Table 1 below. The present study focuses on one of these categories in particular, anti-vax and disease-related conspiracy theories, and the impact on engagement of the three most frequently discussed conspiracy theories of this type. These three conspiracy theories turned out to vary significantly in extremity, leading to the following theory-driven hypothesis:

H1: The number of reactions a post receives varies with the presence or absence in the post content of one or more of the following three conspiracy theories about the COVID-19 vaccines and lockdown mandates: (i) vaccines are harmful, ineffective, and/or poison (e.g., the government or world powers are lying and hiding that vaccines cause cancer, heart attacks, death, etc.); (ii) vaccines are part of a government, New World Order

(NWO), Great Reset, and/or bioweapon plot; (iii) vaccine/mask/social distancing mandates are intentionally harmful, unlawful, and Nazi-like (e.g., unvaccinated people will have their children taken, be sent to concentration camps, etc.).

## 2. Method

### 2.1. Data Collection

The dataset for this study, derived from the author's dissertation, consisted of all posts made to the "Anti-Vaxx" group on Gab from June 1, 2023, to November 15, 2024, totaling 2,656.<sup>1</sup> Information about the group posts for this date range was collected using the Gab API and stored in JSON files, allowing easy extraction of metadata, such as dates and counts of comments and reactions, as well as content, including attached media and quoted posts. An automated process downloaded all the attached images and videos and most of the linked videos, with roughly 15 downloaded by hand.

### 2.2. Critical Technocultural Discourse Analysis

With such a large dataset, it was unrealistic to attempt to qualitatively code them all by hand, so at this stage, 100 posts were randomly selected, and an HTML page was generated containing the post contents and links. HTML was chosen for its readability and ease of import into MAXQDA. These 100 posts were analyzed using critical technocultural discourse analysis and qualitatively coded into ten *a priori*, theory-driven categories, with emergent subcategories; often, several subcategories from the same *a priori* category applied to a single post.

At this point, as part of the larger study, an additional 100 Facebook posts were also analyzed; the codebook resulting from the full 200-post analysis was included in the system prompt (Table 1) to guide the LLM analysis. Two additional researchers were also given the full list of categories and emergent subcategories, with definitions, and each coded a 10% sample of the two 100-post datasets. These researchers were allowed to disagree with specific applications of categories and subcategories, and were allowed to create additional subcategories, but were not allowed to delete subcategories or categories or add additional categories. Agreement was established across all three coders.

**Table 1.** System instruction (subcode lists truncated for length)

You are a social science researcher with an expertise in digital extremism and conspiracy theories, studying online anti-vax groups. When given the contents of a social media post, potentially including linked articles, attached photos and videos, and quoted posts, you use qualitative coding to identify key features of the post. Linked articles are passed as raw HTML; please be sure to analyze the title and contents of the article, but not the other material, such as advertisements and links to other articles. Posts may also include a user-chosen context, which functions as a platform-specific hashtag, and a preview card, which summarizes linked and quoted content. Your response should be formatted in markdown and proceed using these four steps:

Step 1: Observe, identify, and describe the content of the post (text, image, and/or video).

Step 2: Analyze the message and intent of that content.

Step 3: Apply codes based on that analysis.

Step 4: Review those codes for redundancy or missed codes.

After these four steps, you should provide a list of the final codes. Please put "Final Codes" before that list for ease of processing. Please format codes with subcodes as separate entries reading "Code: Subcode".

Your codebook contains 10 primary codes, some of which include subcodes to more precisely specify the features of the post. You may generate your own subcodes if none of the existing subcodes apply, but you may not generate new codes.

Here is a list of all the codes and their subcodes:

Code: Misinformed Responses

No subcodes

<sup>1</sup> This is unfortunately no longer possible, because group pages on Gab now display only the last 2 months of group posts.

Code: Praising Public Figures Subcode: Dr Phil Subcode: Russell Brand [... 12 subcodes total]
Code: Villainizing Public Figures and/or Organizations Subcode: Vaxxed Subcode: Big Pharma [... 23 subcodes total]
Code: Groups Being Signaled Subcode: Unvaccinated/Antivaxx Subcode: Conservatives/MAGA/White Supremacists/Nationalists Subcode: Parents
Code: Antivaxx/Disease-Related Conspiracy Theories Subcode: Big Pharma Subcode: Hiding Alternative Cures and Treatments [... 15 subcodes total]
Code: Conspiracy Theories Unrelated to Antivaxx Subcode: Incel Subcode: Crisis Actors/False Flag/Staged Events [... 22 subcodes total]
Code: Hate Speech/Violent Rhetoric Subcode: National/Ethnic/Race/Religion Subcode: LGBTQ [... 5 subcodes total]
Code: Using Irony/Humor/Sarcasm No subcodes
Code: Coded Language No subcodes
Code: Prophetic Revelation/Demons/Jesus Will Save Us/End Times No subcodes

### 2.3. LLM Analysis

The data scraping and LLM analysis portions of the study were contracted to an AI researcher, who worked under the observation and guidance of the researcher conducting this study, ensuring accuracy and applicability of the system instructions and prompts. In preparation for the LLM analysis and coding, the full HTML of each linked article (roughly 1,000 in total) was also downloaded. To remove all extraneous data contained in those pages, such as ads, navigation menus, and links to other articles, the LLM was given the full HTML for each article and instructed to return only the title and text of the article, formatted in Markdown. This process was successful for roughly 80% of the articles; the remaining 20% were left as HTML, which did not affect the LLM's analysis in any material way.

After all the content was downloaded, processed, and stored, it was submitted to the LLM one post at a time via the LLM's API, interleaving text and media in an approximation of the order they would appear on Gab. Using the above system instruction, which was developed through analysis of the LLM's "show thinking" feature and iterative testing, the LLM was instructed to respond with a detailed summary and analysis of each post's content and applicable qualitative codes and sub-codes based on that analysis, a task at which it was overwhelmingly successful. After removing posts that were no longer available, linked to content that was no longer available, or linked to videos over 1 hour long, which were too long for the LLM to process, there were only eight posts that the LLM did not successfully analyze.

## 2.4. Verification of LLM Analysis

Once the complete dataset had been analyzed by the LLM, a list was generated containing every category and subcategory used in that analysis; it did not include any new categories. The author and an additional researcher then checked the new subcategories for overlap, either with each other or with one of the original subcategories, and codes were collapsed as appropriate. For instance, several posts were coded with some variation on “Antivaxx/Disease-Related Conspiracy Theories: Denial of Germ Theory,” which were all collapsed into the “Antivaxx/Disease-Related Conspiracy Theories: COVID and/or Other Illnesses Aren't Real/Inflating Numbers” subcategory.

After collapsing the codes, both researchers assessed the applicability of each code generated for each post in the full dataset and found nearly all the codes to be correct. An examination of the provided explanations for the codes judged incorrect further revealed that the vast majority of these codes were, according to the LLM, merely “implied” by the content. After removing these codes, fewer than 10 incorrect codes remained, and these were notably all the result of misunderstanding some specific communicative nuance, rather than hallucination or other well-known LLM errors. The manual analysis of the initial 200 posts was further compared with the LLM-generated analyses of those posts, which revealed that the model had identified every manually identified code, and sometimes also applied additional accurate codes. This extremely high level of human-LLM agreement supported the use of the LLM’s responses as the basis for further analysis of the dataset.

## 2.5. Independent Variables

The three independent variables analyzed for this study were selected due to their popularity on the Gab Social group page “ANTI-VAXX.” Antivax/Disease-Related Conspiracy Theories were identified in more posts than any other *a priori* category (n = 2053 posts), and the present project focused on the top three emergent sub-codes from this category: (i) vaccines are harmful/ineffective/poison (n = 1668 posts), (ii) vaccines are part of a government/NWO/Great Reset/bioweapon plot (n = 965 posts), (iii) mandates are harmful/unlawful/Nazi-like (n = 573 posts).

The presence or absence of conspiracy theories of these three types were used as independent variables (IVs), with the number of reactions a post received as the dependent variable (DV). The relationship between the three IVs and the DV were modeled by a negative binomial regression with interaction terms. Table 2 contains the post counts for each combination of independent variables.

**Table 2.** Post counts for each combination of independent variables

Mandates Absent			Mandates Present		
Harmful/Ineffective	NWO/Bioweapon		Harmful/Ineffective	NWO/Bioweapon	
	Absent	Present		Absent	Present
Absent	456	117	Absent	87	68
Present	778	472	Present	111	307

### 2.5.1. Vax is Harmful/Ineffective

The most commonly observed independent variable on the anti-vax group page was Vax is Harmful/Ineffective with 1668 posts. For the purposes of this study, Vax is Harmful/Ineffective will be defined as: Vaccines (especially COVID-19 vaccine) are inadvertently poisonous/harmful to one's health (e.g., causes cancer, heart attacks, blood clots, sudden death, etc.) and the government/world powers/etc. are lying and hiding this information from the public; and/or vaccines are ineffective (people can still catch illnesses they were vaccinated against). Figure 1 shows an example from the dataset of a Vax is Harmful/Ineffective post.

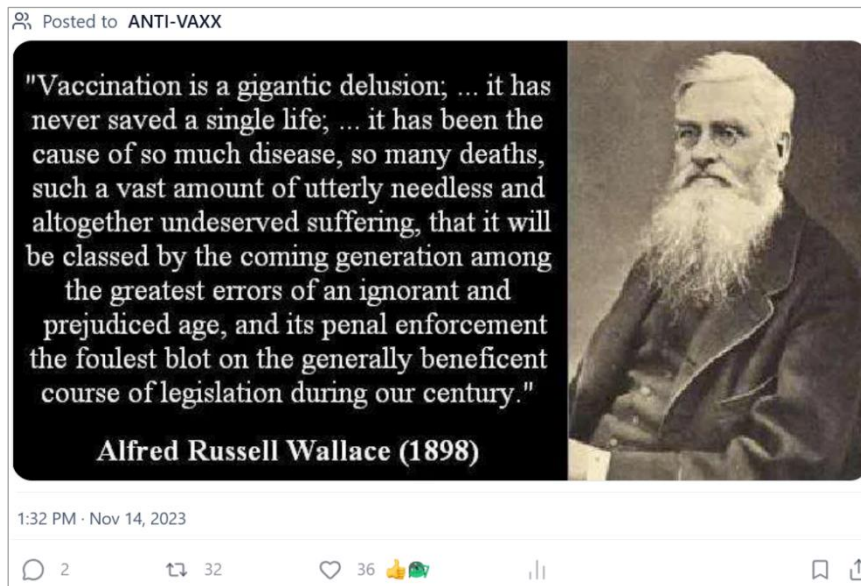


Figure 1. Example of a Vax is Harmful/Ineffective post

### 2.5.2. NWO/Bioweapon Vax Conspiracy

The second-most-observed independent variable on the anti-vax group page was NWO/Bioweapon Vax Conspiracy, with 965 posts. For the purposes of this study, NWO/Bioweapon Vax Conspiracy will be defined as: Vaccines (especially the COVID-19 vaccine) are NWO/Government/Great Reset engineered bioweapons intended to kill billions of the population, and/or microchip us and turn us into slaves/robot-army. Figure 2 shows an example from the dataset of an NWO/Bioweapon Vax Conspiracy post.



Figure 2. Example of an NWO/Bioweapon Vax Conspiracy post (text truncated for length)

### 2.5.3. Pandemic-Related Mandates are Harmful

The third-most-observed independent variable on the anti-vax group page was "Pandemic-Related Mandates are Harmful," with 573 posts. For the purposes of this study, Pandemic-Related Mandates are Harmful will be defined as: World Governments/U.S. Democrats/Public Figures are enforcing illegal and harmful

draconian social distancing/mask and vaccination mandates. Failure to comply will result in having children taken, and/or being detained and imprisoned or sent to Nazi-like camps for the unvaccinated. Figure 3 shows an example from the dataset of a Pandemic-Related Mandates are Harmful post.

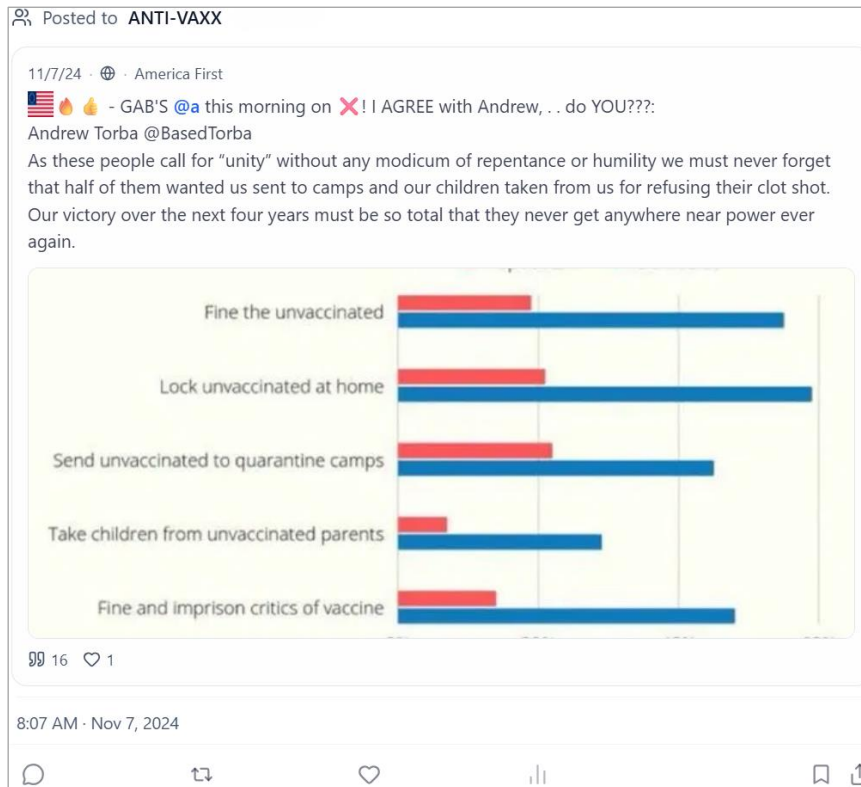


Figure 3. Example of a Pandemic-Related Mandates are Harmful post

## 2.6. Dependent Variable

For this study, the dependent variable (DV) being analyzed is the number of reactions (like, dislike, haha, angry, honk, love, salute, pray) each post received. It was determined, both visually (Figure 4) and by calculating the ratio of variance to mean (approximately 96), that the DV was overdispersed. No structural zeros were present within the DV count, meaning all zeros were the result of the count-generating process of users reacting to posts. Additionally, a hurdle model was unnecessary, as there was no threshold or barrier that needed to be met or overcome for a post to receive its first reaction.

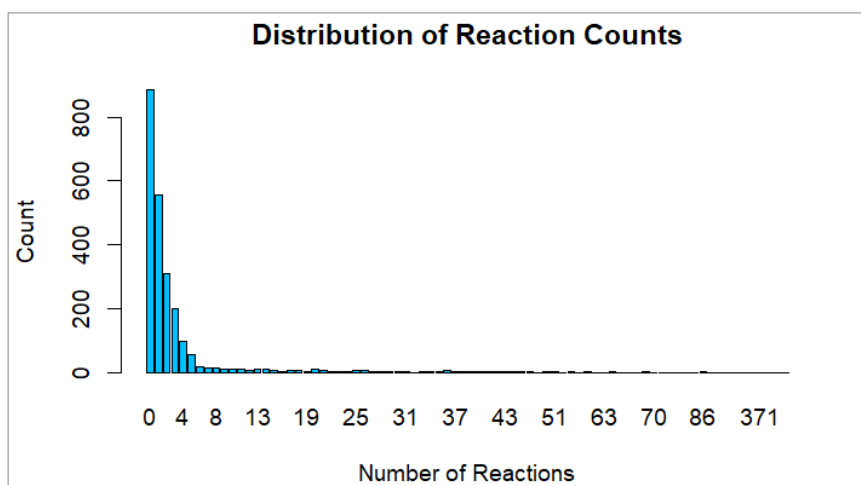


Figure 4. Barplot of reaction counts to posts on Gab Social group page “Anti-Vaxx”

### 3. Results

#### 3.1. Coefficients and Confidence Intervals

The number of reactions a post received on the Gab Social group page “Anti-Vaxx” did vary with the presence or absence of one or more of the three conspiracy theories—(i) vaccines are inadvertently harmful, (ii) vaccines are bioweapons, or (iii) pandemic-related mandates are harmful—in the post content, thus supporting the alternative hypothesis. All three independent variables and interactions were significant at the 0.001 level, and 95% confidence intervals were represented (Figure 5).

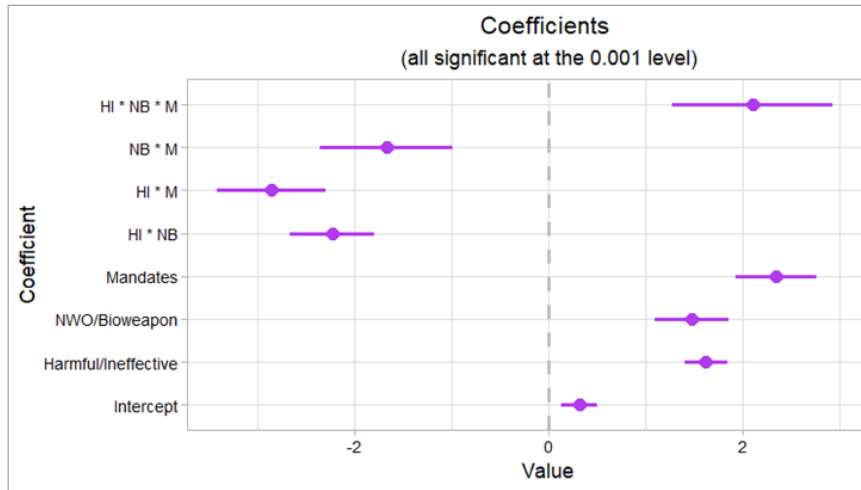


Figure 5. Plot of standard log count coefficients with 95% confidence intervals

While all independent variables and interactions in this study were statistically significant, the coefficients represent a logarithmic transformation of reaction counts, making direct interpretation less intuitive. Therefore, examining the predicted values offers a clearer understanding of the effects of the three independent variables on actual reaction counts.

#### 3.2. Predicted Values

As shown in Figure 6, posts that do not address any of the three independent variable topics—(i) vaccines are inadvertently harmful, (ii) vaccines are bioweapons, or (iii) pandemic-related mandates are harmful—are predicted to receive approximately 1.4 reactions, while posts that mention one or more of these topics are expected to receive a minimum of 3.1 reactions. The number of reactions varies, however, depending on the topic or topics discussed: Posts discussing only (i) have the highest predicted reaction count at 14.4; posts discussing only (ii) are second, with 7; and posts discussing only (iii) are third, with 6. For posts discussing multiple topics, the presence of either (ii) or (iii) reduces the predicted reaction count, and the presence of both reduces it further.

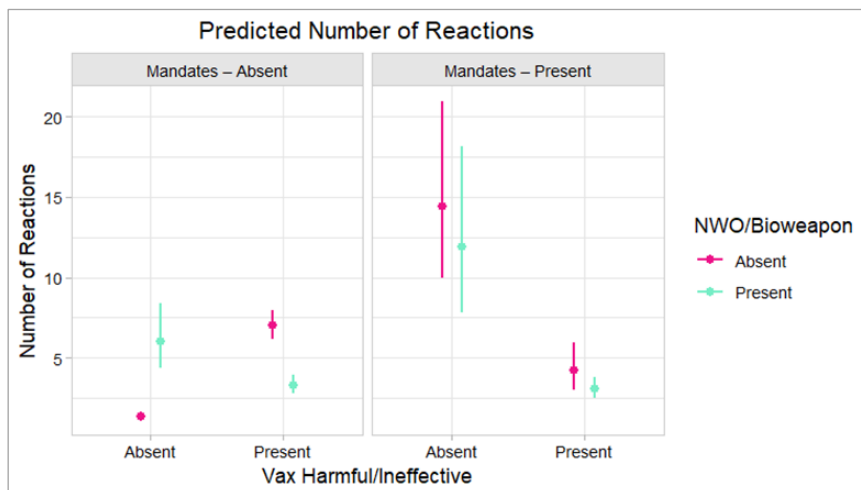


Figure 6. Plot of predicted reaction counts

## 4. Discussion

The order of the highest to lowest predicted reaction counts suggests that posts that discuss more extreme and fringe anti-vax conspiracy theories (e.g., the vaccine is turning the population into a robot-slave-army) tend to receive fewer reactions, as opposed posts that contain conspiracy theories with ideas that users might view as “more plausible” (e.g., children will be taken from unvaccinated parents). One significant reason for this trend could be the influence of major news media outlets and public figures, such as Fox News and Tucker Carlson, who in 2022, during the height of the COVID-19 pandemic, lockdown, and subsequent releases of the vaccine, made unverified claims about CDC-mandated child vaccinations. Carlson, for instance, aired a segment titled “CDC: Your Children, Our Rules” in which he stated that the CDC was forcing children to become vaccinated or face not being able to attend public schooling. Within 24 hours, Carlson’s false claim had gone viral throughout social media and was being commented on by multiple prominent rightwing public figures (Diamond & Sun, 2022).

Tucker Carlson has an extensive and documented history of making false claims, including claims about vaccine-related deaths being on the rise (Walsh, 2021), but to date has not reported that vaccines are spliced with alien DNA, even if he has shown support for those who do make these sorts of claims (Ramirez, 2020). Carlson’s public popularity could help to explain the hierarchy of predicted reaction counts for posts containing only one of the three types of conspiracy theory.

When the variables are considered together, we see a similar trend across the two most extreme subcategories: discussing conspiracy theories of either kind reduces reactions, and discussing conspiracy theories of both kinds reduces them further. The effect of discussing Pandemic-Related Mandates are Harmful conspiracy theories is somewhat inconsistent, however; it increases reactions for posts that also discuss NWO/Bioweapon Vax conspiracy theories, but its effect is entirely negated by the presence of a Vax is Harmful/Ineffective conspiracy theory, having a much greater effect than the more extreme NWO/Bioweapon Vax conspiracy theories. The reason for this is not clear, but one possible explanation is that, draconian or not, everyone experienced the lockdown and mask mandates. In contrast, not everyone experienced people dying from the vaccine—in fact, given that the vaccine was not deadly, nobody did, at least not in the way the conspiracies suggest—and billions of people were vaccinated.

## 5. Conclusion & Practical Implications

In the anti-vax group page “Anti-Vaxx” on fringe social media platform Gab Social, the most fringe of fringe conspiracy theories receive less engagement, as measured by number of reactions (like, dislike, haha, angry, honk, love, salute, pray), than the middle-of-the-road fringe conspiracy theories. Even when these theories interact with one another, the most fringe conspiracy theories reduce engagement. This can possibly be explained by the promotion of some conspiracy theories over others (vaccine mandates over vaccine is a bioweapon) being present in the mainstream media. These findings provide reason to be cautiously optimistic, as they indicate that the most extreme conspiracy theories may not be significantly resonating with the broader anti-vaccine community on the platform. The author recognizes the limitations present within the study, most notably that, as in any study, there are numerous other independent variables that could have been tested, as well as platforms, groups, and subjects that could have been studied. Future research in this area might consider studying the same reaction counts as presented in this study, but changing the independent variables (e.g., non-vaccine-related conspiracy theories + vaccine-related conspiracy theories + hate-speech); a comparison of reaction counts across different platforms; and/or replacing reaction counts with number of views per post.

### Statement of Researcher

#### Researcher’s contribution rate statement:

**Giovanna L. Henery:** Conceptualization, methodology, investigation, validation, data curation, formal analysis, writing – original draft, writing – review & editing.

#### Conflict statement:

The author declares that they have no conflict of interest.

#### Data Availability Statement:

The data supporting this study’s findings are available on request from the corresponding author. However, the data are not publicly available due to privacy or ethical restrictions.

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### Ethical Considerations:

This research is not human subjects research, as determined by the Colorado State University Institutional Review Board, protocol 5907, dated 06/03/2024.

### Author Biography:

**Giovanna L. Henery, Ph.D.**, is an investigative researcher and intelligence analyst with expertise in mis/disinformation, digital extremism, conspiracy theories, and OSINT. Her research employs both qualitative and quantitative methodologies, and she frequently collaborates with anti-hate advocacy groups and law enforcement.

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# Quality, reliability and misinformation in mental health and neurodivergence content on social media: a systematic review

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- Significant variability and frequent inaccuracies found in mental health and neurodivergence information on social media.
- Findings highlight urgent need for credible content, clearer misinformation standards, and improved platform moderation.

## Abstract

Social media is increasingly used for health information seeking, yet no systematic review has assessed the quality of mental health or neurodivergence-related information on social media. This systematic review aimed to assess the quality, reliability, and prevalence of misinformation in such content, comparing findings across platforms and topics. Searches were performed in MEDLINE Ultimate, APA PsycINFO, CINAHL, and Scopus. Studies were eligible if they evaluated the accuracy, quality, or reliability of mental health or neurodivergent-related information on social media platforms. Twenty-seven studies met the inclusion criteria and were critically appraised using a bespoke tool assessing the search, evaluation, and methodological quality. Due to heterogeneity, the findings were synthesized narratively. Across the 27 included studies, 5057 social media posts were analysed. Misinformation prevalence ranged from 0% to 56.9% and was higher on TikTok than YouTube, and neurodivergence-related content showed higher misinformation prevalence than mental health topics. Information quality and reliability varied widely but were generally higher for professionally created content. These findings highlight a clear need for action: mental health and neurodivergence organizations should create and share accurate, evidence-based content to counter misinformation, and clinicians should be supported to do the same. There is a need for strengthened content moderation, as well as consistent definitions and measures of mental health misinformation. Addressing these issues is vital to protect public mental health and improve the reliability of online information.

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## 1. Introduction

Social media platforms, such as YouTube, Facebook, Instagram, and TikTok, are increasingly utilized for health information-seeking purposes (Falgoust et al., 2022; Neely et al., 2021; Sumayyia et al., 2019). The interactive and dynamic nature of social media promotes the sharing of experiences and peer support, which can be beneficial for those seeking health information (Chen & Wang, 2021; Zhao & Zhang, 2017). Social media algorithms serve users content that aligns with their existing interests and beliefs, while limiting exposure to different perspectives, creating an “echo chamber” (Cinelli et al., 2021). Echo chambers limit users’ exposure to differing perspectives and can therefore reinforce misleading claims. These processes align with theories of selective exposure and confirmation bias, which suggest that individuals preferentially engage with content that confirms their existing beliefs, thereby reinforcing misinformation within algorithmically curated platforms (Cinelli et al., 2021; Nickerson, 1998). The lack of verification and regulation on social media platforms raises further concerns about the accuracy and reliability of the ‘infinite scroll’ of information users consume (Girardi et al., 2022; Wang et al., 2019).

Commentators have highlighted TikTok’s algorithmic model as a key factor in the spread of misinformation (Grandinetti & Bruinsma, 2022). To encompass the variety of definitions outlined in the literature, the present review defines misinformation as a claim which is based on anecdotal, false, or misleading information due to a lack of scientific evidence (Suarez-Lledo & Alvarez-Galvez, 2021). This definition aligns with the broader “information disorder” framework, which conceptualizes misinformation as information that is false, but not created with the intent on causing harm (Wardle & Derakhshan, 2017). Misinformation is particularly prominent on social media; one review found that up to 80% of health-related content was misinformation, while another found that health-related misinformation was more popular than accurate health information (Suarez-Lledo & Galvez, 2021; Wang et al., 2019). Health misinformation has been linked to harmful consequences, such as promoting misinformed behaviors and heightening distress during health emergencies and pandemics (Borges do Nascimento et al., 2022; Kim & Tandoc, 2022).

Mental health misinformation can perpetuate stigma, which can lead to discrimination and delays in people seeking professional help (Corrigan et al., 2014). Inaccurate beliefs about the causes of mental illness, such as that mental health problems are due to weakness, can reinforce negative stereotypes and discourage individuals from accessing treatment (Henderson et al., 2013). Furthermore, research has found that misinformation that portrays mental illnesses as dangerous or untreatable leads to public fear (Clement et al., 2015; Knaack et al., 2017). In addition, misinformation about treatment options, such as promoting non-evidence-based treatments, can delay people from receiving appropriate care and ultimately result in poorer outcomes (McVay, 2023; Starvaggi et al., 2024).

Studies have reported an increase in young people self-diagnosing with mental health conditions and neurodivergence following information they have seen on social media (Gilmore et al., 2022; Hasan, 2023). This is concerning as incorrect self-diagnosis based on misinformation could conceivably result in delayed or inappropriate treatment and contribute to the pathologization of behaviors, although there is a lack of existing research on this topic. This trend can be partially understood through a mental health literacy framework, which suggests that low public understanding of diagnostic criteria could increase vulnerability to misinformation (Jorm, 2000)

In this review, neurodivergence specifically refers to neurodevelopmental conditions such as autism and ADHD, which are conceptually distinct from mental health conditions. These constructs are examined together as they commonly co-occur within mental health discourse on social media and are similarly affected by misinformation on these platforms (Starvaggi et al., 2024). Despite these potentially significant implications for public (mental) health and increasing research in this area, a comprehensive systematic review that assesses the quality, reliability, and prevalence of mental-health and neurodivergence-related misinformation across social media platforms has yet to be conducted. While one literature review summarized recent findings related to this topic (Starvaggi et al., 2024), it did not utilize systematic search or appraisal methods and was limited to a small number of studies and therefore does not provide a full picture of the present issue. The present systematic review addresses this gap by assessing the quality and accuracy of mental health and neurodivergence-related information across different social media platforms. Through a narrative synthesis of the data, this review sought to answer the following questions: (1) What is the prevalence of mental health and neurodivergence-related misinformation on social media? (2) What is the quality and reliability of mental health and neurodivergence-related information on social media? (3) Does the accuracy, quality, and reliability of mental health and neurodivergence-related information vary across social media platforms and topics?

## 2. Method

### 2.1. Guidelines

This review was prospectively registered on Open Science Framework (OSF) (<https://doi.org/10.17605/OSF.IO/EHJBK>). The review was then conducted and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al., 2021) guidelines and the Synthesis Without Meta-analysis (SWiM) guidelines (Campbell et al., 2020).

### 2.2. Search Strategy

The databases included in the search were MEDLINE Ultimate, APA PsycINFO, CINAHL, and Scopus. These databases were searched on the 1st October 2024 using the following search terms: ("mental health" OR "mental illness" OR "mental disorder" OR psychosis OR dissociation OR schizophre\* OR adhd OR CBT OR "cognitive behavioural" OR "eating disorde\*" OR anorexi\* OR bulimi\* OR OCD OR autism OR ASD OR BPD OR "personality disorder" OR depression OR bipolar OR "obsessive compulsive" OR anxiety OR "attention-deficit hyperactivity disorder" OR ptsd OR "post-traumatic" OR phobia OR "body dysmorphic disorder" OR psychotherapy) AND (misinformation OR disinformation OR accurate OR accuracy OR "fake news" OR useful OR quality OR reliable OR reliability OR credibility OR credible OR trustworth\* OR DISCERN OR misleading) AND ("social media" OR youtube OR reddit OR facebook OR twitter OR instagram OR tiktok OR pinterest OR tumblr) NOT (covid-19 or coronavirus or pandemic). An academic librarian approved the strategy and databases. Google Scholar and reference lists of eligible articles were also searched.

### 2.3. Eligibility Criteria

#### 2.3.1. Inclusion Criteria

Studies were included if the objectives were to evaluate the quality and/or accuracy of mental health and neurodivergence-related information on social media platforms. All methods of assessing the quality and/or accuracy of this information were eligible. Studies were included if they were written in English and no date restrictions were implemented.

#### 2.3.2. Exclusion Criteria

Studies were excluded if they did not assess the quality and/or accuracy of mental health or neurodivergence-related information on social media. For example, studies were excluded if they explored attitudes towards mental health misinformation on social media or if they evaluated mental health information on standard websites.

### 2.4. Study Selection

Once the search was conducted, duplicates were identified and removed. The remaining articles were screened based on title and abstract by the lead reviewer (AC), who also screened the full text of all potentially eligible articles to identify studies which met the criteria for inclusion. A second rater (AO) reviewed 25% of articles at each stage. While formal inter-rater reliability statistics were not calculated, the reviewers discussed and aligned the inclusion criteria in advance, and discrepancies were resolved through discussion. Screening was conducted in Rayyan.

### 2.5. Data Extraction

Data extraction was conducted on Microsoft Excel using a pre-determined data extraction template by the lead reviewer (AC), which was piloted on a sample of the included studies. A second reviewer (JM) extracted data for 25% of the included studies, and any discrepancies were discussed and resolved. Extracted data included key study characteristics such as author(s), year, study design, sample size (i.e., number of social media posts evaluated), social media platform, topic(s), how misinformation was defined, evaluation method(s), and results (i.e., misinformation prevalence, information quality, and reliability). From piloting the extraction template, the DISCERN scale (Charnock et al., 1999) and Global Quality Scale (GQS) (Bernard et al., 2007) appeared to be frequently used and were therefore added to the extraction table.

## 2.6. Quality Ratings

Due to the nature of the review questions, the research designs utilized within this topic differ from the standard experimental, observational or qualitative designs usually seen within the field of psychology and did not contain participants. This meant standard tools for assessing the quality of studies, such as the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018) and Critical Appraisal Skills Programme (CASP) (CASP, 2018) checklist were not applicable. A quality appraisal tool created and used in a similar review exploring health misinformation on social media was therefore used, which fit with the study designs used in this topic (Suarez-Lledo & Alvarez-Galvez, 2021) (Table 1). This tool assessed the quality of the search strategy used (S-score) (eight items), how rigorous the evaluation was (E-score) (six items) and a general evaluation of the quality of the research process, such as the methodology, reporting of the results and discussion, for either quantitative (9 items) or qualitative (6 items) studies (G-score). Each score was calculated as the sum of each of the items by equating “yes” or “good” as 1 point, “fair” as 0.5 points, and “no” or “poor” as 0 points. A higher score indicates that a study is of good quality, while a lower score indicates a poor-quality study, with scores <50% classed as low quality. As the original tool does not yield a category for high quality studies, the authors of the present review took the decision to classify studies with a rating of over 75% as high quality. This threshold was selected to enable transparent categorisation and comparison of study quality. All of the included studies were critically appraised by AC, with a second reviewer (JM) assessing 25% of these. Any discrepancies were discussed and resolved.

**Table 1.** Quality assessment tool.

Dimension	Items
Search Quality (SQ)	<ol style="list-style-type: none"> <li>1. Was search date/period mentioned?</li> <li>2. Was search tools mentioned?</li> <li>3. Was more than 1 search tool used?</li> <li>4. Was search terms mentioned?</li> <li>5. Was user engagement mentioned?</li> <li>6. Was initial hits reported?</li> <li>7. Was posts in more than 1 language assessed?</li> <li>8. Was interrater reliability for post selection determined</li> </ol>
Evaluation Quality (EQ)	<ol style="list-style-type: none"> <li>1. Raters blinded for the source</li> <li>2. Number of raters reported</li> <li>3. More than 1 rater</li> <li>4. Interrater reliability figure for evaluation determined</li> <li>5. A priori criteria defined for accuracy / A priori criteria defined for evaluation</li> <li>6. Criterion standard for evaluation stated and different from personal opinion</li> </ol>
Scoring system for methodological quality of quantitative included studies (GQ)	<ol style="list-style-type: none"> <li>1. Did the study address a clearly focused issue?</li> <li>2. Did the authors use an appropriate method to answer their question?</li> <li>3. Was the study population clearly specified and defined?</li> <li>4. Were measures taken to accurately reduce measurement bias?</li> <li>5. Were the study data collected in a way that addressed the research issue?</li> <li>6. Did the authors take sufficient steps to assure the quality of the study data?</li> <li>7. Was the data analysis sufficiently rigorous?</li> <li>8. How complete is the discussion?</li> <li>9. To what extent are the findings generalizable to other international contexts?</li> </ol>
Scoring system for methodological quality of qualitative included studies (GQ)	<ol style="list-style-type: none"> <li>1. Were steps taken to increase rigour in the analysis of the data?</li> <li>2. Were the findings of the study grounded in/ supported by the data?</li> <li>3. Please rate the findings of the study in terms of their breadth and depth.</li> <li>4. To what extent does the study privilege the perspectives and experiences of health care professionals and patients/carers that are relevant to comparable health systems</li> <li>5. Overall, what weight would you assign to this study in terms of the reliability/ trustworthiness of its findings?</li> <li>6. What weight would you assign to this study in terms of the usefulness of its findings for this review?</li> </ol>

## 2.7. Synthesis

A meta-analysis was deemed to be inappropriate for the analysis due to significant heterogeneity across the included studies. This included variation in the social media platforms examined and differences in topic focus (i.e., mental health and neurodivergence). Studies also varied in both the evaluation methods and reporting formats, which limited the comparability of results. Therefore, a narrative synthesis of the findings from the included studies is provided, adopting the Synthesis without Meta-Analysis (SWiM) guidelines (Campbell et al., 2020), structured around the quality of the research, findings related to the quality and reliability of the information, including the misinformation prevalence and whether this varies by social media platform or topic.

## 3. Results

### 3.1. Identification of Studies

Of 2772 abstracts identified for screening, 46 full text papers were retrieved and screened, yielding 26 studies which met the criteria for inclusion. An additional paper was identified through searching the reference lists of included papers, resulting in a total of 27 studies. A PRISMA flowchart is presented in Figure 1.

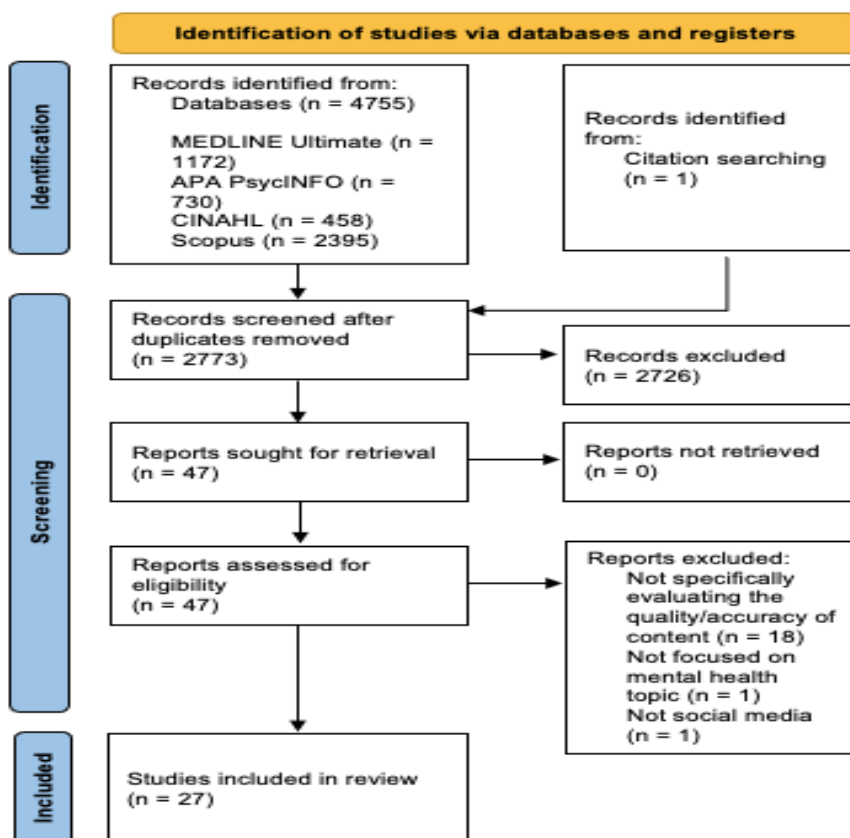


Figure 1. Prisma flow diagram.

### 3.2. Study Characteristics

The characteristics and findings for each included study are outlined in Table 2 and a narrative summary is also provided. In terms of platforms, included studies evaluated information on Instagram (n=1), YouTube Kids (n=1), Facebook (n=2), X (formerly Twitter) (n=1), TikTok (n=5), and YouTube (n=18). One of these studies evaluated both TikTok and YouTube.

Nearly a third of the included studies focused on neurodivergence, specifically autism (n=4) and attention-deficit hyperactivity disorder (ADHD) (n=4). The remaining studies focused on a variety of mental health diagnoses and treatments, including anorexia nervosa (n=3), post-partum depression (PPD) (n=2), bipolar disorder (n=2), obsessive-compulsive disorder (OCD) (n=2), substance abuse (n=1), dissociative identity disorder (DID) (n=1), schizophrenia (n=1), psychosocial interventions for schizophrenia (n=1), MDMA-assisted psychotherapy for PTSD (n=1), agoraphobia (n=1), MRI claustrophobia (n=1), electroconvulsive therapy (ECT) (n=1), and “mental health” (n=1). One study also explored anxiety, depression and ADHD within the same paper. In total, 5057 social media posts were analyzed across the 27 included studies. The smallest sample was 38 YouTube videos, while the largest was 1532 Facebook statements.

**Table 2.** Study characteristics and results.

Publication	Platform	Topic	Sample	Definition of Misinformation	Prevalence of Misinformation	DISCERN	GQS	Quality Rating (%)
Abhishek et al. (2021)	YouTube	OCD	82 videos	Grossly deviating from DSM-5 descriptions.	Meaning of obsessions - 8.5% Meaning of compulsions - 4.9%	N/A	N/A	67.40
Abu Sabra & Al Kalaldehy (2024)	YouTube	ECT	250 videos	Not recorded	N/A	3 (Median) <i>mDISCERN</i>	3 (Median)	71.74
Alsabhan et al. (2024)	YouTube	Bipolar Disorder	58 videos	Not recorded	N/A	35.8 (Median) <i>Full DISCERN</i>	N/A	65.22
Aragon-Guevara et al. (2023)	TikTok	Autism	133 videos	Lack of consistency with existing scientific knowledge related to causes, presentation, diagnostic criteria, evidence-based interventions, and other relevant areas of research.	41%	N/A	N/A	76.101
Bizzotto et al. (2023)	Facebook	Mental Health	1532 statements	Not recorded	26.1%	N/A	N/A	43.48
Brown et al. (2024)	TikTok	Autism	100 videos	Videos containing any factually untrue or scientifically unsubstantiated claims about any aspect of ASD.	40%	N/A	N/A	60.87
Cavalcante et al. (2023)	YouTube	Autism	216 videos	Not recorded	N/A	3 (Median) <i>mDISCERN</i>	3 (Median)	71.74
Chakrabarty et al. (2024)	YouTube	Autism	41 videos	Not recorded	N/A	Type of uploader: Doctors – 3 Hospitals – 3 Healthcare organization - 2.5 News channel - 2 Parent of patient – 3 Patient - 3 (Medians) <i>mDISCERN</i>	Type of uploader: Doctors – 5 Hospitals – 3 Healthcare organization - 3 News channel - 2 Parent of patient – 4 Patient – 4 (Medians)	67.40

Dobosz et al. (2023)	YouTube	Body Dysmorphic Disorder	38 videos	Not recorded	N/A	32.89 (Mean) Full DISCERN	Total: 2.84 Type of uploader: Healthcare – 3.83 Non-healthcare – 2.53 (Medians)	71.74
Joseph et al. (2015)	Twitter	Schizophrenia	685 Tweets	Medically inappropriate Tweets make direct reference to inaccurate facts about the illness.	“Schizophrenia” – 6.6% “Schizophrenic” – 30.1% Total – 18.76%	N/A	N/A	54.35
Kaya et al. (2021)	YouTube	OCD	131 videos	Not recorded	N/A	33.5 (Median) Full DISCERN Total: 3.55	N/A	73.90
Kaya & Azturk (2023)	YouTube	Agoraphobia	50 videos	Videos containing false or unreliable content.	22%	Professionals – 3.78 Non-professionals – 2.89 (Means) mDISCERN	Total: 3.4 Type of uploader: Professionals – 3.57 Non-professionals – 2.92 (Means)	69.60
Kumar & Jha (2018)	YouTube	Psychosocial interventions for Schizophrenia	49 videos	Not recorded	Psychosocial interventions – 0% Interventions in general – 8% CBTp – 0% CR – 12%	N/A	N/A	58.70
Kyarunts et al. (2022)	YouTube	MDMA-assisted psychotherapy for PTSD	100 videos	Not recorded	N/A	31.30 (Mean) Full DISCERN	2.3 (Mean)	56.52
Liu-Zarzuela et al. (2023)	YouTube	Postpartum Depression	64 videos	Videos containing: 1) An inaccurate definition of PPD, 2) At least one inaccurate statement about the mechanism of PPD, and 3) At least one inaccurate statement about the treatment/management of PPD.	Total: 7.81% Type of Uploader: Psychiatrist – 0% Other healthcare provider – 0% Health organization – 11.11% Television clip – 0% News channel – 8.33% Other organization – 11.11% Independent user – 12.50%	1.87 (Mean) mDISCERN	2.73 (Mean)	80.43
Liu-Zarzuela et al. (2024)	Facebook	Postpartum Depression	69 videos	Videos containing: 1) an inaccurate statement about PPD, 2) provided an inaccurate explanation of the mechanism/pathogenesis of PPD, 3) included an	Total: 3% Type of Uploader: Healthcare provider – 0% Healthcare organization – 0%	2.32 (Mean) mDISCERN	2.48 (Mean)	76.10

				inaccurate statement about the treatment/management of PPD.	Television clip – 0% News channel – 0% Other organization – 7.69% Independent user – 7.69%			
Lookingbill et al. (2023)	TikTok	Anorexia	200 videos	Pro-anorexia content.	29.5%	N/A	N/A	58.70
Mallya et al. (2024)	YouTube (Kids)	Depression, Anxiety & ADHD	163 videos	Videos containing an inaccurate definition of the condition, an inaccurate statement about the condition's mechanism, and/or an inaccurate statement about the condition's treatment/management. 1) An inaccurate definition on at least one portion of the definition of DID per the DSM-V-TR, 2) An inaccurate statement on at least one portion on the mechanism of DID, and 3) An inaccurate statement on at least one portion on the treatment/ management of DID.	Depression – 0% Anxiety – 0% ADHD – 8.89%	N/A	N/A	52.17
Munoz et al. (2024)	YouTube, TikTok	Dissociative Identity Disorder	60 YouTube videos 97 TikTok videos	An inaccurate statement on at least one portion on the mechanism of DID, and 3) An inaccurate statement on at least one portion on the treatment/ management of DID.	YouTube 6.7% TikTok 10.3%	YouTube 1.7 TikTok 0.4 (Means) <i>mDISCERN</i>	YouTube 1.8 TikTok 1.1 (Means)	73.90
Mutlu & Arik (2023)	YouTube	MRI Claustrophobia	65 videos	Videos containing scientifically inaccurate content that misleads patients regarding decisions or treatment.	56.92%	Type of uploader: Professionals – 4.06 Non-professionals – 2.90 (Means) <i>mDISCERN</i>	Type of uploader: Professionals – 4.13 Non-professionals – 2.08 (Means)	76.10
Niu & Reed (2023)	YouTube	Substance Abuse	100 videos	Not recorded	25%	N/A	N/A	41.30
Patel et al. (2023)	Instagram	Bipolar Disorder	196 posts	Not recorded	N/A	Type of uploader: Medical professionals - 1 Healthcare organization - 2 Patient – 1 Others – 1 (Medians) <i>mDISCERN</i>	Type of uploader: Medical professionals - 3 Healthcare organization - 2 Patient – 2 Others – 2 (Medians)	58.70
Suresh et al. (2023)	YouTube	Anorexia	59 videos	Not recorded	N/A	Type of uploader: Doctors – 4 Hospital/healthcare organization – 4	Type of uploader: Doctors – 4 Hospital/healthcare	54.35

Author(s)	Platform	Topic	Number of Videos	Content Description	Percentage	News channel – 3 Patient – 3 Other – 3 (Medians) <i>mDISCERN</i>	organization – 4 News channel – 4 Patient – 4 Other – 4 (Medians)	Quality Score
Syed-Abdul et al. (2013)	YouTube	Anorexia	140 videos	Pro-anorexia content.	29.3%	N/A	N/A	73.90
Thapa et al. (2018)	YouTube	ADHD	159 videos	Not recorded	38.36%	N/A	N/A	67.40
Ward et al. (2020)	YouTube	ADHD	120 videos	Not recorded	N/A	Total: 2.03 Type of uploader: Neurologists, pediatricians, psychiatrist (MD) – 2.63 Other medical professional (non-MD) – 3.40 Nonmedical professional – 1.69 PhD – 2.13 Company/advertiser – 2.40 (Means) <i>mDISCERN</i>	N/A	52.17
Yeung et al. (2022)	TikTok	ADHD	100 videos	Videos containing information lacking scientific evidence (e.g., unsubstantiated claims about ADHD).	Total: 52% Type of uploader: HCP – 3% Non-HCP – 55.1%	N/A	N/A	76.10

**Note.** DISCERN (Charnock et al., 1999); modified DISCERN (*mDISCERN*) (Singh et al., 2012); Global Quality Scale (GQS) (Bernard et al., 2007). Abbreviations: ADHD, attention-deficit hyperactivity disorder; ECT, electroconvulsive therapy; GQS, Global Quality Scale; HCP, healthcare professional; MDMA, 3,4-Methylenedioxymethamphetamine; MRI, magnetic resonance imaging; OCD, obsessive-compulsive disorder; PTSD, post-traumatic stress disorder

### 3.3. Quality Ratings

The mean quality rating for included studies was 64.82%, with a range of 41.30% (Niu & Reed, 2023) to 80.43% (Liu-Zarzuela, 2023), indicating variation in quality. A summary table of the quality ratings for all included studies is outlined in Table 3. Amongst the included studies, Aragon-Guevara et al. (2023), Liu-Zarzuela et al. (2023), Liu-Zarzuela et al. (2024), Mutlu et al. (2023), and Yeung et al. (2022) were deemed to be of the highest quality. The studies rated as low quality were Bizzotto et al. (2023) and Niu and Reed (2023). A common weakness was search quality: 25/27 studies included social media content in only one language, and 24/27 did not assess interrater reliability for post selection. Studies also frequently lacked measures to reduce measurement bias, with 16/27 studies failing to report an interrater reliability figure for the evaluation.

### 3.4. Synthesis

It was not possible to group findings by social media platform and topic due to differences in measurement and reporting methods, which would not have allowed for sufficiently large groups to coherently synthesize the findings. Findings are grouped by the measurement method used and comparisons drawn between platforms and topics within this.

**Table 3.** Summary of quality ratings.

Study	SQ	EQ	GQ	Total
Abishek et al. (2021)	50.00	75.00	77.78	67.40
Abu Sabra et al. (2024)	62.50	66.67	83.33	71.74
Alsabhan et al. (2024)	50.00	66.67	77.78	65.22
Aragon-Guevara et al. (2023)	62.50	75.00	88.89	76.10
Bizzotto et al. (2023)	18.75	41.67	66.67	43.48
Brown et al. (2024)	50.00	58.33	72.22	60.87
Cavalcante et al. (2023)	50.00	75.00	88.89	71.74
Chakrabarty et al. (2024)	62.50	58.33	77.78	67.40
Dobosz et al. (2023)	43.75	83.33	88.89	71.74
Joseph et al. (2015)	25.00	66.67	72.22	54.35
Kaya et al. (2021)	50.00	83.33	88.89	73.90
Kaya et al. (2023)	50.00	83.33	77.78	69.60
Kumar et al. (2018)	56.25	50.00	66.67	58.70
Kyarunts et al. (2022)	50.00	33.33	77.78	56.52
Liu-Zarzueta et al. (2023)	62.50	83.33	94.44	80.43
Liu-Zarzueta et al. (2024)	50.00	83.33	94.44	76.10
Lookingbill et al. (2023)	37.50	58.33	77.78	58.70
Mallya et al. (2024)	31.25	66.67	61.11	52.17
Munoz et al. (2024)	56.25	75.00	88.89	73.90
Mutlu et al. (2023)	50.00	83.33	94.44	76.10
Niu et al. (2023)	31.25	33.33	55.56	41.30
Patel et al. (2023)	50.00	33.33	83.33	58.70
Suresh et al. (2023)	37.50	33.33	83.33	54.35
Syed-Abdul et al. (2013)	68.75	75.00	77.78	73.90
Thapa et al. (2018)	50.00	75.00	77.78	67.40
Ward et al. (2020)	31.25	66.67	61.11	52.17
Yeung et al. (2022)	62.50	75.00	88.89	76.10

### 3.5. Definitions of Misinformation

Thirteen studies outlined their definitions of misinformation, which varied across studies. Most studies defined misinformation as content which contained factually inaccurate and/or scientifically unsubstantiated claims (e.g., Brown et al., 2024; Liu-Zarzueta et al., 2024; Yeung et al., 2022). Other studies used more specific criteria to define misinformation, such as deviation from the DSM-V (Abishek et al., 2021), pro-anorexia content (Lookingbill et al., 2023; Syed-Abdul et al., 2013), and content which misleads patients regarding treatment decisions (Mutlu et al., 2023).

### 3.6. Tools Used to Evaluate Information

Three approaches were used to evaluate the reliability, quality and accuracy of mental health and neurodivergence-related information on social media.

Seventeen studies reported the percentage of misinformation, demonstrating the accuracy of the information. The prevalence of misinformation depended on how each study defined it, rather than using a validated tool, and was calculated as the percentage of content assessed that contained misinformation. Fifteen studies used the DISCERN measure, a validated tool for assessing the reliability of written health information (Charnock et al., 1999). Four studies used the full 16-item DISCERN, with scores between 63-75 considered "excellent", 51-62 "good", 39-50 "fair", 27-38 "poor", and 16-26 "very poor". Eleven studies used the 5-item

modified DISCERN (mDISCERN) (Singh et al., 2012), in which a score of three or more indicates highly reliable information.

The Global Quality Scale (GQS), a validated five-point Likert scale designed to assess the quality of online health information (Bernard et al., 2007), was used in 12 studies. A score of one indicates poor quality and a score of five indicates excellent quality.

Studies varied in how they reported the (m)DISCERN and GQS, with some reporting means and others reporting medians. A narrative summary was used to compare findings across topics and social media platforms.

### 3.7. Prevalence of Misinformation

Misinformation prevalence was reported in 17/27 studies and varied across social media platforms and topics. Overall, misinformation prevalences ranged from 0% for videos on anxiety and depression on YouTube Kids (Mallya et al., 2024), to 56.92% for videos on MRI claustrophobia on YouTube (Mutlu et al., 2023). The mean misinformation prevalence across all studies was 26.41%.

In terms of platform, misinformation prevalence was consistently higher on TikTok, including prevalences of 52% for ADHD-related TikTok videos (Yeung et al., 2022) and 41% for autism-related TikTok videos (Aragon-Guevara et al., 2023), while another study reported higher misinformation prevalence on TikTok (10.3%) than on YouTube (6.7%) for content about DID (Munoz et al., 2024). The mean misinformation prevalence for mental health and neurodivergence-related information on TikTok was 34.56%. The prevalence of misinformation for YouTube videos varied depending on the topic and was lowest in videos about DID at 6.7% (Munoz et al., 2024), and highest in videos about MRI claustrophobia at 56.92% (Mutlu et al., 2023), with a mean of 21.99% misinformation. YouTube Kids had the lowest misinformation prevalence, reporting no misinformation for both anxiety and depression and 8.89% for ADHD (Mallya et al., 2024). Two studies investigated misinformation on Facebook, with a mean prevalence of 14.55%. Only one study investigated misinformation on X (formerly Twitter), reporting a prevalence of 18.76%, while the single study on Instagram did not report a prevalence.

In terms of topic, social media content on PPD contained the least amount of misinformation, ranging from 3% on Facebook (Liu-Zarzuela et al., 2024) to 7.81% on YouTube (Liu-Zarzuela et al., 2023), while content on MRI claustrophobia was found to contain the most misinformation at 56.92% (Mutlu et al., 2023). Content on neurodivergence consistently contained a higher misinformation prevalence than content on mental health conditions and treatments, with prevalences of 40% (Brown et al., 2024) and 41% (Aragon-Guevara et al., 2023) for autism, and 38.6% (Thapa et al., 2018) and 52% (Yeung et al., 2022) for ADHD.

### 3.8. Reliability of Information

The reliability of information, demonstrated by (m)DISCERN scores, varied considerably across platforms, topics, and uploader types. For the full DISCERN, possible scores range from 16 (very poor reliability) to 75 (excellent reliability). Only YouTube studies used the full DISCERN and reported scores ranging from a median of 31.3 (Kyarunts et al., 2022) to 35.8 (Alsabhan et al., 2024), indicating poor reliability across different topics.

For studies that utilized the 5-item mDISCERN, overall mean scores for YouTube ranged from 1.7 (Munoz et al., 2024) to 3.55 (Kaya et al., 2023), indicating the reliability of YouTube videos varies from poor to high across different topics. YouTube videos were reported to be more reliable than TikTok videos, as demonstrated by Mutlu et al. (2023), who found that TikTok videos on DID had a mean mDISCERN score of 0.4, compared to 1.7 for YouTube videos on the same topic. When looking at the mean mDISCERN scores for PPD content, Facebook was reported to be more reliable than YouTube, with means of 2.32 and 1.87, respectively. Meanwhile, YouTube videos demonstrated higher reliability than Instagram videos across different topics.

Professionally created content was usually found to be more reliable than content created by non-professionals when considering the mDISCERN scores (Kaya & Azturk, 2023; Mutlu et al., 2023; Suresh et al., 2023), although some studies reported the reliability of professional and patient-created content to be of equal reliability (Chakrabarty et al., 2024; Patel et al., 2023). Content by professionals was reported to be more reliable on YouTube than on Instagram, with studies reporting median scores of 4 (Suresh et al., 2023) and 1 (Patel et al., 2023), respectively.

Three of the high-quality studies assessed the reliability of the information, all of which used the mDISCERN. The overall mean mDISCERN score for the higher-quality studies ranged from 1.87 (Liu-Zarzuela et al., 2023) to 2.32 (Liu-Zarzuela et al., 2024), whereas reliability was not evaluated in the lower-quality studies.

Studies that reported both misinformation prevalence and overall mean mDISCERN scores had lower misinformation prevalence. Some studies with low misinformation prevalence also demonstrated low

mDISCERN scores, indicating low reliability (Liu-Zarzueta et al., 2023; Munoz et al., 2024), whereas a study with a higher misinformation prevalence was rated as highly reliable (Kaya et al., 2021). All three of these studies assessed information on YouTube but varied by topic.

### 3.9. Quality of Information

The quality of the information was demonstrated by GQS scores, which varied by platform, topic, and uploader type. For YouTube, the overall mean GQS scores ranged from 1.8 for DID content (Munoz et al., 2024) to 3.4 for agoraphobia content (Kaya et al., 2023), demonstrating that the quality and flow of YouTube content vary from poor to moderate across topics. YouTube videos were reported to be of slightly higher quality than TikTok videos, as demonstrated by Mutlu et al. (2023) in which TikTok videos on DID had a mean GQS score of 1.1, compared to 1.8 for YouTube videos on the same topic. Content for PPD was reported to be of poor quality across both Facebook and YouTube, with mean GQS scores of 2.48 (Liu-Zarzueta, 2024) and 2.73 (Liu-Zarzueta, 2023), respectively.

Professionally created content was mostly reported to be of higher quality than content created by non-professionals when considering the GQS scores (Chakrabarty et al., 2024; Dobosz et al., 2023; Kaya & Azturk, 2023; Mutlu et al., 2023; Patel et al., 2023). However, for YouTube videos on autism, content uploaded by patients and parents had higher median GQS scores than content uploaded by hospitals and healthcare organizations (Chakrabarty et al., 2024), whereas there was no difference in median GQS scores between uploader types for YouTube videos about anorexia.

Some studies that reported low misinformation prevalence also reported low mean GQS scores, indicating the information was of poor quality (Liu-Zarzueta et al., 2023; Liu-Zarzueta et al., 2024; Munoz et al., 2024), while a study reporting comparatively higher misinformation prevalence also reported a higher mean GQS score, which indicated that the information was of moderate quality (Kaya et al., 2021). Some studies reported information as both of poor reliability and poor quality (Munoz et al., 2024) and of high reliability and moderate quality (Kaya et al., 2021), although this finding was inconsistent.

## 4. Discussion

This systematic review aimed to identify the quality and accuracy of mental health and neurodivergence-related information on social media, including the prevalence of misinformation. A total of 27 papers of varying quality were included in this review, and a synthesis of the included studies compared the quality, accuracy and reliability of information by social media platform and topic.

This review highlights considerable variation in the accuracy, reliability and quality of information across social media platforms, topics, and uploader types. TikTok was found to have the highest prevalence of misinformation, while Facebook was reported to have the lowest, with no prior research having compared misinformation prevalences between the two. The accuracy, reliability and quality of information on YouTube varied across different topics but scored consistently better than TikTok, aligning with previous research which found that YouTube content contained more credible information and less misinformation than TikTok (Tam et al., 2022). This variability suggests that platform-specific factors, such as algorithmic systems and content moderation, may influence the spread of misinformation, therefore supporting theories of selective exposure and confirmation bias (Cinelli et al., 2021; Nickerson, 1998). This review's findings in relation to TikTok align with previous research suggesting the role of TikTok's algorithm in spreading misinformation (Grandinetti & Bruinsma, 2022). Contrastingly, Facebook and YouTube's search-based designs have less focus on rapid engagement and viral trends, with YouTube often favoring more established channels and Facebook prioritizing content by existing connections and followed pages (UIDesignz, 2024; QuickFrame, 2023), which perhaps deliver information from more established and trusted sources than TikTok's 'For You Page'. YouTube Kids was the only platform to report findings of no misinformation for some topics, which is likely due to the implementation of stricter content moderation and prioritization of child-friendly content (YouTube Kids, n.d.).

The variability of findings for YouTube across different topics indicates that platform-specific factors are not the only influence in the spread of misinformation. Low health literacy has been linked with the spread of misinformation on health topics (Borges do Nascimento et al., 2022), which suggests a lack of (mental) health literacy on certain topics may contribute to increased misinformation. While most studies included in this review did not evaluate whether misinformation prevalence differed by type of uploader, the studies which did report this supported previous research which found that misinformation usually originates from individual users with no official or institutional affiliations (Wang et al., 2019). This suggests the proportion of professional vs non-professional uploaders may vary depending on the topic within a certain social media platform, with some topics

involving more discourse among lay people which may impact the misinformation prevalence, although this cannot be concluded as part of the present review. These findings may partly be explained by mental health literacy frameworks, in which conditions characterised by overlapping symptoms, less clearly defined diagnostic boundaries, and high public discourse may be particularly vulnerable to oversimplification and misinterpretation on social media (Jorm, 2000).

Studies using the (m)DISCERN and GQS measures also consistently reported that professionally created content contained more reliable and higher quality information than non-professional content across most topics, aligning with findings in the field of health misinformation in which content by medical professionals were of higher quality than non-medical influencers (Dimitroyannis et al., 2024). However, anorexia content by doctors and patients were found to be of equally high quality, while content on bipolar disorder by medical professionals and patients were found to be of equally poor reliability. This may indicate a clearer public understanding and reduced stigma for anorexia than bipolar disorder, and there is scope for future research to investigate the role of stigma and public perceptions on the quality of information shared across different topics. However, this finding also raises concerns regarding the quality of information on bipolar disorder being shared by professionals and the role this may play in the spread of misinformation, particularly as health professionals are viewed as trusted sources on social media (Freeman et al., 2023).

Interestingly, studies reported information on mental health and neurodivergence as being accurate but unreliable and of low quality, and of being inaccurate but with high reliability and moderate quality. The purpose of this review was not to identify relationships between measures, which would not have been possible regardless due to the limited number of studies. However, this finding demonstrates the importance of studies using more than one measure when conducting research on this topic to thoroughly evaluate and provide a fuller picture of mental health and neurodivergence-related information on social media.

Many of the included studies used the (m)DISCERN to evaluate the reliability of the information. While this is a validated tool, it was developed for the evaluation of written health information, and the suitability for its use in evaluating videos on social media platforms is therefore questionable (Azer, 2020). This research poses a need for a tool specifically designed to assess the reliability of mental health and neurodivergence-related content on various social media platforms, such as including criteria for short video content rather than purely written information.

Another key issue highlighted by this review is the lack of consistency in how information on mental health and neurodivergence is evaluated and reported in social media studies. While there was variation in the methods used to evaluate the information (i.e., percentage of misinformation, mDISCERN, DISCERN, GQS), the way these findings were reported also lacked consistency, with some studies reporting means and others medians. This limits the ability to coherently compare findings across platforms and topics and highlights a need for a consistent methodology in the evaluation and reporting of mental health and neurodivergence-related information quality on social media.

#### 4.1. Limitations

There are several limitations to this review which should be considered, the first of which relates to the bias in the number of studies evaluating each platform. Most studies focused on YouTube, while minimal studies evaluated X (formerly Twitter), Facebook or Instagram. This prevented comparisons from being made within each platform as they were for YouTube, limiting the conclusions which can be made regarding potential factors which impact the quality of information on these platforms.

As this review focused on the quality of mental health and neurodivergence-related information on social media, studies were only included if they utilised tools which specifically measured this, i.e., whether information was accurate or reliable. However, this meant that studies exploring other qualities of this social media content were excluded. This excluded studies which utilised the Patient Education Materials Assessment Tool (PEMAT) (Shoemaker et al., 2014), which measures the understandability and actionability of content. Although outside this review's scope, this limited broader insights into mental health and neurodivergence-related content, particularly whether content is presented in a way that is understandable and promotes action, which would be an important topic to explore within its own context.

A further limitation related to the use of multiple evaluation methods (i.e., DISCERN, mDISCERN, GQS, and misinformation prevalence). While this allowed for a more comprehensive assessment of accuracy, quality, and reliability, this limited direct comparability and complicated synthesis across platforms and topics.

Another limitation was the quality appraisal tool used. Due to the novel topic area, there were no existing validated tools which would have been appropriate due to the designs of the included studies. While the tool

used was appropriate for the study designs and had been used in a previous review (Suarez-Lledo & Alvarez-Galvez, 2021), it is limited in its validity in assessing the quality of the studies in this review. Furthermore, this tool does not outline a cut-off score for high quality studies, and therefore the conclusions made about the quality of the studies were limited to whether they were higher or lower quality than one another, and an arbitrary value was required to establish the highest quality studies. Furthermore, while some studies were of considerably lower quality, indicating a higher risk of bias, they were included in this review. While this is a limitation of the present review, this decision was made as removing lower-rated studies would have made comparing findings by social media platform and topic even more challenging.

Finally, the generalizability of these findings is limited by aspects of the studies included in the review, particularly that many studies did not report inter-rater reliability, and that most included studies evaluated content in only one language. Furthermore, while this review included some studies from the Global South, the majority came from the Global North, which presents a risk of Westernised bias and limits the present review's generalizability to other international contexts.

## 5. Implications and Future Directions

These findings have important implications, particularly relating to public (mental) health. Given some of the concerning findings related to the accuracy, reliability and quality of mental health and neurodivergence-related information on social media, organisations for mental health and neurodivergence should disseminate more credible content to counteract misinformation. Individual clinicians should also actively engage with content and share accurate information to users, with organisations and services providing support with this, including guidance on effective and responsible information sharing on social media. Considering the fast-moving nature of social media, it would be beneficial for future research to understand the social media literacy of clinicians and identify areas of learning to support with the sharing of credible information. The accurate interpretation and responsible sharing of social media content for both clinicians and the public could be further supported by social media literacy initiatives.

Future research should assess social media user demographics by platform to identify whether this influences the accuracy, quality and reliability of information across platforms. This review also demonstrates the need for consistency within this topic, first with the conceptual definition of (mental) health misinformation, and second with the measurement and reporting of information. Future research should therefore focus on the development of validated and standardised tools for assessing the quality, accuracy, and reliability of assessing this content on social media. From a policy perspective, these findings support the development of clearer standards or recommendations for online information on mental health and neurodivergence. Finally, these findings highlight a need for platforms to review algorithmic designs and strengthen content moderation strategies to prioritise accurate information on mental health and neurodivergence and reduce the spread of misinformation, particularly for trending or highly engaged content.

<b>Statement of Researchers</b>	
<b>Researchers' contribution rate statement:</b>	<b>Alice Carter:</b> Conceptualization, data curation, formal analysis, investigation, methodology, project administration, supervision, validation, visualization, writing (original draft), writing (review & editing). <b>Fergus Gracey:</b> Second Author: Conceptualization, methodology, supervision, writing (review & editing). <b>Joanna Moody:</b> Investigation, validation, writing (review & editing) <b>Amber Ovens:</b> Investigation, validation, writing (review & editing) <b>Eleanor Chatburn:</b> Conceptualization, methodology, supervision, writing (review & editing)
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# Social media flow and academic procrastination (SoMe FIAP) project across cultures: A protocol for measurement and structural modeling in three regions

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## Highlights:

- Social media habits of youth in Türkiye, Ghana, and Hong Kong are examined cross-culturally.
- The project aims to establish cross-cultural measurement invariance of digital well-being scales.
- Modeling social media flow's transition into maladaptive behaviors like phubbing and academic procrastination.
- The mediating roles of FoMO, smartphone addiction, and digital pressure are tested.

## Abstract

**Background:** Although social media flow is often viewed as an ideal state marked by deep absorption, its potential to develop into dysregulated behaviors, such as phubbing and academic procrastination, remains a vital yet under-studied area, especially in non-Western settings. It is unclear whether these harmful outcomes mainly stem from a failure of self-regulation or from a separate pathological pathway driven by fear of missing out (FoMO) and addictive behaviors. Additionally, the lack of measurement tools validated across cultures hinders accurate comparisons of these psychological processes across societies. This protocol presents a multinational project (i.e., Social Media Flow and Academic Procrastination [SoMe FIAP] Project) aimed at addressing these gaps by establishing measurement invariance and testing theory-based structural models in regions (Türkiye, Ghana, and Hong Kong) with diverse cultures. **Methods:** The project will use a multifactorial, complex, predictive correlational design with a cross-sectional survey approach. A target sample of 1500 youths (i.e., 18 years and older) will be recruited through convenience sampling from higher education institutions (N = 500 per region). Data will be collected via a secure, web-based platform (i.e., REDCap) or on printed paper. The assessment set will include culturally adapted measures of the Social Media Flow Scale, the Social Media-Focused FoMO Scale, the Bergen Social Media Addiction Scale, the Smartphone Application-Based Addiction Scale, the Generic Scale of Phubbing, Social Digital Pressure Scale, the Social Overload Scale, Social Network Site Exhaustion Scale, Social Media Continuance Scale, Brief Self-

- Findings will guide culturally sensitive educational strategies to enhance youth digital resilience.

Control Scale, and Academic Procrastination Scale. **Analysis Plan:** The analytical strategy will be structured around two complementary workstreams. Workstream One aims to establish cross-cultural measurement invariance (configural, metric, and scalar) for all constructs using Multi-Group Confirmatory Factor Analysis (MGCFA). Workstream Two will employ Hayes' Process macro to test four specific hypothetical models: (1) a moderated mediation model connecting flow to phubbing through FoMO and smartphone addiction; (2) a model exploring the buffering effect of self-control on the relationship between flow and academic procrastination; (3) a moderated mediation model examining how social digital pressure and overload influence discontinuation intentions; and (4) a model assessing the particular pathological pathway from flow to academic procrastination mediated by addiction symptoms. Additionally, other explorative analyses will be done, including Latent Profile Analysis (LPA) to identify distinct psychosocial user profiles. **Discussion/Implications:** This project aims to create a strong, culturally validated psychometric toolkit to assist future studies on digital well-being in Türkiye, Ghana, and Hong Kong. By clearly distinguishing between regulatory deficits and compulsive behaviors, the findings will provide detailed insights into the causes of digital dysregulation. The results will guide the development of culturally appropriate educational and clinical strategies to promote digital resilience among youth in different cultural contexts.

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## 1. Introduction

Social media platforms have become key sources for adolescents and young adults to interact socially, present themselves, and seek information. Along with these advantages, growing evidence indicates that some users develop persistent, unregulated patterns of social media use that are linked to impaired functioning and lower well-being (Andreassen, 2015; Andreassen et al., 2017). Reviews also highlight that problematic engagement should be seen not only as a matter of time spent, but as a complex pattern driven by motivational, emotional, and self-control factors (Kuss & Griffiths, 2011). Cross-cultural evidence further indicates that rates of problematic or addictive social media use vary significantly across societies, suggesting that sociocultural contexts and digital environments influence both the risk of such use and its manifestations (Cheng et al., 2021).

One core motivational mechanism that may help explain persistent engagement is flow, namely the intrinsically rewarding state of deep absorption that can arise during optimally challenging activities (Csikszentmihalyi, 1990). Social media environments are designed to facilitate continuous feedback loops that may support flow-like experiences, and empirical work suggests that stronger platform-related flow is associated with more compulsive, addiction-like social media use patterns (Brailovskaia et al., 2018; Brailovskaia et al., 2020). From a reinforcement perspective, flow may function as a pathway through which gratification and immersion increase the intensity of use and undermine reflective self-regulation (Andreassen et al., 2016; Brailovskaia et al., 2018; Brailovskaia et al., 2020).

A second, closely related motivational factor is fear of missing out (FoMO), defined as the widespread fear that others might be enjoying rewarding experiences to which one is not part (Przybylski et al., 2013). FoMO has been linked to increased engagement and more frequent checking behaviors, and online-specific FoMO has been identified as a direct risk factor for problematic online communication patterns (Wegmann et al., 2017). Recent measurement research also highlights that FoMO can be understood and measured in platform-specific ways, making measurement more relevant to social media contexts (Çelik & Özkara, 2022).

Beyond intrapersonal mechanisms, problematic engagement appears in interpersonal behaviors such as phubbing, which is the act of ignoring a person nearby by focusing on one's phone. Phubbing has been viewed

as both a result of compulsive smartphone use and a social norm that can increase device checking and online vigilance (Chotpitayasunondh & Douglas, 2016). Scale development and validation studies indicate that behaviors related to phubbing can be measured reliably, enabling theory-based modeling of their causes and effects (Chotpitayasunondh & Douglas, 2018). In a broader risk framework, tendencies toward smartphone addiction may also serve as a nearby behavioral indicator of poorly regulated mobile engagement (Csibi et al., 2018).

Self-regulation is another essential area of explanation. Trait self-control, as measured by widely used tools, correlates with adaptive functioning and a lower risk of impulsive or compulsive behaviors (Tangney et al., 2004). In educational settings, failures in self-regulation often happen alongside academic procrastination, which is strongly linked to student performance and well-being outcomes (Steel, 2007). Evidence also indicates that procrastination affects students' academic life satisfaction and emotional well-being (Balkis & Duru, 2016), making it an important downstream outcome when social media use conflicts with goal-oriented academic tasks (Üztemur, 2020). Meanwhile, social media engagement is driven by perceived social demands and pressures. Concepts such as social overload highlight the stress caused by excessive social support demands on social networking sites, which can lead to exhaustion and a desire to cut back (Maier et al., 2015). Similarly, digital inequality frameworks argue that “overuse” is not just an individual choice but is influenced by social patterns and shaped by an abundance of communication and contextual demands (Gui & Büchi, 2021). These dynamics support the idea that social media burnout and exhaustion are accumulative outcomes that may push individuals toward withdrawal and discontinuation intentions (Han, 2018).

To address the issues of social media measures across cultures, we proposed the Social Media Flow and Academic Procrastination (SoMe FIAP) Project. In particular, as the proposed project is explicitly cross-cultural, valid comparisons require more than just translating instruments. Best-practice guidelines in test adaptation emphasize linguistic and cultural equivalence as well as psychometric comparability (Hambleton & Patsula, 1999). Additionally, cross-group comparisons demand explicit testing of measurement invariance, with recommended procedures and decision rules extensively discussed in the methodological literature (Vandenberg & Lance, 2000; Chen, 2007; Putnick & Bornstein, 2016). Without at least scalar-level equivalence, mean comparisons across regions can be misleading, and structural comparisons may be affected by measurement artifacts. Building on this background, the present cross-cultural project investigates how motivational immersion (social media flow) and social pressure mechanisms (FoMO, digital expectations, and overload) lead to maladaptive outcomes that affect everyday functioning and well-being (Brailovskaia et al., 2018; Brailovskaia et al., 2020; Przybylski et al., 2013). Importantly, many tools and explanatory models in this area have been developed and validated within limited cultural contexts, leaving questions about construct equivalence and the generalizability of structural relationships across different sociocultural settings. To address this gap, we will gather harmonized survey data in Türkiye, Ghana, and Hong Kong.

The SoMe FIAP project aims to produce two complementary lines of research: (1) a series of psychometric validation studies that establish measurement invariance, and (2) theory-driven modeling studies. First, we will create four distinct methodological papers to confirm that the measures used function equivalently across the three cultures. Considering the large-scale nature of the SoMe FIAP project, several studies will be examined separately after data collection. Specifically, Psychometric Study One will evaluate the validity of the engagement and motivation scales, Social Media Flow, Social Media Focused FoMO, and Social Media Continuance, using addiction (BSMAS) and self-regulation (Brief Self-Control Scale [BSCS], Academic Procrastination Scale-Short Form [APS]) measures to assess concurrent validity. Psychometric Study Two will test the measurement invariance of problematic use behaviors, specifically Smartphone Application-Based Addiction (SABAS), Generic Scale of Phubbing (GSP), and Social Media Addiction (BSMAS), with continuance and self-control scales acting as concurrent validity checks. Psychometric Study Three will validate the measurement of digital stress factors, Social Digital Pressure, Social Overload, and SNS Exhaustion, using continuance intentions for concurrent validity. Psychometric Study Four will confirm the cross-cultural equivalence of academic and regulatory outcome measures, APS, and BSCS, ensuring accurate assessment in educational contexts.

After establishing measurement invariance, we will conduct a series of theory-driven modeling studies. In Modeling Study One, we will examine the pathway from rewarding immersion to interpersonal costs in the immediate social environment. We will test whether social media flow is associated with phubbing through sequential mechanisms involving social media-focused FoMO and addiction-like tendencies, and whether these indirect relations differ by gender (Brailovskaia et al., 2020; Çelik & Özkara, 2022; Chotpitayasunondh & Douglas, 2018). In Modeling Study Two, we will extend the same motivational core (flow) to academic self-

regulation outcomes by examining whether social media flow predicts academic procrastination via social media-focused FoMO, and whether trait self-control buffers or amplifies these indirect relations (Steel, 2007; Tangney et al., 2004; Przybylski et al., 2013). In Modeling Study Three, we will shift focus from intrinsically rewarding immersion to externally imposed demands and accumulated strain by testing a serial mediation model where social digital pressure influences discontinuous use through social overload and social media exhaustion. We will also evaluate the role of FoMO-related motivational processes in sustaining use despite strain (Dhir et al., 2018; Gui & Büchi, 2021; Han, 2018; Maier et al., 2015) as well as the role of the regions as moderators. In Modeling Study Four, we will return to the context of academic impairment to examine the underlying pathological mechanisms in greater depth; specifically, we will test whether the relationship between social media flow and academic procrastination is sequentially mediated by FoMO and social media addiction (Andreassen et al., 2016). Across all studies, we will rely on the validated structures established in the initial psychometric phase to determine whether both parameter estimates and indirect effects replicate across Türkiye, Ghana, and Hong Kong (Chen, 2007; Putnick & Bornstein, 2016; Vandenberg & Lance, 2000). This protocol paper formalizes these aims and predefines the analytical approach, thereby enhancing transparency and knowledge accumulation.

## 2. Objectives and Research Questions

### 2.1. Objectives

The main goal of the SoMe FIAP project is to explore the psychological processes that turn healthy social media use into problematic behavior, and to understand how these patterns affect academic and social life among youth (adolescents and young adults) in Türkiye, Ghana, and Hong Kong. Specifically, the project aims to:

1. Establish the cross-cultural measurement invariance of a comprehensive set of constructs related to social media motivation, addiction, digital stress, and self-regulation across three distinct cultural settings.
2. Test a series of theory-driven models to identify the mediating pathways (e.g., FoMO, addiction, social overload) and moderating conditions (e.g., gender, self-control, and regions) that link social media flow and digital pressure to maladaptive outcomes such as phubbing, academic procrastination, and discontinuous use.

### 2.2. Study Packages and Workstreams

To achieve these objectives systematically, the project is organized into two parallel workstreams: Workstream One focuses on psychometric validations, while Workstream Two tests modeling hypotheses.

#### 2.2.1. Workstream One: Cross-Cultural Psychometric Validation

This workstream focuses on the urgent need for culturally appropriate measurement tools by establishing construct validity, internal consistency, and measurement invariance (configural, metric, and scalar) of the project's instruments across the three participating nations/regions. To ensure a thorough psychometric assessment, this workstream is divided into four separate validation studies:

- **Psychometric Study One (Motivation and Engagement Constructs):** This study will establish the cross-cultural validity of the Social Media Flow Scale, the Social Media Focused FoMO Scale, and the Social Media Continuance Scale. To assess concurrent validity, we will examine the associations between these constructs and the Bergen Social Media Addiction Scale (BSMAS), the BSCS, and the APS.
- **Psychometric Study Two (Problematic Use Behaviors):** This study focuses on the psychometric evaluation of maladaptive usage patterns by validating the SABAS, the GSP, and the BSMAS. The Social Media Continuance Scale and the BSCS will be utilized to test concurrent validity.
- **Psychometric Study Three (Digital Stressors):** This study aims to validate the measurement of digital environmental pressures, specifically the Social Digital Pressure Scale, the Social Overload Scale, and the SNS Exhaustion Scale. The Social Media Continuance Scale will be included to assess concurrent validity, given the theoretical link between stress and discontinuance intentions.
- **Psychometric Study Four (Academic and Regulatory Outcomes):** The final psychometric study will examine the cross-cultural equivalence of the APS and the BSCS to ensure accurate assessment in educational contexts. The BSMAS will be used as a criterion measure for concurrent validity.

### 2.3.2. Workstream Two: Modeling

Following the establishment of measurement invariance, this workstream will use the validated measures to test four specific hypothetical models of the antecedents and consequences of social media use.

- **Modeling Study One: Flow and Interpersonal Neglect (Phubbing)**
  - *Objective:* To examine the transition from flow to social neglect.
  - *Hypotheses:* The study posits that social media flow is positively associated with phubbing. It is hypothesized that this relationship is serially mediated by social media-focused FoMO and smartphone addiction tendencies, and that these direct and indirect associations are moderated by gender.
- **Modeling Study Two: Flow and Academic Self-Regulation**
  - *Objective:* To explore the interaction between motivational drives and self-regulatory traits in an academic context.
  - *Hypotheses:* It is hypothesized that higher social media flow predicts higher academic procrastination via increased social media-focused FoMO. Crucially, trait self-control is expected to function as a moderator, buffering the strength of the relationship between flow/FoMO and procrastination.
- **Modeling Study Three: Digital Pressure and Discontinuance**
  - *Objective:* To investigate the cumulative impact of social demands on user retention.
  - *Hypotheses:* The study hypothesizes that social digital pressure positively predicts discontinuous use intentions. This relationship is expected to be serially mediated by social overload and SNS exhaustion. Conversely, FoMO is hypothesized to negatively predict discontinuous use, acting as a retaining factor that keeps exhausted users online. Lastly, these direct and indirect associations will be moderated by the regions.
- **Modeling Study Four: The Pathological Pathway to Procrastination**
  - *Objective:* To identify the specific addiction-based mechanism underlying academic neglect.
  - *Hypotheses:* Distinct from the self-control model in Study Two, this study focuses on pathology. It is hypothesized that the relationship between social media flow and academic procrastination is sequentially mediated by FoMO and Social Media Addiction (BSMAS), representing a dysregulated behavioral pathway.

### 2.3. Exploratory Aims

Complementing the variable-centered analyses in Workstream Two, the project also includes an exploratory, person-centered goal. For example, using LPA, we aim to identify distinct subgroups of youth across Türkiye, Ghana, and Hong Kong who share similar patterns of social media use, addiction symptoms, and self-regulatory skills. This will help characterize "at-risk" versus "engaged but functional" user profiles.

## 3. Method

### 3.1. Study Design, Setting, and Participants

The current project will use a multifactorial, complex, predictive correlational design to systematically analyze the relationships among social media flow, addiction, digital pressure, and self-regulatory outcomes across diverse cultural settings. The research will be organized as a cross-sectional survey conducted simultaneously in Türkiye, Ghana, and Hong Kong. The three regions are intentionally chosen to represent diverse sociocultural environments with different levels of digital infrastructure and educational systems, helping to test cross-cultural applicability. The target population will include adolescents and young adults aged 18 years and older who are enrolled in higher educational institutions. To achieve sufficient statistical power for the SoMe FIAP project's analyses (e.g., Hayes' Process macro and multi-group invariance analysis), the project plans to gather about 1500 participants, aiming for 500 from each region. A convenience sampling method will be employed, with Principal Investigators and local research teams distributing recruitment materials, such as posters and flyers, at partner university campuses.

### 3.2. Measures

The study will employ well-established self-report tools to evaluate key constructs. To measure motivation and engagement, the 11-item Social Media Flow Scale (Brailovskaia et al., 2020) will be used to assess absorption and time distortion (rated on a 5-point Likert scale), while the 9-item Social Media-Focused FoMO Scale (Çelik & Özkara, 2022) will measure specific anxiety about missing online experiences using a 7-point Likert scale. Discontinuation intentions will be assessed with the 4-item Social Media Continuance Scale (Han, 2018), rated on a 7-point Likert scale and reverse-coded for analysis. Regarding problematic use and addiction, the project uses the 6-item BSMAS (Andreassen et al., 2016) rated on a 5-point scale (1 = very rarely to 5 = very often), and the 6-item SABAS (Csibi et al., 2018) rated on a 6-point scale to assess addiction symptoms. Interpersonal neglect will be measured using the 15-item GSP (Chołpitayasunondh & Douglas, 2018), rated on a 7-point scale ranging from never to always. To capture digital environmental stressors, the study will include the 3-item Social Digital Pressure Scale (Gui & Büchi, 2021) rated on a 5-point Likert scale, the 6-item Social Overload Scale (Maier et al., 2015) rated on a 7-point Likert scale, and the 4-item SNS Exhaustion Scale (Maier et al., 2015) rated on a 7-point scale. Academic and self-regulatory outcomes will be assessed using the 5-item APS (McCloskey, 2011) and the 13-item BSCS (Tangney et al., 2004), both rated on a 5-point Likert scale. Finally, sociodemographic variables including age, gender, and educational level will be collected to serve as covariates and moderators in the subsequent analyses.

### 3.2. Cross-Cultural Adaptation and Data Collection Procedures

Ensuring the linguistic and conceptual equivalence of measures is crucial for this cross-cultural project. Therefore, all instruments will go through a thorough translation and adaptation process. For measures not already validated in the local languages, a standard forward-back translation method will be used, followed by a review by bilingual experts to confirm cultural relevance. Data collection will be conducted exclusively through secure web-based platforms REDCap (Research Electronic Data Capture) and SurveyMonkey, or on paper. Participants will access the survey via QR codes embedded in the recruitment materials, which will direct them to a mobile-friendly landing page containing the information sheet and electronic informed consent form. The data collection system is set up to require responses to all items, preventing incomplete surveys and eliminating missing data. Regarding participant compensation, incentive structures will be adapted to local regulations and norms: participants in Hong Kong will receive supermarket coupons (HK100) upon completion, while participants in Türkiye and Ghana will voluntarily contribute without financial compensation.

## 4. Statistical Analysis Plan

### 4.1. Data Screening and Psychometric Validation

Statistical analyses will be conducted using SPSS, JASP, R software, JAMOVI or Mplus for appropriate analyses. The significance level for all tests will be set at  $p < .05$ . Prior to hypothesis testing, the dataset will be screened for normality using skewness and kurtosis, with values within  $\pm 2$  considered acceptable. Given that all data are self-reported, common method bias (CMB) will be assessed using Harman's one-factor test; if a single factor accounts for less than 40% of the variance (Podsakoff et al., 2003), CMB will not be considered a pervasive threat.

The first phase of analysis (Workstream One) focuses on establishing the psychometric properties of the scales within each region. Confirmatory Factor Analysis (CFA) will be conducted to verify factor structures, evaluating model fit via standard indices (comparative fit index [CFI]  $> .90$ , Tucker-Lewis index [TLI]  $> .90$ , root mean square error of approximation [RMSEA]  $< .08$ , standardized root mean square residual [SRMR]  $< .08$ ) (Byrne, 2010). Internal consistency will be assessed using both Cronbach's alpha (Cronbach, 1951) and McDonald's omega coefficients (McDonald, 1999), while convergent and discriminant validity will be examined using Average Variance Extracted (AVE) and Fornell-Larcker criteria, respectively (Fornell & Larcker, 1981). Following within-region validation, Multi-Group CFA (MG-CFA) will be performed to test measurement invariance at the configural, metric, and scalar levels (Vandenberg & Lance, 2000), using the CFI and RMSEA criteria proposed by Cheung and Rensvold (2002).

### 4.2. Modeling and Profiling

Once the measurement models are established, the second phase (Workstream Two) will involve testing the proposed relationships using modeling. The analysis will include four specific studies. Modeling Study One

will examine a moderated mediation model exploring the pathway from social media flow to phubbing via FoMO and smartphone addiction, with gender as a moderator. Modeling Study Two will explore the mediating role of FoMO and the buffering role of self-control in the relationship between flow and academic procrastination. Modeling Study Three will analyze the moderated mediation of social overload and exhaustion in the connection between digital pressure and discontinuance with regions as moderator. Modeling Study Four will investigate the pathological pathway from flow to procrastination through addiction. For all mediation analyses, bootstrapping with 5000 resamples will be used to estimate the significance of indirect effects. Moreover, further exploratory analyses would be conducted based on current literature so as to comprehensively understand social media situations among youths across the regions.

## 5. Ethics and Dissemination

### 5.1. Ethics Approval and Oversight

The study protocol has been developed in strict accordance with ethical principles outlined in the Declaration of Helsinki and the American Psychological Association (APA) guidelines. Primary ethical approval will be obtained from the Human Research Ethics Committee (HREC) at The Education University of Hong Kong (EdUHK), which acts as the coordinating institution for this multinational/regional project. After receiving primary approval, the Principal Investigators in Türkiye and Ghana will submit the approved protocol to their respective institutional review boards (IRBs) to obtain local ethical clearance. Any changes to the protocol (such as modifications to recruitment procedures or survey items) will be submitted to the relevant ethics committees for review and approval prior to implementation.

### 5.2. Informed Consent Process

Given the online nature of the data collection, a strict electronic informed consent (e-consent) process will be used through the REDCap and SurveyMonkey platforms. Before accessing the survey, potential participants will be shown a detailed Information Sheet in English or their local language. This document will clearly describe the study's purpose, procedures, the voluntary nature of participation, and the right to withdraw at any time. Therefore, all participants will provide their consent by e-signing a space provided on the consent form page.

### 5.3. Risks, Burdens, and Benefits

The study will involve minimal risk to participants, defined as risks no greater than those encountered in daily life or regular psychological assessments. The main burden is the time needed to complete the survey, which will take about 20–25 minutes. Considering that the survey will address topics such as addiction, anxiety (FoMO), and social pressure, some participants might experience mild, short-term emotional discomfort or increased awareness of their social media habits. To help with this, the debriefing page will provide contact information for local student counseling services and mental health hotlines in each region. Although there will be no direct benefits for individual participants, there will be broader societal benefits. The results will help improve understanding of digital well-being across cultures and could guide educational programs and policies aimed at reducing social media addiction and academic procrastination among youth.

### 5.4. Confidentiality and Privacy Protections

Data privacy will be safeguarded through strict pseudonymization and encryption methods. All data collected via REDCap will be transmitted over an encrypted SSL connection and stored on secure, firewall-protected servers hosted by The Hong Kong Polytechnic University.

- Anonymization: The survey responses will be de-identified. Any personal information collected for incentive distribution (e.g., email addresses in Hong Kong) will be stored in a separate database, linked to the survey data only via a randomly generated participant ID. This link will be destroyed immediately after the data collection and incentive distribution phases are complete.
- Data Access: Access to the raw dataset will be restricted to the core research team members who have signed confidentiality agreements. Data sharing for verification or secondary analysis will involve only fully anonymized datasets, ensuring that no individual participant can be re-identified.

### 5.5. Incentives and Undue Influence

To respect cross-cultural differences and local economic contexts, the incentive structure has been carefully calibrated to avoid undue influence or coercion. In Hong Kong, where student participation in research often involves compensation for time, participants will receive supermarket coupons (valued at HK\$100). This amount is deemed as a "token of appreciation" rather than a coercive financial inducement. In Türkiye and Ghana, in accordance with local academic norms and to prevent potential ethical conflicts, participation will be entirely voluntary and will not include monetary compensation. This differential approach has been justified to the ethics committees as a necessary adaptation to local cultural and institutional standards.

## 5.6. Dissemination Policy

The research team is dedicated to Open Science principles. We aim to publish the study results in high-impact, peer-reviewed international journals, emphasizing both the methodological (psychometric validation) and substantive (modeling analysis) findings. The results will be reported following the STROBE guidelines for cross-sectional studies. Additionally, de-identified datasets and statistical analysis syntax files will be shared in a public repository (e.g., OSF) after the primary manuscripts are accepted, supporting replication and cumulative science. Findings will also be shared with non-academic stakeholders, including participating schools and educational policymakers, through summary reports and policy briefs.

## 6. Discussion

### 6.1. Strengths and Scientific Contribution

The SoMe FIAP project has several unique strengths that fill important gaps in current research on digital well-being. Its main strength is its clear cross-cultural approach. Although the prevalence of problematic social media use varies worldwide, comparative studies have often been limited by the lack of comparable measurement tools (Cheng et al., 2021). By focusing on establishing measurement invariance (configural, metric, and scalar) across Türkiye, Ghana, and Hong Kong before testing structural hypotheses, this study makes sure that any differences seen in addiction or engagement are due to real cultural differences and not measurement issues (Chen, 2007; Putnick & Bornstein, 2016).

Second, the SoMe FIAP project goes beyond simple time-use models to examine the complex psychological mechanisms behind dysregulated use. By combining Flow Theory (Csikszentmihalyi, 1990) with the Stressor-Strain-Outcome framework (Dhir et al., 2018), the project offers a comprehensive view of how inherently rewarding experiences can unexpectedly lead to maladaptive outcomes. The difference between the regulatory pathway tested in Modeling Study Two, which focuses on self-control deficits (Tangney et al., 2004), and the pathological pathway tested in Modeling Study Four, which emphasizes addiction symptoms (Andreassen et al., 2016), marks a major theoretical improvement. This dual approach enables a more detailed understanding of why students neglect academic responsibilities in favor of social media, highlighting the distinction between regulation failure and compulsive behavior.

### 6.2. Limitations

Despite its robust design, the SoMe FIAP project has certain limitations inherent to its methodology. The main limitation is the cross-sectional nature of the data collection. While the proposed mediation models rely on strong theoretical foundations to infer directionality, for example, flow leading to addiction (Brailovskaia et al., 2018), cross-sectional data prevent the establishment of temporal causality. Longitudinal designs would be necessary to definitively confirm whether digital pressure comes before exhaustion or whether exhausted users become more sensitive to pressure. Secondly, relying on self-report measures introduces the possibility of response biases, such as social desirability or recall bias, especially for sensitive topics such as addiction or phubbing. Although procedural remedies such as guaranteeing anonymity and conducting statistical checks for common method bias (Podsakoff et al., 2003) will be used, these biases cannot be completely eliminated. Thirdly, using convenience sampling within educational institutions limits how broadly the findings can be applied. While recruiting from universities includes a large portion of the youth population, the results may not fully reflect the experiences of non-student youth or those from lower socioeconomic backgrounds with limited access to formal education.

### 6.3. Theoretical and Practical Implications

The expected outcomes of this project have significant implications for both theory and practice. Theoretically, validating tools such as the Social Media Flow Scale and the Social Media-Focused FoMO Scale

(Çelik & Özkara, 2022) across three cultures will provide researchers with strong instruments for studying digital motivation globally. Additionally, explaining the serial mediation or moderated mediation mechanisms, specifically, how social digital pressure leads to discontinuation intentions through overload and exhaustion, will contribute to the literature on digital burnout, offering a new perspective beyond the common focus on addiction (Han, 2018; Maier et al., 2015).

Practically, the results will guide the development of targeted educational and clinical interventions. For example, if Modeling Study Two shows that self-control effectively buffers the negative impact of flow on procrastination (Balkis & Duru, 2016), interventions could focus on self-regulation training rather than strict abstinence. Conversely, if Modeling Study Four identifies a strong pathological pathway through addiction, more intensive psychological support may be necessary for students showing these symptoms. By pinpointing specific cultural and gender-related risk factors for phubbing and procrastination, the project aims to provide educators, policymakers, and mental health professionals in Türkiye, Ghana, and Hong Kong with the evidence needed to promote healthier digital habits among youth.

## 7. Conclusion

This protocol describes a rigorous, multinational/regional study aimed at understanding the complex relationships between social media use, addiction, and academic self-regulation among youth. By focusing on cross-cultural measurement invariance and using both variable-centered and person-centered analytical methods, the project seeks to overcome the limitations of earlier research. The expected results will clarify the different pathways, regulatory versus pathological, through which social media affects functioning, and will also produce a validated set of psychometric tools for future cross-cultural studies. Ultimately, this work aims to guide the development of culturally sensitive educational and clinical interventions to enhance digital well-being in an increasingly connected world.

## 8. Administrative Information

### 8.1. Funding and Support

This work is supported by the FEHD Internationalization Research and Writing Partnership Grant from The Education University of Hong Kong. The funding body plays no role in the study design, data collection, data analysis and interpretation, or manuscript writing.

### 8.2. Authorship and Contributions

The project involves international collaboration among researchers from Türkiye, Ghana, and Hong Kong. All principal investigators contributed to the development of the study design, the selection of measures, and the drafting of this protocol. Future manuscripts resulting from this project will adhere to standard authorship criteria (e.g., ICMJE guidelines), ensuring that all contributors who make significant intellectual contributions are recognized.

<b>Statement of Researchers</b>	<b>Conceptualization:</b> DKA, DO, AG, SÜ. <b>Methodology:</b> DKA, DO, AG, SÜ. <b>Software:</b> DKA, DO, AG, SÜ. <b>Validation:</b> DKA, DO, AG, SÜ. <b>Investigation:</b> DKA, DO, AG, SÜ. <b>Resources:</b> DKA, DO, AG, SÜ. <b>Data Curation:</b> DKA, DO, AG, SÜ. <b>Writing – original draft:</b> DKA, DO, AG, SÜ. <b>Writing – review &amp; editing:</b> DKA, DO, AG, SÜ. <b>Visualization:</b> DKA, DO, AG, SÜ. <b>Supervision:</b> DKA, DO, AG, SÜ. <b>Project administration:</b> DKA, SÜ. All authors read and approved the final manuscript.
<b>Researchers' contribution rate statement:</b>	
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**Ethical Considerations:**

Ethical approval for this protocol was obtained from the Scientific Research and Publication Ethics Committee of Gaziantep University (Decision No. 21, December 2, 2025), the Human Research Ethics Committee (HREC) at The Education University of Hong Kong (EdUHK) (Ref. no. 2024-2025-0407, April 2, 2025), and the Central University's Institutional Review Board (CUIRB/36/03/25, March 10, 2025).

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