

When the mindful ones experience flow: a moderated-mediation model of purchase intention in live commerce

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Abstract

Purpose – The emerging live streaming technology has provided a novel means for streamers to interact with viewers, allowing for synchronous and vivid demonstrations of products for sale. However, individual streamers as sellers still struggle to improve sales in their live stores. Drawing upon flow theory, our study proposes and tests a moderated-mediation model that explores (1) the indirect influences of telepresence and social presence as two important live streaming affordances on viewers' purchase intentions through the immersive state of flow and (2) the dynamic contingency embedded in the indirect relationships between presence and purchases through flow as created by mindfulness.

Design/methodology/approach – We collected survey data from 251 experienced consumers of a three-year Kuaishou store run by an Inner Mongolian singer in China. We applied a covariance-based structural equation modeling approach to examine the first-stage moderated-mediation model.

Findings – Our results show that viewers' flow state mediated the effects of telepresence and social presence on purchase intentions of both virtual gifts and physical products. Additionally, mindfulness toward live streaming strengthened the mediation effect of flow on the relationship between telepresence and purchase intentions but weakened its mediation effect between social presence and purchase intentions.

Originality/value – Our study not only expands the existing knowledge on live commerce but also systematically addresses the theoretical tension between flow and mindfulness as two important user states that coexist in the live commerce context. Our findings also reveal practical implications for streamers, managers and designers of live commerce.

Keywords Live streaming, Live commerce, Virtual gifts, Telepresence, Social presence, Mindfulness, Flow

Paper type Research paper

1. Introduction

Live commerce has emerged as a novel paradigm in e-commerce, enabling synchronous interactions between streamers and viewers (Lim *et al.*, 2020). By the end of 2023, China boasted 597 million live commerce users, with a market size exceeding RMB ¥4.9 trillion (Ma, 2022; Ou, 2024). Similarly, the United States reported live commerce sales surpassing US\$50 billion in 2023 (Chevalier, 2024). Despite its burgeoning popularity, streamers encounter significant hurdles in boosting sales within live environments (Chen *et al.*, 2023; Guo *et al.*, 2022). Factors such as excessive barrage messages can impose cognitive loads on viewers, leading to exhaustion and decreased engagement (Hua *et al.*, 2024). Additionally, while communal interactions in live fan clubs may be enjoyable for some viewers, others experience social burdens that bias their product evaluations (Hung *et al.*, 2021). Consequently, skepticism persists whether live streaming features always help boost sales (Guo *et al.*, 2022; Hua *et al.*, 2024). Meanwhile, both managers and researchers have recognized the pivotal role of viewers' heightened involvement and immersion in driving purchase behaviors in live commerce, where decisions are made within limited time duration and tend to be impulsive in nature (Iresearch, 2021; Zheng *et al.*, 2022). For instance, investments in immersive live streaming environments have been observed to elicit



favorable consumer responses, resulting in increased sales (Iimedia, 2024). Empirical studies further corroborate that immersive experiences in live commerce elevate viewers' pleasure (Sun *et al.*, 2019), enhancing their loyalty and willingness to purchase through live channels (Song *et al.*, 2021). However, the puzzle remains unsolved regarding how live streaming features can be effectively translated into viewers' immersive experiences, thereby boosting sales in live stores.

Previous research primarily adopts social-oriented perspectives to investigate the effectiveness of live commerce, emphasizing streamers' characteristics (Li *et al.*, 2024; Lu and Chen, 2021) and viewers' social experiences with streamers (Li *et al.*, 2023; Wang *et al.*, 2022; Yang *et al.*, 2023). Alternatively, studies draw on the technology affordance lens to explore how live streaming features nurture social presence perceptions, thereby facilitating viewers' purchase decisions (Hou *et al.*, 2020; Men *et al.*, 2023). The affordance lens elucidates the interaction potential between users and technology functionalities (Wang *et al.*, 2024), providing a robust framework to understand the impact of live streaming technology on consumer behaviors. Notably, live commerce transcends social entertainment, serving commercial purposes. Streamers display products in all-rounds and demonstrate product functionalities in live rooms, thereby making viewers feel like being in a remote store and can touch, feel, or even try on the products for sale. Consequently, telepresence and social presence emerge as two of the most prominent affordances in live commerce. However, the extant live commerce literature is biased toward the importance of social presence, and the role of telepresence has been overlooked.

In addition, in examining how technology facilitates live shopping, extant studies have also explored psychological mechanisms such as trust (Xiong *et al.*, 2023) and perceived enjoyment (Yan *et al.*, 2023). While trust characterizes the typical shopping motivation in traditional online settings (Xiong *et al.*, 2023), perceived enjoyment captures the pleasant feelings in using any hedonic technology (Yan *et al.*, 2023). We posit that these identified psychological mechanisms might not effectively capture viewers' immersive experience crucial for fostering willingness to pay in live commerce. In engaging with streamers' live shows, viewers immerse themselves in an interactive and entertaining experience, leading to full concentration and even a state of engrossment (Guan *et al.*, 2022; Iresearch, 2021). Immersion, as a critical psychological state, potentially influences purchase behavior in live commerce. Flow theory aptly describes this immersive state, where viewers' engagement transcends mere enjoyment, reaching a level of involvement where time is forgotten (Zheng *et al.*, 2023). Compared to traditional e-commerce, live commerce facilitates real-time interactions between streamers and viewers, as well as among viewers themselves. Consumers are thus granted greater control, less exertion, and heightened enjoyment, ultimately leading to purchases (Sun *et al.*, 2019). Therefore, we propose that flow theory emerges as a pertinent mechanism that translates presence affordances of live streaming technology into sales performance. We thus formulate the first research question to investigate:

RQ1. How does flow translate telepresence and social presence, nurtured by live streaming features, into purchase intention?

Existing literature has also noted the importance of cognitive differences in setting contingent effects throughout the flow formation process in response to external stimuli (Zhao and Wagner, 2023). For example, consumers with higher cognitive evaluation capabilities in information and technology tend to appreciate immersive shopping experiences primarily driven by cognitive signals, such as service quality, Website security, and product attributes. Conversely, those with lower cognitive evaluation capabilities are more influenced by social cues like interactivity (Kim and Ko, 2019; Martín *et al.*, 2011). In this vein, we posit that a fundamental cognitive distinction among live streaming viewers lies in their mindfulness toward the technology, which reflects users' cognitive awareness in leveraging such technology. Mindfulness, defined as a mental state enabling users to focus on and be aware of technology-related issues, also encapsulates users' deliberative processes and novelty-seeking

tendencies when interacting with technologies (Sun *et al.*, 2016; Thatcher *et al.*, 2018). This construct has emerged as a pivotal boundary condition across various technology use contexts, including information seeking in virtual communities (Zha *et al.*, 2015), mobile phone addiction (Liu *et al.*, 2017), and systems adoption (Benlian, 2022; Wei *et al.*, 2020). Despite its broad applicability, the contingent role of mindfulness in interpreting live shopping behaviors remains understudied. Therefore, we introduce mindfulness as a crucial contingency factor and formulate the following research question:

RQ2. How does mindfulness toward live streaming moderate the indirect effects of telepresence and social presence on purchase intention through the mediation of flow?

To summarize, our research makes several significant contributions to the live commerce literature. First, by juxtaposing telepresence and social presence within the context of live commerce, we explore their indirect impacts on viewers' purchase behaviors—specifically, regarding both virtual gifts and physical products—through the lens of flow. This endeavor not only extends the existing knowledge on presence into the realm of live commerce but also deepens our understanding of the influential mechanisms of presence in this context. Second, we theoretically compare and contrast flow and mindfulness, and empirically test a moderated-mediation theoretical model to predict and explain viewers' purchase decisions in live commerce. This represents one of the first attempts to conceptually differentiate between flow and mindfulness within the same technology use context, offering profound insights into consumer psychology and behavior in live commerce. Third, our study provides actionable recommendations for individual streamers and platform managers on how to effectively harness live streaming functionalities to enhance shopping experiences and boost sales in live commerce. These contributions collectively advance the theoretical and practical understanding of live commerce, filling critical gaps in the existing research landscape.

2. Theoretical foundation

We first identify two important affordances that live streaming technology offers to viewers as potential consumers: telepresence and social presence. These affordances allow viewers to experience the presence of remote stores, streamers as sellers, as well as other viewers. We then proceed to explain why we draw on the flow theory to understand the impacts of presence affordances on purchase behaviors in live commerce. In addition, we introduce mindfulness as an important user state that sets nuanced contingencies for the indirect influences of telepresence and social presence on purchase behaviors through flow.

2.1 Affordances of live streaming: telepresence and social presence

Technology affordance is fundamentally anchored in the material functions of a technology, but can be actualized when it is sensed by users (Li *et al.*, 2020; Markus and Silver, 2008). Prior research has investigated numerous affordances of live streaming technology, such as visibility (Zhang *et al.*, 2022), guided shopping (Xiong *et al.*, 2023), and entertainment (Wang *et al.*, 2024). Although these identified affordances share similarities with those of other social commerce contexts, the concept of presence—an illusion of the physical existence of others and the environment in remote locations (Qiu and Benbasat, 2005)—emerges as the most crucial affordance distinguishing live commerce from traditional e-commerce. For one, the real-time demonstrations facilitated by live streaming, coupled with functionalities such as virtual try-ons, offer viewers an experience akin to that of physical retail stores, which corresponds to telepresence. For another, unlike the solitary and mechanical shopping experience of traditional e-commerce, live commerce fosters a warm and engaging shopping atmosphere by strengthening instant connections between streamers and viewers, and even among viewers themselves, thereby embodying social presence. However, the majority of the live commerce studies primarily focus on the impact of social presence on purchases or sales

(e.g. Guan *et al.*, 2022; Yang *et al.*, 2023; Zhang *et al.*, 2022), while neglecting the crucial role played by telepresence. This oversight limits our understanding of viewers' live shopping experience, wherein live streaming serves not merely as an entertainment tool but also as a means of shopping.

Telepresence and social presence constitute two pivotal dimensions of the presence affordance in live commerce. Telepresence refers to a user's perception of being physically present in a remote location through the use of technology (Animesh *et al.*, 2011; Qiu and Benbasat, 2005). Live streaming creates a highly simulated scenario in which viewers can ask questions and receive guidance in real-time just like in a real store. This telepresence affordance allows viewers to perceive themselves as actively present in the live rooms through the live streaming technology (Han *et al.*, 2020). Conversely, social presence pertains to the extent to which a technology medium enables users to perceive the existence of others in a virtual environment (Animesh *et al.*, 2011; Short *et al.*, 1976). Live streaming technology fosters a warm and engaging shopping atmosphere by enabling viewers to send virtual gifts, express likes, and engage in voice communication with both streamers and other viewers. The social presence affordance of live streaming is characterized by users' perception of streamers and other viewers being around them, creating a sense of intimacy and warmth through the technology (Animesh *et al.*, 2011; Darke *et al.*, 2016).

Extant research on live commerce also explores quite a number of psychological mechanisms that potentially transform technological stimulus in live rooms into viewers' purchase behaviors. For instance, trust (Xiong *et al.*, 2023; Zhang *et al.*, 2022) and swift guanxi (Yan *et al.*, 2023) are readily borrowed from the traditional e-commerce settings, portraying the critical uncertainty-related beliefs that permit monetary transactions online. Perceived enjoyment (Yan *et al.*, 2023) characterizes user experiences with any hedonic technologies in general. We maintain that these psychological mechanisms do not adequately capture the unique consumer psychological experiences inherent in live shopping. Specifically, live commerce, with its real-time streaming capabilities and rich social interactions, offers viewers immersive experiences often accompanied by a loss of self-awareness and time control (Guan *et al.*, 2022). The concept of flow, which aptly reflects such an immersive psychological state, has received scant attention in the context of live commerce. In the following sections, we draw on flow theory to elucidate how the two presence affordances—telepresence and social presence—trigger viewers' shopping interests.

2.2 Flow in live commerce

Flow theory is rooted in Csikszentmihalyi's seminal work on games (Csikszentmihalyi, 1975). Flow is defined as a psychological state characterized by engagement and absorption in an activity, fostering a holistic sensation and enjoyment among individuals (Csikszentmihalyi and Csikszentmihalyi, 1988). Flow theory has provided profound insights into consumers' purchase behaviors and decisions across various e-commerce contexts, encapsulating the essence of their immersive and enjoyable online shopping experiences (Rodriguez-Ardura and Meseguer-Artola, 2016). Flow encompasses three dimensions: attention focus, enjoyment, and perceived control (Jiang and Benbasat, 2005; Koufaris, 2002; Wu *et al.*, 2020). Attention focus allows consumers to become fully absorbed in online shopping and even lose self-consciousness (Chang *et al.*, 2016). Enjoyment reflects consumers' emotional responses to the pleasurable and fulfilling aspects of their online shopping experiences (Liu *et al.*, 2018). Perceived control, meanwhile, refers to the extent to which consumers feel in control of the virtual environment, mitigating perceived uncertainty and potential frustration (Pelet *et al.*, 2017).

In the context of live commerce, the flow state similarly drives viewers to persist in watching and engaging in online purchases (Li and Peng, 2021). Flow captures the intrinsically rewarding, playful, and exploratory nature of live streaming viewers' experiences (Guan *et al.*, 2022). High flow experiences among viewers foster full engagement in live streaming and a sense of control over the virtual environment during interactions with

streamers and other viewers. This, in turn, leads to various positive outcomes, including emotional attachment to streamers (Li and Peng, 2021), perceived value of the live streaming experience (Chen and Lin, 2018), satisfaction (Guan *et al.*, 2022), and stickiness of live commerce platforms (Bao and Zhu, 2022). Guan *et al.* (2022) further emphasize that flow encourages the purchase of virtual gifts during live streaming. Essentially, the flow state is self-reinforcing; as viewers experience inherent pleasure and reward in live streaming, their purchase behaviors are effectively stimulated by the senses of “being there” and “being with others”.

Additionally, several boundary conditions can influence flow experiences in response to external stimuli, such as users’ perceived competition in VR sport games (Kim and Ko, 2019), university students’ perceived support in e-learning systems (Khan *et al.*, 2017), and viewers’ experiences on short-video platforms (Zhao and Wagner, 2023). These boundary conditions typically reflect users’ cognitive perceptions when interacting with or utilizing specific technologies. We propose that mindfulness, defined as users’ alert and conscious cognitive state when engaging with novel technologies, serves as a fundamental boundary condition for viewers’ reactive and interactive experiences in live commerce. Specifically, we anticipate that viewers’ mindfulness toward live streaming technology may exert contingent effects when different technology affordances nurture their flow experience.

2.3 Mindfulness toward live streaming

Mindfulness represents a distinct state of awareness and conscious interaction among users engaging with a novel technology. This state coexists with, yet is differentiated from, the concept of flow. Drawing on Langer’s (1989b) definition, mindfulness encompasses a cognitive state of “alertness and lively awareness,” characterized by a broad attentional focus encompassing both internal and external phenomena in the present moment (Dane, 2011). Heightened cognitive awareness among mindful individuals enables them to make informed decisions tailored to their specific contexts (Elhai *et al.*, 2018; Fiol and O’Connor, 2003; Langer, 1989a). In the realm of live commerce, mindful users exhibit a heightened awareness of both environmental and intrapsychic stimuli, focusing on collecting utility information about the technology rather than being swayed by hedonic cues (Dane, 2011). This mindfulness enables viewers to concentrate on critical aspects such as the novelty, advantages, and alternative options associated with live streaming technology (Gao *et al.*, 2021; Sun *et al.*, 2016). Consequently, it shapes users’ interactions with the virtual environment (Bishop *et al.*, 2004; Dane, 2011), facilitating more rational decision-making in live commerce settings. Mindfulness toward live streaming comprises four dimensions: technological novelty seeking, engagement with the technology, awareness of local context, and cognizance of alternative technologies (Sun *et al.*, 2016). Technological novelty seeking involves users comparing live streaming with similar technologies to identify unique features of live commerce. Engagement with the technology reflects users’ active exploration of detailed functionalities and development of a comprehensive understanding. Awareness of local context emphasizes users’ recognition of whether live streaming aligns with specific contexts and tasks. Cognizance of alternative technologies underscores users’ awareness of alternative perspectives on live streaming, aiding in avoiding over- or underestimating its strengths and weaknesses.

Table 1 delineates the key differences between the core concepts of presence affordance, user states of flow, and mindfulness. First, telepresence and social presence constitute the material features of live streaming perceived by users through interactions with the technology or other users via the technology, respectively. Second, while presence refers to the technical attributes inherent in live streaming as perceived by users, both flow and mindfulness denote the psychological states of users during live streaming engagement. Third, flow and mindfulness each embodies distinct involved psychological experiences. Flow, characterized as an optimal immersive state, typically engenders emotional enjoyment; when users interact

Table 1. Theoretical differences between presence, flow, and mindfulness in live commerce

Construct	Presence (Section 2.1)	Flow (Section 2.2)	Mindfulness (Section 2.3)
Definition	Viewers' perceptions of "being there" and "being together" under the stimulation of the live streaming technology	An enjoyable psychological state of experience in which viewers are absolutely absorbed and engaged in the live streaming context, unaware of the passage of time	A state of conscious awareness which enables viewers concentrate on the important issues about the live streaming technology such as its novel function, advantage, and alternatives
Dimensions	Social presence, telepresence	Attention focus, enjoyment, perceived control	Technological novelty seeking, engagement with the technology, awareness of local context, cognizance of alternative technologies
Psychological property User-technology relationship	Users' perception toward the technology features Perceived through interacting with the technology or with others through using the technology	An unconscious affective and cognitive state Engrossed and connected unconsciously to the technology	A conscious cognitive state Involved but conscious toward the technology in use and alternative technologies

Source(s): Authors' own work

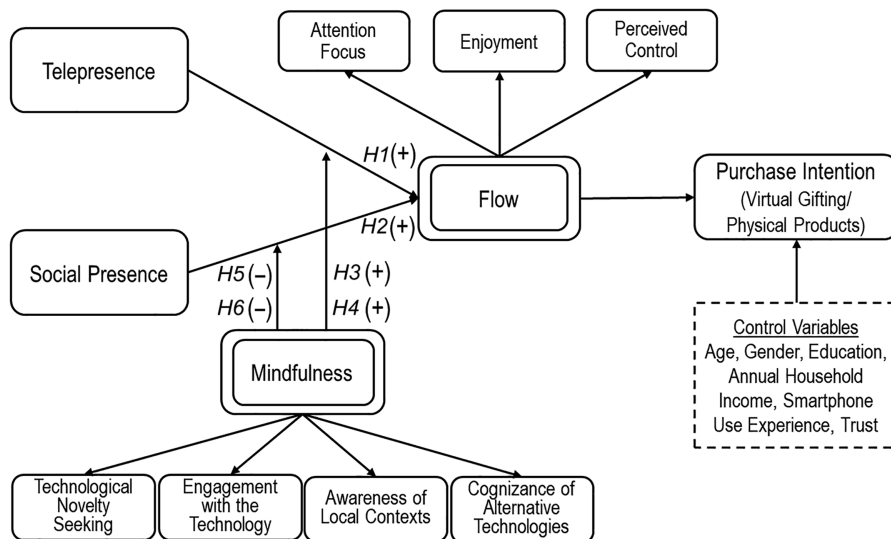
with the live streaming technology, they tend to be engrossed and lose attention to anything else but the technology itself (Koufaris, 2002). Conversely, mindfulness denotes users' conscious engagement with the live streaming technology (Sun *et al.*, 2016), wherein users remain cognizant of alternative technological options.

3. Research model and hypotheses

Flow theory helps us orchestrate the research model by interlinking the affordances of telepresence and social presence with purchase intention, while incorporating the crucial boundary condition of mindfulness (Figure 1). For one, flow connects the two important live streaming affordances of telepresence and social presence with viewers' purchase intentions. For another, mindfulness is a viewer state that differs but coexists with flow, thereby setting important boundaries for the mediation effects of flow. Moreover, we follow the recent insights from Yang *et al.* (2023) and consider viewers' purchase intentions in live commerce entails both virtual gifting and buying physical products.

Telepresence represents a perception that transports users into a virtual environment, where they perceive it as real (Animesh *et al.*, 2011). Prior research has extensively examined telepresence across diverse online shopping domains, including online gaming (Faiola *et al.*, 2013), e-learning (Guo *et al.*, 2016), and virtual reality contexts (Nah *et al.*, 2011). These studies consistently demonstrate telepresence's ability to foster positive attitudes toward technology and facilitate immersive and enjoyable user experiences (Han *et al.*, 2020; Peukert *et al.*, 2019; Suh and Chang, 2006). Research also reveals that immersive experiences, often associated with the psychological state of flow, significantly contribute to heightened user satisfaction. This, in turn, encourages prolonged engagement and investment in terms of time, energy, and money (Wu *et al.*, 2020; Yang and Gong, 2021). Consequently, the flow state correlates positively with outcomes such as increased purchase intentions and enhanced e-loyalty (Wu *et al.*, 2020; Bilgihan, 2016).

In the context of live commerce, the inability for viewers to physically interact with products is compensated by a rich, interactive virtual shopping environment that simulates the



Source(s): Authors' own work

Figure 1. A moderated-mediation model of purchase intention in live rooms

experience of being in a physical store (Lu and Chen, 2021; Ma et al., 2022; Zhao et al., 2020). Telepresence plays a pivotal role here by fostering viewers' belief in the virtual space created by live streaming technology, leading to increased involvement and immersion in live shows accompanied by enjoyment. This positive flow experience evokes viewers' desire to engage in social interactions with streamers, ultimately intensifying their inclination to send virtual gifts as a token of satisfaction with the live shows (Zhao et al., 2020). Furthermore, the sense of 'being there' effectively bridges the physical distance between viewers and streamers, cultivating a captivating and controllable shopping environment (Baker et al., 2019). As a result, viewers become engrossed in the live streaming rooms, feeling as if they are physically present in a store. This enhanced confidence in product judgments through the remote channel makes them more likely to make purchases within the live commerce context (Ma et al., 2022). For example, Li and Peng (2021) note that telepresence, as a defining characteristic of live streaming scenes that engrosses viewers, providing a sense of amusement and detachment from their physical surroundings and amplifying their inclination to make purchases. Therefore, we propose the following hypothesis:

- H1. Flow mediates the relationships between telepresence and users' purchase intentions of (a) virtual gifts and (b) physical products in live rooms.

Social presence encompasses the degree to which users perceive sociability, warmth, sensitivity, and closeness while interacting with others within a specific activity (Animesh et al., 2011; Darke et al., 2016). This heightened sense of social presence encourages participants to engage with others as though they are not strangers, fostering trust in the platform and facilitating a complete immersion in the activity (Yang et al., 2022). This perception of 'being together with others' can cultivate a sense of closeness and psychological intimacy, thereby enhancing involvement, enjoyment, and perceived control within the activity (Guan et al., 2022; Rauwers et al., 2016). Simultaneously, individuals experiencing a high-flow state tend to demonstrate increased engagement with the activity, which in turn can drive consumer intentions to make purchases (Kim et al., 2013).

Within the context of live commerce, viewers' perception of social presence indirectly influences their purchase intentions of virtual gifts and physical products through the mediation of flow, driven by two primary factors (Guan *et al.*, 2022). Firstly, heightened social presence within live streaming environments prompts viewers to perceive streamers and fellow viewers as intimately connected, fostering a sense of pleasure and belonging within the live rooms (Sun *et al.*, 2019). This, in turn, drives active involvement and absorption in social interactions, creating an immersive and enjoyable state. Such absorption deepens viewers' emotional attachment to streamers, leading to their involvement in live exchanges such as sending virtual gifts (Li and Peng, 2021; Zheng *et al.*, 2023). Secondly, the social presence fostered by live commerce diminishes the psychological distance between streamers and viewers, encouraging viewers to relax their guard and fully engage in the live shows (Ma *et al.*, 2022). This positive flow experience fulfills viewers' affective trust toward streamers as well as the products sold through the live channel, thereby amplifying their intentions to purchase physical products within the live room (Guan *et al.*, 2022; Ma *et al.*, 2022). Zheng *et al.* (2023) further highlight how social presence cultivates an enjoyable and immersive state among viewers, rendering them receptive to marketing cues from streamers, consequently boosting both purchase intentions and behaviors. Based on the above analysis, we propose that:

H2. Flow mediates the relationships between social presence and users' purchase intentions of (a) virtual gifts and (b) physical products in live rooms.

Mindfulness represents a psychological state characterized by an individual's consciousness and freedom, focused on present-moment phenomena both internally and externally (Dane, 2011). Users varying in mindfulness engage in distinct decision-making processes when interacting with technologies (Gao *et al.*, 2021; Moqbel *et al.*, 2023). Specifically, highly mindful users are inclined to explore valuable functions and details of technology with confidence and flexibility (Dane, 2011; Sun *et al.*, 2016). Furthermore, mindfulness fosters active involvement with technology, enhancing users' adaptability to technological contexts (Sun *et al.*, 2016; Thatcher *et al.*, 2018) and conveying positive emotional attitudes towards exploratory and innovative usage behaviors (Brown and Ryan, 2003; Grover *et al.*, 2017). This positive mindset also alleviates psychological strain associated with new technologies (Sutcliffe *et al.*, 2016; Wei *et al.*, 2020).

As mentioned, telepresence and social presence are distinct attributes of live streaming technology. Telepresence embodies physical attributes that mitigate the perceived physical distance from live stores, encapsulating the commercial essence of live e-commerce (Animesh *et al.*, 2011). In contrast, social presence pertains to social attributes that reduce psychological distance with streamers and other viewers (Guan *et al.*, 2022). Given these attributes, we anticipate that viewers' flow experiences, contingent on their mindfulness levels, are influenced by different presence affordances within the live streaming context, subsequently shaping their purchase behaviors. Mindful viewers are more likely to maintain internal focus and clarity, rather than being overly influenced by social cues when engaging with technology (Wei *et al.*, 2020). They prioritize physical technology features, such as telepresence, which offer a highly simulated shopping scenario, aiding in product performance and quality assessment. Conversely, less mindful viewers exhibit lower technological awareness and are more susceptible to social cues, leading them to be drawn toward the social atmosphere fostered by streamers and viewers.

In the context of live commerce, viewers with higher mindfulness exhibit greater receptiveness to the novelty of live streaming and a heightened awareness of its technical functionalities. These individuals are more prone to engage with advanced technologies such as virtual try-on features, enabling them to feel physically present in a real store. These technologies facilitate deeper product diagnosis, enabling more informed purchase decisions. Thus, mindful viewers perceive telepresence during live shopping as akin to a physical store experience, focusing on presented content and engaging with streamers to obtain more product information cues. Consequently, they fully engage in the live streaming, explore products with

greater interest and immersion, and are more likely to experience flow (Gao *et al.*, 2021; Thatcher *et al.*, 2018). Conversely, viewers with lower mindfulness may struggle to adapt to new environments like virtual ones, lacking awareness of local contexts and the ability to seek out innovative live streaming features (Zha *et al.*, 2015). When sensing telepresence in live commerce, they are less likely to utilize this technology affordance effectively, leading to a lesser enjoyment of the live shopping experience.

As demonstrated previously, flow mediates the path from telepresence to purchase intention. Based on this mediation hypothesis and the preceding discussion, we further propose that mindfulness intensifies the mediating role of flow in the link between telepresence and purchase intention. High-mindful viewers, due to their novelty-seeking ability, better utilize the convenience of highly simulated scenarios provided by live streaming technology (Gao *et al.*, 2021). Consequently, they are more likely to experience flow enjoyment when facing telepresence, enhancing purchase intentions for virtual gifts and physical products in live rooms. Conversely, low-mindful viewers' flow experiences are less intense when feeling telepresence, ultimately leading to lower purchase willingness. As such, mindfulness reinforces the mediating influence of flow between telepresence and purchase intention. Therefore, we propose that:

H3. Mindfulness strengthens the positive effect of telepresence on flow.

H4. Mindfulness strengthens the positive mediation effects of flow on the relationships between telepresence and users' purchase intentions of (a) virtual gifts and (b) physical products in live rooms.

As previously emphasized, social presence within live commerce environments nurtures warmth, sociability, and closeness among viewers, thereby facilitating entry into a flow state and augmenting the propensity for purchases (Animesh *et al.*, 2011; Guan *et al.*, 2022). However, the impact of social presence on purchase intention through flow may vary across individuals. We propose that mindfulness acts as a moderator, diminishing this relationship, particularly among individuals exhibiting lower mindfulness levels. Existing research suggests that high mindfulness fosters self-regulation, leading to improvements in sleep quality and reduced addictive technology use (Howell *et al.*, 2010; Liu *et al.*, 2017). High-mindful individuals tend to maintain clarity of thought and remain vigilant regarding their engagement with technology (Sun *et al.*, 2016; Thatcher *et al.*, 2018). Conversely, lower mindfulness has been associated with negative mental health outcomes such as loneliness, depression, and anxiety (Bluth and Blanton, 2014; Brown and Ryan, 2003). When individuals with lower mindfulness perceive a sense of warmth and closeness in a virtual environment, their attention tends to be driven away by the sense of warmth and close relationships with remote others, and become concentrate on and immerse themselves in the virtual setting.

In the context of live commerce, viewers with high mindfulness, encountering social presence, are less likely to deeply engage due to their calm and measured approach to new technology (Gao *et al.*, 2021). Their heightened vigilance towards the technology itself shields them from undue influence by affective and social attributes, mitigating susceptibility to social interaction addiction (Peters *et al.*, 2011). High-mindful individuals tend to focus on the present moment and their physical and emotional responses to technology features, rather than being swayed by social cues within the live room (Gao *et al.*, 2021). This focused awareness can mitigate the positive influence of social presence on flow, enabling individuals to remain grounded and less distracted by social factors. Conversely, low-mindful viewers are more susceptible to perceptual motivation, even through virtual channels (Wei *et al.*, 2020). When experiencing social presence, they are more prone to be inspired by the intimacy and warm atmosphere in the virtual setting, leading to increased immersion and pleasure during live streaming (Wei *et al.*, 2020). Thus, social presence more readily triggers a flow experience among less mindful viewers.

Considering the mediating role of flow between social presence and purchase intention, coupled with the moderating influence of mindfulness, we posit that mindfulness dampens the mediating effect of flow in the relationship between social presence and purchase intention. High-mindful viewers, resistant to affective and social influences, are less likely to experience flow triggered by social presence, reducing their purchase desires. In contrast, low-mindful viewers, less vigilant and more inclined to emotional responses, often feel a sense of belonging within viewer communities, relying on streamer demonstrations or viewer comments rather than critically assessing product information (Zha *et al.*, 2015). Consequently, they are more influenced by social presence, experiencing flow and thereby intensifying their purchase intentions for both virtual gifts and physical products in live rooms. Thus, we propose the following hypotheses:

- H5. Mindfulness weakens the positive effect of social presence on flow.
- H6. Mindfulness weakens the positive mediation effects of flow on the relationships between social presence and users' purchase intentions of (a) virtual gifts and (b) physical products in live rooms.

4. Method

4.1 Measures

All measures were developed based on the existing literature and adjusted to fit the context of live commerce. Specifically, the measures of telepresence were adapted from Animesh *et al.* (2011) and Qiu and Benbasat (2005). Social presence was assessed with the items from Animesh *et al.* (2011) and Gefen and Straub (2004). The measures of flow followed the three dimensions of attention focus, enjoyment, and perceived control from Koufaris (2002) and later modeled as a second-order construct with both orders as reflective. The items of purchase intention were slightly revised based on the ones from Pavlou and Gefen (2004) to fit the research context, including intentions to purchase virtual gifts and physical products. The moderator of mindfulness was also operationalized as a second-order construct with both orders reflective in nature; the items assessing the four dimensions of technological novelty seeking, engagement with the technology, awareness of local contexts, and cognizance of alternative technologies were adapted from Sun *et al.* (2016). In addition to the demographic variables of age, gender, education, annual household income, and smartphone use experience, we also controlled for trust in sellers (Pavlou and Gefen, 2004). Appendix 1 summarizes all of the items used in our study.

We used five-point Likert scales ranging from strongly disagree (1) to strongly agree (5) for all measures. We employed the technique of back-translation (Brislin, 1970) to ensure the translation validity from English to Chinese. One researcher who spoke fluent English and Chinese first translated the measures from English to Chinese. Then, another researcher with similar bilingual qualifications translated the Chinese measures back to English. A third bilingual researcher compared the two English versions of measures and further polished the Chinese instrument. Finally, three IS research assistants and three IS doctoral students who had shopping experiences of live commerce were invited to closely review the Chinese measures. Afterward, we conducted a pilot test comprised of 50 college students, all of whom had use experiences of live streaming mobile applications, in order to have preliminary assessment of all constructs' psychometric properties and further scrutinization on readability of the Chinese-version instrument.

4.2 Data collection

We administered the survey in collaboration with a streamer from Kuaishou. Kuaishou is one of the most influential live streaming platforms in China with the average daily active users

exceeding 300 million by June 2020, and 83.8% of the users created live streaming contents in China (Thomala, 2021). Kuaishou offers two alternative business models to engage its active users, including virtual gifting and live streaming commerce. According to Kuaishou's prospectus of its initial public offering (IPO) in the Hong Kong Stock Exchange in February 2021, (1) the daily average usage among Kuaishou's daily active users exceeded 86 min and 10 times per day by September 2020, (2) the gross billing of virtual gifting in China reached RMB ¥ 140 billion in 2019, and was expected to reach RMB ¥ 416.6 billion by 2025, with a compound annual growth rate of 19.9%; and (3) Kuaishou held more than 1.4 billion live streaming shows during January and September 2020, which helped bring 62.2% of its total revenue (i.e. RMB ¥ 204.1 billion) in the period of time (Hkexnews, 2021).

The streamer that assisted our survey administration was a local singer from inner Mongolia of China. She opened her Kuaishou account in early 2017 to have live streaming shows in Mongolian language and this account had accumulated more than 350k followers by the end of 2020. In addition to the revenue source of receiving virtual gifts on live shows, she started her live streaming commerce in early 2018, which mainly sells Mongolian local products, including local dairy products and personal care products made with local plants and herbs. Her Kuaishou store had been selling up to 100 types of products, with a unit price range of RMB ¥ 1–400 and completed over 30k transactions by the end of 2020.

Our Mongolian singer was a representative Kuaishou user and live commerce seller for the following reasons. First, users' talent skill shows ranked as one of the five most popular live streaming content on the platform, and more than 70 million users broadcasted with talent shows like dancing and singing by the end of 2022 (Thepaper, 2023). Second, up to 6.64 million users from less developed regions in China received financial support through virtual gifting or live commerce selling local products on the platform by the end of 2019 (Kuaishou, 2020). The live commerce orders for local products on Kuaishou reached 560 million in 2021 (E-commerce News, 2022). Besides, collecting data from the shoppers of a single Kuashou streamer also help minimize external noise and reduce potential bias rooted in personal characteristics of multiple different streamers (Belanche et al., 2021; Hafenbrack et al., 2020).

During our survey administration in June 2021, the Mongolian singer helped us create a short-video on her main page to (1) briefly introduce the purpose of our study together with a QR code linked to the online survey valid for seven days, (2) explain that qualified participants needed to be a follower to the singer's account for more than three month and had live commerce purchase experience in the past year, and (3) promise that the participants' inputs in the survey would be kept in confidential and the singer would not have access to participants' personal data. Participants were asked to answer questions based on their latest visit experience to the Mongolian singer's live room [1]. In order to mitigate the risk of recall bias in our survey, we employed several strategies: (1) crafted clear, precise questions of each item to reduce variation in comprehension; (2) asked participants to recall the most recent experiences, which could be the easiest; (3) allowed participants to revisit the live rooms where their latest shopping experiences took place before the survey. These methods serve as key memory aids to improve recall accuracy (Khare and Vedel, 2019; Yan et al., 2022). We were able to collect 328 copies of questionnaires; 251 copies were retained as the final sample after data cleaning (e.g. straight line input, redundant IP address, and answer time within two minutes). We provided a reward of RMB ¥ 5 to every participant upon confirming the validity of their survey input.

Table 2 presents the sample demographic information. We find that the participants aged below 25 accounted for about half of the total sample (45.8%); female sample (59.8%) was larger than male one (40.2%); more than 60% of the sample (62.6%) had annual household income of less than RMB ¥ 100k. These demographic characteristics were consistent with the latest industry report on live streaming users in China (Iimedia, 2021). In addition, we observed that most of the participants were with bachelor degrees or below (92.4%) and had smartphone use experience of more than one year (94.8%). In sum, our sample were representative of the total population of live streaming shoppers.

Table 2. Sample demographics

Characteristics	Category	Frequency	Percentage (%)
Age	18 and below	9	3.6
	18–25	106	42.2
	26–40	37	14.7
	41–50	80	31.9
	51–60	15	6.0
	60 and above	4	1.6
Gender	Male	101	40.2
	Female	150	59.8
Education	High school and below	64	25.5
	Associate degree	34	13.5
	Bachelor's degree	134	53.4
	Master's degree and above	19	7.6
Annual household income (US \$1 = RMB 6.48)	RMB 50k and below	75	29.9
	RMB 50k-100k	82	32.7
	RMB100k-200k	53	21.1
	RMB 200k and above	41	16.3
Smartphone use experience	1 year and below	13	5.2
	1–3 years	49	19.5
	3–6 years	114	45.4
	6 years and above	75	29.9

Note(s): 1 US dollar = 6.48 RMB; <http://www.pbc.gov.cn/rmyh/108976/109428/index.html>, accessed on 14 July 2021

Source(s): Authors' own work

5. Data analysis

We performed model assessment and hypotheses tests in three steps: (1) the measurement model, (2) the structural models with simple mediation and moderation effects, and (3) the first-stage moderated mediation tests.

5.1 The measurement model

We first employed Mplus 8.0, the most popular covariance-based structural equation modeling (SEM) analytical software (Muthén and Muthén, 2012), to assess two measurement models and obtained good model fit indices. The first measurement model estimated multiple dimensions of flow and mindfulness as independent constructs: chi-square/d.f. = 1.981, CFI = 0.916, SRMR = 0.057, and RMSEA = 0.063; the second measurement model assessed flow and mindfulness as second-order constructs: chi-square/d.f. = 1.876, CFI = 0.922, SRMR = 0.065, and RMSEA = 0.059 (Bentler and Bonett, 1980; Hu and Bentler, 1998). While both measurement models displayed similar levels of model fit (model comparison with $p > 0.05$), we adopt the estimation approach with flow and mindfulness as second-order constructs, which was consistent with their conceptualization and also provided parsimonious model structures with more degrees of freedom (Doll et al., 1994).

We also observed good reliability and convergent validity of all latent variables in our research model. Specifically, Cronbach's alpha as well as composite reliability of all variables were above 0.7 (Fornell and Larcker, 1981); the average variance extracted (AVEs) of each variable was greater than the recommended threshold of 0.50 (Fornell and Larcker, 1981) (see Table 3). Discriminant validity was confirmed in that (1) the square root of AVE of each variable exceeded the cross-variable correlations (Chin et al., 2003) (see Table 3), and the heterotrait-monotrait (HTMT) values were lower than the reference of 0.85 (Henseler et al., 2015; Voorhees et al., 2016) (see Table 4).

Table 3. Psychometric properties, mean

	1	2
1. TP	0.857	
2. SP	0.637**	0
3. FAF	0.646**	0
4. FEY	0.564**	0
5. FPC	0.392**	0
6. MNS	0.528**	0
7. MEG	0.471**	0
8. MLC	0.440**	0
9. MAT	0.225**	0
10. PVG	0.506**	0
11. PPP	0.513**	0
12. TRU	0.535**	0
Mean	2.967	3
Standard deviation	1.008	0
Cronbach's alpha	0.909	0
Composite reliability	0.932	0

Note(s): TP: telepresence; SP: social presence; FAF: attention focus; FEY: enjoyment; FPC: perceived control; MNS: technological novelty seeking; MEG: engagement with the technology; MLC: awareness of local alternatives; MAT: cognizance of alternative technologies; PVG: purchase intention of virtual gifts; PPP: purchase intention of physical products; TRU: trust in sellers. ** $p < 0.05$, two-tailed test

Source(s): Authors' own work

ard deviations, and correlations

	3	4	5	6	7	8	9	10	11	12
3. FAF	0.921									
4. FEY	0.648**	0.924								
5. FPC	0.425**	0.514**	0.905							
6. MNS	0.507**	0.540**	0.391**	0.818						
7. MEG	0.370**	0.382**	0.423**	0.546**	0.903					
8. MLC	0.484**	0.606**	0.436**	0.585**	0.361**	0.890				
9. MAT	0.301**	0.461**	0.465**	0.490**	0.384**	0.469**	0.798			
10. PVG	0.575**	0.504**	0.383**	0.432**	0.366**	0.513**	0.308**	0.918		
11. PPP	0.532**	0.506**	0.405**	0.436**	0.435**	0.459**	0.335**	0.697**	0.927	
12. TRU	0.527**	0.559**	0.446**	0.614**	0.380**	0.531**	0.366**	0.460**	0.487**	1.000
Mean	3.025	3.405	3.279	3.337	3.117	3.429	3.580	2.866	2.926	3.303
Standard deviation	1.010	0.934	0.919	0.827	0.960	0.868	0.814	1.064	0.967	0.777
Cronbach's alpha	0.910	0.914	0.779	0.752	0.887	0.869	0.811	0.907	0.918	1.000
Composite reliability	0.943	0.946	0.901	0.858	0.930	0.920	0.875	0.942	0.948	1.000

Note(s): TP: telepresence; SP: social presence; FAF: attention focus; FEY: enjoyment; FPC: perceived control; MNS: technological novelty seeking; MEG: engagement with the technology; MLC: awareness of local alternatives; MAT: cognizance of alternative technologies; PVG: purchase intention of virtual gifts; PPP: purchase intention of physical products; TRU: trust in sellers. ** $p < 0.05$, two-tailed test

Source(s): Authors' own work

Table 4. Heterotrait-monotrait ratios (HTMT)

	1	2	3	4	5	6	7	8	9	10	11
1. TP											
2. SP	0.716										
3. FAF	0.708	0.541									
4. FEY	0.615	0.758	0.710								
5. FPC	0.465	0.634	0.504	0.609							
6. MNS	0.643	0.740	0.612	0.649	0.512						
7. MEG	0.523	0.511	0.411	0.425	0.509	0.671					
8. MLC	0.494	0.615	0.543	0.680	0.530	0.718	0.412				
9. MAT	0.266	0.595	0.339	0.527	0.572	0.615	0.435	0.550			
10. PVG	0.552	0.517	0.632	0.553	0.455	0.520	0.407	0.577	0.344		
11. PPP	0.556	0.554	0.582	0.551	0.477	0.526	0.482	0.513	0.374	0.763	
12. TRU	0.561	0.544	0.552	0.585	0.506	0.708	0.403	0.570	0.390	0.482	0.507

Note(s): TP: telepresence; SP: social presence; FAF: attention focus; FEY: enjoyment; FPC: perceived control; MNS: technological novelty seeking; MEG: engagement with the technology; MLC: awareness of local contexts; MAT: cognizance of alternative technologies; PVG: purchase intentions of virtual gifts; PPP: purchase intentions of physical products; TRU: trust in sellers

Source(s): Authors' own work

In addition, the variance inflation factors (VIFs) were all lower than the threshold of 3.33, ranging from 1.074 to 2.596. This implied that multicollinearity was not a significant issue with our data. Common method variance, a typical systematic bias potentially influencing single-method survey data, was assessed with two statistical analyses, including Harman's single-factor test (Podsakoff *et al.*, 1982) and the marker variable test (Lindell and Whitney, 2001) (see Appendix 2). The results indicated that common method bias neither created major threat to our data.

Moreover, we also further explored the causal validity from presence to flow. Theoretically, most of the prior studies have considered the two types of presence as antecedents instead of consequences of flow across different e-commerce contexts, such as virtual world (Animesh *et al.*, 2011), online game (Liu, 2017), online learning (Guo *et al.*, 2016) and live shopping (Li and Peng, 2021). Empirically, we conducted a three-stage least squares regression analysis (Lin *et al.*, 2023) to address the potential endogeneity problem. In stage 1, we regressed telepresence and social presence against the control variables of consumers' age, gender, education, annual household income, smartphone use experience, and trust in live commerce sellers to obtain residual values for the two variables. In stage 2, we used the residuals as indicators and regressed flow with them, along with the control variables. In stage 3, we added the interaction terms to examine the moderating effects. Results showed that the telepresence and social presence residuals, as well as their interactions with mindfulness were significantly related to flow, indicating a consistent and unbiased pattern compared with the original results using the measures of telepresence and social presence. Therefore, endogeneity is not a serious problem in our study.

5.2 The structural models

We also used Mplus 8.0 to assess the structural models, in which we modeled flow and mindfulness as second-order constructs with both orders as reflective. Model 1, the baseline model, exhibited good model fitness: chi-square/d.f. = 2.185, CFI = 0.914, SRMR = 0.055, and RMSEA = 0.069 (Bentler and Bonett, 1980; Hu and Bentler, 1998). As shown in Model 1 of Table 5, both telepresence ($\beta = 0.373^{**}$, $p < 0.01$) and social presence ($\beta = 0.556^{**}$, $p < 0.01$) had positive impacts on flow, and flow has positive influences on purchase intentions of virtual gifts (PVG) ($\beta = 0.608^{**}$, $p < 0.01$) as well as physical products (PPP) ($\beta = 0.478^{**}$,

Table 5. Structural model results

		Model 1 The mediation model	Model 2a The mediation model + mindfulness			Model 2b The moderated mediation model			
		PVG	PPP	FLOW	PVG	PPP	FLOW	PVG	PPP
Telepresence (TP)	0.3 (0.1)	0.121 (0.231)	0.124 (0.211)	0.340** (0.003)	0.071 (0.338)	0.091 (0.289)	0.346** (0.001)	0.129 (0.212)	0.114 (0.229)
Social Presence (SP)	0.5 (0.1)	-0.077 (0.354)	0.019 (0.462)	0.034 (0.433)	-0.073 (0.363)	0.023 (0.453)	0.038 (0.431)	0.002 (0.496)	0.044 (0.397)
Flow (FLOW)		0.608** (0.004)	0.478* (0.017)		0.720** (0.003)	0.554* (0.016)		0.548* (0.011)	0.490** (0.008)
Mindfulness (MIND)				0.649** (0.000)			0.614** (0.001)		
Control Variables	Age	-0.152* (0.012)	-0.060 (0.154)	-0.152* (0.015)	-0.062 (0.148)	-0.152* (0.015)		-0.160* (0.011)	-0.065 (0.137)
	Gender	-0.037 (0.256)	0.037 (0.254)	-0.007 (0.452)	0.057 (0.160)	-0.007 (0.452)		-0.024 (0.338)	0.051 (0.185)
	Education	-0.084 (0.092)	-0.002 (0.486)	-0.107 (0.052)	-0.019 (0.373)	-0.107 (0.052)		-0.105 (0.061)	-0.019 (0.379)
	Annual Household Income	-0.044 (0.253)	0.084 (0.100)	-0.045 (0.241)	0.081 (0.100)	-0.045 (0.241)		-0.046 (0.242)	0.085 (0.094)
	Experience	0.031 (0.314)	-0.070 (0.115)	0.022 (0.369)	-0.077 (0.094)	0.022 (0.369)		0.017 (0.396)	-0.080 (0.087)
	Trust in sellers	0.108 (0.109)	0.148* (0.037)	0.014 (0.450)	0.080 (0.218)	0.014 (0.450)		0.047 (0.336)	0.090 (0.184)
	Interactions	MIND × TP						0.284** (0.004)	
	MIND × SP						-0.320** (0.001)		
R ²	74.	48.6%	45.3%	86.8%	51.6%	46.9%	86.1%	45.8%	44.1%

Note(s): PVG: purchase intention of virtual products. $f^2_{TP \rightarrow FLOW} = 0.163$, $f^2_{SP \rightarrow FLOW} = 0.043$, $f^2_{FLOW \rightarrow PVG} = 0.092$, $f^2_{FLOW \rightarrow PPP} = 0.068$, $f^2_{MIND * TP \rightarrow FLOW} = 0.057$, $f^2_{MIND * SP \rightarrow FLOW} = 0.070$

Source(s): Authors' own work

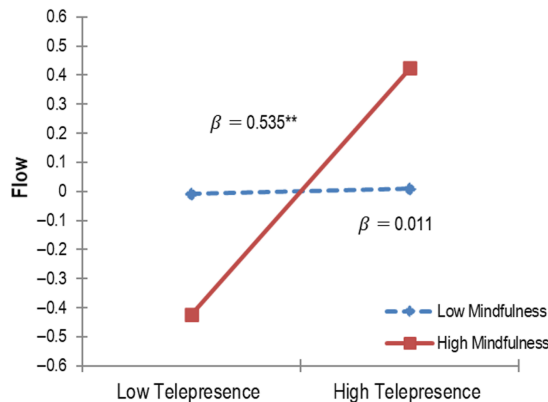
$p < 0.01$). To further verify the mediation effects, we estimated the bias-corrected bootstrap confidence intervals (CI) of the mediation effects using 1,000 bootstrap resamples (Hayes et al., 2011; Preacher and Hayes, 2008). As shown in Table 6, flow mediated the influence of telepresence on both PVG ($\beta = 0.227$, bias-corrected 90% CI: [0.071,0.511]) and PPP ($\beta = 0.178$, bias-corrected 90% CI: [0.050,0.452]). Therefore, H1a and H1b were supported. In addition, flow mediated the influence of social presence on PVG ($\beta = 0.338$, bias-corrected 90% CI: [0.179,0.792]) and PPP ($\beta = 0.266$, bias-corrected 90% CI: [0.117, 0.667]), thus supporting H2a and H2b.

In Model 2a of Table 5, mindfulness was added as a control variable to Model 1, which displayed a positive influence on flow ($\beta = 0.649^{**}$, $p < 0.01$). In Model 2b of Table 5, the interaction terms between mindfulness and telepresence and between mindfulness and social presence were further included. Results showed that mindfulness positively moderated the influence of telepresence on flow ($\beta = 0.284^{**}$, $p < 0.01$), while negatively moderated the influence of social presence on flow ($\beta = -0.320^{**}$, $p < 0.01$). Therefore, H3 and H5 were supported. We depicted the interaction diagrams to visualize the moderation effects in Figure 2. Particularly, telepresence was positively associated with flow ($\beta = 0.535^{**}$, $p < 0.01$) only when mindfulness was high; social presence had a positive effect on flow ($\beta = 0.441^{**}$, $p < 0.01$) only when mindfulness was low. Our study evaluated the explanatory power by employing the coefficient of determination (R^2) and the effect size metric (f^2). First, the

Table 6. Mediation test results

Mediation path	Indirect effects through flow	Bias-corrected 90% confidence intervals (CIs)	
H1a: TP → FLOW → PVG	0.227	0.071	0.511
H1b: TP → FLOW → PPP	0.178	0.050	0.452
H2a: SP → FLOW → PVG	0.338	0.179	0.792
H2b: SP → FLOW → PPP	0.266	0.117	0.667

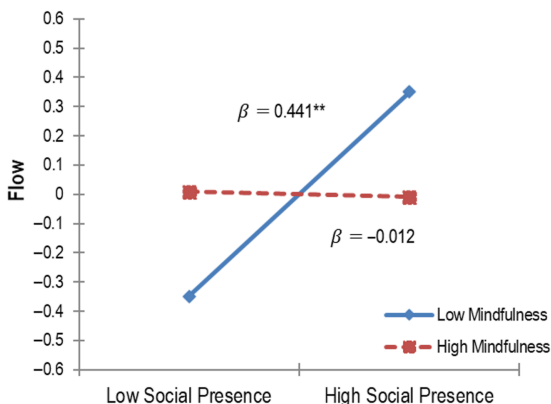
Note(s): TP: telepresence; SP: social presence; PVG: purchase intention of virtual gifts; PPP: purchase intention of physical products. Standardized coefficients are reported
Source(s): Authors' own work



Note(s): * $p < 0.05$, ** $p < 0.01$, one-tailed test. Unstandardized path coefficients

Source(s): Authors' own work

Figure 2. Telepresence→Flow (H3)



Note(s): * $p < 0.05$, ** $p < 0.01$, one-tailed test. Unstandardized path coefficients

Source(s): Authors' own work

Figure 3. Social Presence→Flow (H5)

proposed research model demonstrated considerable explanatory capabilities, accounting for flow with an R^2 of 74.4%, PVG with an R^2 of 48.6%, and PPP with an R^2 of 45.3%. Second, we also calculated the effect sizes of the structural model (see the notes in Table 5), revealing that all values surpassed the threshold of 0.02. This finding indicates that the effect sizes of the paths in our model were acceptable (Cohen, 1988).

5.3 The moderated mediation tests

We performed the first-stage moderated mediation tests in Model 2b of Table 5 also with Mplus 8.0 (Muthén and Muthén, 2012). The first-stage moderated mediation in our model means the extent to which the indirect relationship between telepresence (or social presence) with purchase intentions of virtual gifts (or physical products) through flow are contingent upon a particular level of mindfulness, and such a contingency exists only on the direct relationship between telepresence (or social presence) and flow, but not on the paths between flow and PPP or PVG (Edwards and Lambert, 2007). Again, we used 1,000 bootstrap resamples to estimate bias-corrected bootstrap confidence intervals (CI) of the moderated mediation effects.

The results in Table 7 illustrate that mindfulness strengthened the positive mediation effects of flow on the relationships between telepresence and PVG (index of moderated mediation = 0.397, bias-corrected 90% CI: [0.174, 0.814]) and PPP (index of moderated mediation = 0.372, bias-corrected 90% CI: [0.132, 0.746]), supporting H4a and H4b. Specially, the indirect effects of telepresence on PVG (conditional indirect effect = 0.423, bias-corrected 90% CI = [0.177, 0.815]) and PPP (conditional indirect effect = 0.396, bias-corrected 90% CI = [0.184, 0.808]) through flow were positive and significant only when mindfulness was high. Such moderated mediation effects are visualized in the interaction diagrams of Figures 4 and 5—telepresence indirectly promoted PVG ($\beta_{high\ mind}^1 * \beta^2 = 0.423^{**}$, $p < 0.01$) and PPP ($\beta_{high\ mind}^1 * \beta^2 = 0.396^{**}$, $p < 0.01$) through flow at a high level of mindfulness.

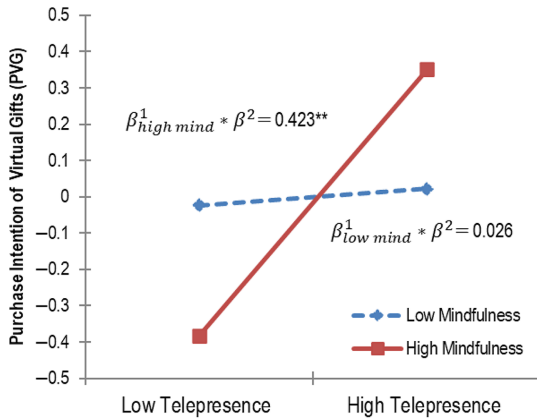
Meanwhile, Table 7 shows that mindfulness weakened the positive mediation effects of flow on the associations between social presence and PVG (index of moderated mediation = -0.360 , bias-corrected 90% CI: [-0.672 , -0.201]) and PPP (index of moderated mediation = -0.337 , bias-corrected 90% CI: [-0.649 , -0.164]), supporting H6a and H6b. That is, the indirect effects of social presence on PVG (conditional indirect

Table 7. Conditional indirect effects of the first-stage moderated mediation effects

Mediators	Paths	Conditional indirect effects through mediators	Bias-corrected 90% confidence intervals (CIs)		
			Lower bound	Upper bound	
FLOW	H4a: TP → PVG	Low	0.026	-0.131	0.344
		High	0.423	0.177	0.815
		<i>Index of Moderated Mediation</i>	0.397	0.174	0.814
	H4b: TP → PPP	Low	0.024	-0.136	0.308
		High	0.396	0.184	0.808
		<i>Index of Moderated Mediation</i>	0.372	0.132	0.746
	H6a: SP → PVG	Low	0.204	0.027	0.517
		High	-0.156	-0.452	0.006
		<i>Index of Moderated Mediation</i>	-0.360	-0.672	-0.201
H6b: SP → PPP	Low	0.191	0.014	0.522	
	High	-0.146	-0.458	0.001	
	<i>Index of Moderated Mediation</i>	-0.337	-0.649	-0.164	

Note(s): TP: telepresence; SP: social presence; PVG: purchase intention of virtual gifts; PPP: purchase intention of physical products. one-tailed test. Unstandardized coefficients are reported

Source(s): Authors' own work



Note(s): * $p < 0.05$, ** $p < 0.01$, one-tailed test. Unstandardized path coefficients

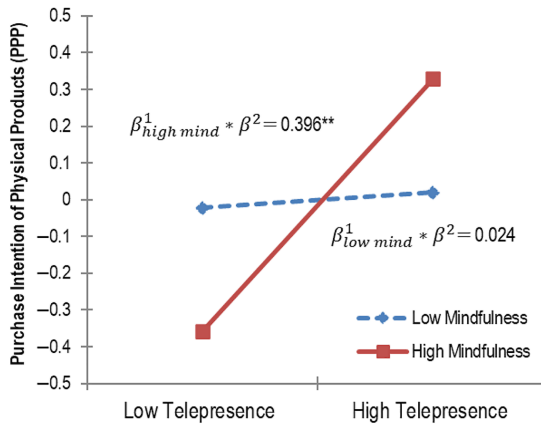
Source(s): Authors' own work

Figure 4. Telepresence→PVG (H4a)

effect = 0.204 bias-corrected 90% CI = [0.027, 0.517]) and PPP (conditional indirect effect = 0.191, bias-corrected 90% CI = [-0.014, -0.522]) were positive and significant only when mindfulness was low. The interaction diagrams in Figures 6 and 7 demonstrate that social presence enhanced PVG ($\beta^1_{high\ mind} * \beta^2 = 0.204^*$, $p < 0.05$) and PPP ($\beta^1_{high\ mind} * \beta^2 = 0.191^*$, $p < 0.05$) through flow at a low level of mindfulness.

6. Discussions

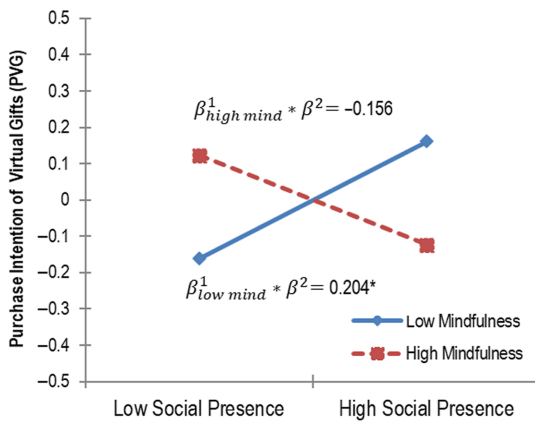
Our study proposes a moderated-mediation model between telepresence, social presence, and purchase intention, which considers the mediating role of flow and the moderating effect of



Note(s): * $p < 0.05$, ** $p < 0.01$, one-tailed test. Unstandardized path coefficients

Source(s): Authors' own work

Figure 5. Telepresence → PPP (H4b)

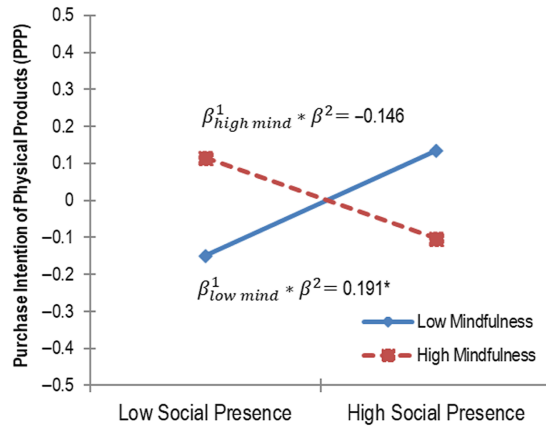


Note(s): * $p < 0.05$, ** $p < 0.01$, one-tailed test. Unstandardized path coefficients

Source(s): Authors' own work

Figure 6. Social presence → PVG (H6a)

mindfulness. Our results suggest the following conclusions. First, we identify two IT-affordance factors, telepresence and social presence, which are positively associated with purchase intentions of virtual gifts and physical products through the mediating effect of flow. Second, the relationship between telepresence, social presence, and purchase intention is moderated by mindfulness. Third, the results of our first-stage moderated mediation analysis suggest that telepresence indirectly promotes PVG and PPP through flow at a high level of mindfulness, while the indirect effects of social presence on PVG and PPP through flow are positive and significant only when mindfulness is low. Next, we discuss the theoretical and practical implications of our findings.



Note(s): * $p < 0.05$, ** $p < 0.01$, one-tailed test. Unstandardized path coefficients
Source(s): Authors' own work

Figure 7. Social presence→PPP (H6b)

6.1 Implications for theory

This study presents a comprehensive model designed to elucidate purchase intention behaviors concerning both virtual gifts and physical products within the domain of live commerce. Our research offers three significant theoretical contributions to the existing literature on live commerce. First, from the perspective of affordances, we scrutinize telepresence and social presence as the unique attributes inherent in live commerce, which serve as pivotal antecedents of flow (Nah *et al.*, 2011; Srivastava and Chandra, 2018). Telepresence replicates the sensation of being in a physical store, whereas social presence fosters feelings of intimacy and belonging within live streaming environments. Both telepresence and social presence facilitate immersive and holistic sensations among viewers, culminating in an enjoyable shopping experience that positively influences purchase decisions in live commerce. While current studies tend to emphasize the dominant role of social presence (e.g. Gu *et al.*, 2023; Zhang *et al.*, 2023), they have overlooked the significance of telepresence. By addressing this gap, our research provides a more comprehensive understanding of how the affordances of live streaming drive purchase behaviors in this context.

Second, grounded in flow theory, we delve into the substantial mediating role of flow between presence and purchase intentions for both virtual gifts and physical products. Prior research has predominantly focused on flow within traditional online shopping environments (Guo and Poole, 2009; Koufaris, 2002; Wu *et al.*, 2020). However, live commerce presents a unique amalgamation of diverse media forms, offering real-time interaction. Crafting a shopping environment that effectively engages viewers to stimulate heightened involvement and enjoyment poses a distinct challenge in live commerce. Consequently, flow theory aptly elucidates consumer behavior within the dynamic realm of live streaming e-commerce (Li and Peng, 2021). By juxtaposing telepresence and social presence, along with the mediating role of flow, we extend the discourse on flow theory within the context of live commerce, offering insight into the burgeoning popularity of immersive and thrilling shopping experiences in live streaming (Chevalier, 2022).

Furthermore, our study contributes to the understanding of live commerce by introducing mindfulness as a second-order moderator. We investigate whether mindfulness enhances or diminishes the mediating impact of flow between the two types of presence (telepresence and social presence) and purchase intention. Although previous IS research has individually

explored mindfulness and flow in IT usage, limited literature addresses their contrasting mechanisms within the e-commerce domain, particularly in live commerce. Our findings reveal that mindfulness amplifies the favorable mediation effects of flow on the relationship between telepresence and purchase intention, while concurrently attenuating these effects between social presence and purchase intention. This discovery underscores that highly mindful viewers maintain composure with new technology, leveraging remote accessibility afforded by live streaming for active participation and informed decision-making in live rooms. Conversely, individuals with lower mindfulness align more closely with social presence affordances, where they are more susceptible to the warm social atmosphere, fostering immersion within live streaming environments. This offers valuable insights for future research, urging the concurrent consideration of flow and mindfulness within the live commerce context.

Finally, we categorize purchase intention into two distinct categories: the purchase intention of virtual gifts and physical products, aligning with the unique dynamics of live commerce. Live commerce not only facilitates traditional product purchases but also uniquely allows gifting behaviors that provide hedonic fulfillment and foster social relationships (Li and Peng, 2021). Consequently, viewers' deep involvement in live streaming intertwines product purchases with gift-giving behaviors. Previous studies have independently examined consumer behavior in live commerce, such as engagement (Wongkitrungrueng and Assarut, 2018), watching intentions (Hu *et al.*, 2017), product purchase intentions (Chen *et al.*, 2020), and virtual gift behaviors (Guan *et al.*, 2022). Only one recent study by Yang *et al.* (2023) has concurrently examined purchase intentions for both virtual gifts and physical products from a social interaction perspective and detected no significant differences between them. Our study echoes the findings of Yang *et al.* (2023) and consolidates these two types of purchase intentions into a unified concept from an alternative theoretical lens of flow. This approach not only advances the knowledge accrued by Yang *et al.* (2023) but also provides an even more comprehensive understanding of consumer behavior within the live commerce environment.

6.2 Implications for practice

The implications of our research findings for practice in the domain of live commerce are profound and actionable for managers, live commerce platform designers, and streamers alike. Firstly, managers are advised to invest in professional training programs tailored for streamers, with a dual focus on enhancing both telepresence and social presence. Such training would equip streamers with the skills necessary to create a more immersive and enjoyable shopping environment for their viewers. By fostering a deeper sense of engagement and presence, these programs have the potential to significantly elevate the overall shopping experience. Secondly, live commerce designers should prioritize the enhancement of interactive features that facilitate seamless communication between streamers and viewers. This enhancement would enrich the shopping experience by making it more interactive and dynamic. The pivotal role of streamers in fostering viewer engagement cannot be overlooked. Streamers' responsiveness and appeal are critical factors that influence viewers' telepresence and social presence during live streaming sessions, as evidenced by previous research (Fei *et al.*, 2021; Guan *et al.*, 2022; Sun *et al.*, 2019). Therefore, streamers should focus on improving their response efficiency and product presentation skills, cultivating an environment where viewers feel akin to engaging with a seller face-to-face in a physical store. This approach is vital in boosting purchase intentions among viewers. Furthermore, streamers can elevate engagement by initiating discussions on captivating topics, conducting interactive games, or offering activities such as red packet giveaways within the live room. Such initiatives foster a warm ambiance and bolster social presence, ultimately amplifying viewer participation during live streaming sessions.

Additionally, our study underscores the existence of varying purchase intention paths among high and low mindful viewers. In response to this, designers should deploy

technological support, such as artificial intelligence and machine learning algorithms, to aid streamers in discerning viewers' characteristics. For high mindful viewers, streamers could leverage technology, such as VR-enabled features showcasing product trials and detailed views, to heighten the sense of telepresence. Conversely, for low mindful viewers, streamers should concentrate on bolstering social presence by fostering increased social interactions within the live room.

6.3 Limitations and future research

While our study has provided valuable insights for managers, live commerce designers, and streamers to enhance viewers' immersive shopping experiences, it is crucial to acknowledge several limitations that pave the way for future research endeavors. Firstly, the reliance on self-reported data to explore viewers' purchase intentions in live commerce introduces inherent limitations. Despite our analysis indicating that common method bias was not a significant concern, future research could benefit from integrating experimental approaches with actual transactional data sourced from live commerce company databases. This combined methodology would offer a more nuanced and comprehensive understanding of viewers' purchase behaviors within the live commerce context. Secondly, our sample was limited to participants from a single streamer's live store on a Chinese live streaming platform. Although we demonstrated the representativeness of both the selected streamer and the consumer participants, and our sample size achieved statistical significance, future research should strive to extend these findings by incorporating a larger and more diverse sample. Specifically, broadening the scope to include multiple streamers with diverse talent skills across various live streaming platforms and cultural backgrounds would significantly enhance the generalizability and robustness of the findings. Furthermore, our research model considered two types of purchase behaviors—planned purchase (PPP) and impulse purchase (PVG)—but did not observe any significant differences between them. Future studies can delve deeper into how live streaming affordances and psychological mechanisms differentially influence consumers' PPP and PVG behaviors. Lastly, trust in sellers was operationalized as a control variable in our model, with a single-item measurement presenting a limitation. To enhance the rigor and validity of future research, scholars are encouraged to adopt a multi-item scale of trust and tailor the measures specifically to the context of live commerce.

7. Conclusion

Our study contributes to the understanding of viewers' purchase behaviors in live commerce. We identify two important live streaming affordances, namely telepresence and social presence, and validate their positive and indirect influences on viewers' purchase intentions of virtual gifts and physical products through flow. Moreover, telepresence indirectly nurtures mindful viewers' purchase intentions through flow, whereas social presence indirectly fosters less mindful viewers' purchase intentions. Our study compares and integrates the distinctive roles of flow and mindfulness in the live streaming context and advances the live commerce research.

Notes

1. Qualitative and quantitative inputs from critical incidents have been commonly used to conceptualize new constructs or test theoretical models in social psychology research (Cameron and Webster, 2011; Connelly *et al.*, 2012). The latest experiences of a certain type of incidents instead of critical incidents (Chell, 1998) can further help reduce (1) the selection bias as participants might display favorable or unfavorable reactions toward the incidents with which they had most impressive experiences, and (2) the retrospective bias as participants need minimum time and efforts to recall such experiences.

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Appendix 1

Table A1. Measurement Items

Constructs		Item
Social presence Animesh et al. (2011) , Gefen and Straub (2004)		SP1. There is a sense of human contact in the live room. SP2. There is a sense of sociability in the live room. SP3. There is a sense of warmth in the live room. SP4. There is a sense of closeness in the live room. SP5: There are many other users interacting in the live room.
Telepresence Animesh et al. (2011) , Qiu and Benbasat (2005)		TP1. I felt that I was in the virtual store when surfing in the live room. TP2. I felt that I was in a same space with the streamer. TP3. The live room experience makes me forget where I am. TP4. I felt that I was looking at or listening to a real sales person. TP5. I felt that the live room was more real or present compared to the physical store.
Flow Koufaris (2002)	Attention focus	During my last visit to the live room FAF1. My attention was focused on the activity FAF2. I concentrated fully on the activity FAF3. I was deeply engrossed in the activity
	Enjoyment	FEY1. I found my visit interesting FEY2. I found my visit enjoyable FEY3. I found my visit fun
	Perceived control	FPC1. I felt calm FPC2. I felt in control
Mindfulness Sun et al. (2016)	Technological novelty seeking	MNS1. I paid attention to differences of the live room from any other technology I previously used MNS2.I tended to figure out how the live room was unique in relation to the similar technologies that I am currently using MNS3.I was mindful about how the live room differed from similar technologies I had used
	Engagement with the technology	MEG1. I had engaged in investigating the live room before using it MEG2. I gathered factual information about the live room MEG3. I got involved in exploring the live room
	Awareness of local contexts	MLC1. I thought about how the live room might help me MLC2. I thought about how the live room might change the current ways of my life MLC3. I thought about how the live room may be compatible with my life
Purchase intention Pavlou and Gefen (2004)	Cognizance of alternative technologies	MAT1. I attended to alternative views regarding the live room MAT2. I was aware of other technologies than the live room MAT3. I paid attention to equivalent technologies to the live room that can fulfill my needs MAT4. I thought about alternative technologies other than the live room to address my demands
	Virtual gifts	PVG1. I would consider purchasing virtual gifts for the streamer PVG2. I will purchase virtual gifts for the streamer PVG3. I intend to purchase virtual gifts for the streamer
	Physical products	PPP1. I would consider buying physical products from the streamer PPP2. I will purchase physical products from the streamer PPP3. I intend to purchase physical products from the streamer
Trust in sellers Pavlou and Gefen (2004)		TRU1. The e-commerce activities in live rooms can be trusted at all times

Source(s): Authors' own work

Appendix B

Common method bias analysis

To mitigate the potential influence of common-method bias resulting from self-reported measures, we employed two tests to ensure the robustness of our findings. Firstly, we conducted Harman's single-factor test (Podsakoff *et al.*, 1982), which is a widely-used method for detecting the presence of common-method bias. The results indicated that there were nine distinct factors with eigenvalues higher than 1, and the largest factor accounted for only 35.07% of the total variance. This finding suggests that no single principal component could explain the majority of the variance, indicating that common-method bias was not a significant concern in our study (Podsakoff and Organ, 1986).

Secondly, we conducted the marker variable test using AMOS 23.0 to further assess the potential influence of common -method bias (Lindell and Whitney, 2001; Westjohn *et al.*, 2009). We selected socially desirable response, which stands for respondents' tendencies to make the answers look good, as a marker variable, as it is not related to the variables in our model (Li *et al.*, 2023). Our results, as shown in Table A2, demonstrate that the marker variable had no significant influence on the flow construct and the two dependent variables of PVG and PPP. Furthermore, the path coefficients of our research model remained consistent with the original estimates. Based on these results, we conclude that common method bias was not a significant threat to the validity of our data.

Table A2. The marker variable test results

Structural paths	Path coefficients without the marker variable	Path coefficients with the marker variable
Telepresence → FLOW	0.359**	0.358**
Social presence → FLOW	0.116	0.114
FLOW → PVG	0.441**	0.440**
FLOW → PPP	0.358**	0.355**
Telepresence → PVG	0.158	0.158
Telepresence → PPP	0.155	0.154
Social presence → PVG	0.096	0.095
Social presence → PPP	0.145	0.143
MIND → FLOW	0.474**	0.479**
<i>Control variables</i>		
Age → PVG	-0.145*	-0.145*
Gender → PVG	-0.031	-0.036
Education → PVG	-0.086	-0.087
Income → PVG	-0.046	-0.044
Experience → PVG	0.020	0.023
Trust in sellers → PVG	0.083	0.085
Age → PPP	-0.055	-0.055
Gender → PPP	0.040	0.029
Education → PPP	-0.005	-0.008
Income → PPP	0.082	0.086
Experience → PPP	-0.076	-0.076
Trust in sellers → PPP	0.129	0.134
<i>Marker variable</i>		
Marker variable → FLOW		0.023
Marker variable → PVG		0.032
Marker variable → PPP		0.073

Note(s): **: $p < 0.01$, *: $p < 0.05$, two-tailed test. PVG: purchase intention of virtual gifts; PPP: purchase intention of physical products; MIND: mindfulness

Source(s): Authors' own work

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