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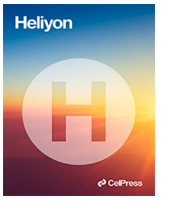

Research article

Problematic use of social media: The influence of social environmental forces and the mediating role of copresence

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ABSTRACT

People's dependence on technology in the digital environment has increasingly become the focus of academic and social attention. Social media, in particular, with the functions of connecting with others and maintaining interactions, has become an inseparable part of people's lives. Although the formation of problematic use of social media has been extensively discussed by scholars, it is mainly confined to the individual level and lacks a macro perspective from the external environment. This study draws on the perspective of institutional theory and introduces copresence as a mediating role, aiming to investigate the influence mechanism of social environmental forces on individuals' problematic use of social media. An online survey (N = 462) was conducted to collect data and test the research model. Our data were analyzed using the structural equation modeling (SEM) approach. Results show that social environmental forces exert an impact on problematic use of social media through the sense of copresence, and only mimetic force can directly affect behavior outcomes while the other two forces can not. Besides, social environmental forces have a relationship with people's sense of copresence while using social media. Among them, mimetic force and normative force positively correlate with copresence while coercive force is negatively related to copresence. Furthermore, copresence is found to influence problematic use of social media positively. Practical and theoretical implications are discussed.

1. Introduction

In the era of digital media, various information and communication technologies (ICTs) have been integrated into almost all aspects of people's lives. In such mediated life, people's fundamental need to belong and stay connected with others may be primarily realized through social media platforms [1]. Social media use has become a ubiquitous activity allowing people to keep in connectivity irrespective of time and space limitations [2]. In addition to its possibilities for effortlessly maintaining instant communication with others, social media provides users with multiple functions as well. For example, WeChat, which is owned by Tencent, can be considered as a unique platform integrating the features of WhatsApp and Facebook [3]. Chen et al. (2018) considered WeChat as a "super-sticky app" and a quasi-utility through the metaphors of the walkie-talkie, the bazaar, and the wallet [4]. WeChat has surpassed the function of media communication in the general sense and become a media ecosystem 'beyond the media' [5], combining the functions of social networking, relationship maintenance, information search, news acquisition, payment, e-books, games, sports

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records, etc. WeChat has more than 1.2 billion active users by the end of March 2020 [6].

With the increasing degree of social mediatization, social media use is not just individual behavior but has evolved into a social phenomenon. Permanently online and permanently connected (PO/PC) [7] may lead to overuse and dependence on social media. As a result, undesirable results have emerged and become a crucial social issue. People always focus on online information and connection, ignoring face-to-face communication and interaction with others [8]. Constant connection through technology has led to the impoverishment of social skills, reduced sustained attention, leaving people unable to engage in meaningful conversations, even absence of mind with what's happening in reality [9]. To a large extent, people have fallen into "alone together", that is, always connected by technology, but actually isolated [10]. Besides, problematic and potentially addictive social media use are related to unhealthy mental and physical conditions [11-14], poor academic and work performance [15,16], and other detrimental effects on people.

In recent years, problematic use of social media (PUSM) has received considerable attention from the scientific community. However, with the absence of consensual terminology and definition, the quantitative increase in research has resulted in the deterioration of the existing fragmentation in this field instead of providing clarity and achieving the intended conceptual convergence [17].

Concerning the formation mechanism of PUSM, it seems that the existing theoretical frameworks have paid much attention to elements of individual-level [18–20] but ignore that external environmental factors could also contribute to PUSM, which presents to be narrow, one-sided to some extent. Social media users are in different social environments, and the diversity of roles has numerous requirements for people, such as social norms or organizational rules. These factors act on them simultaneously and affect them to different degrees. These external social environment factors may shape users' thoughts and behaviors. Thus, the extant research perspectives prevent us from fully understanding the mechanism of PUSM and are not conducive to continuous and in-depth research in this field.

Accordingly, this study tries to understand the influence of external social determinants on PUSM based on the institutional theory [21], which is a powerful theoretical framework to explain the influence of external institutions on organizations' actions [22,23]. Besides, we propose that the external social influence may also affect PUSM through the mediator of people's internal factors, namely, the sense of copresence while using social media.

The subsequent parts of this paper are arranged as follows. Firstly, we review relevant literature on institutional theory, copresence, PUSM, and then establish a research model and propose research hypotheses. Next, we introduce the research methods, present empirical data, and further discuss the research results and implications. Finally, we point out the limitations and future directions.

2. Literature review

2.1. Institutional theory

Institutional perspective account for the irrationality that arises within the institutional context that surrounds organizational actors, in which actors 'accept and follow social norms unquestioningly, without any real reflection' [24], trying to obtain legitimacy instead of efficiency [23]. Three institutional effects influence organizations and organizational actors in the institutional context, mimetic, coercive and normative forces [25].

Mimetic forces derive from uncertainty, which is a powerful force. When organizational technologies are poorly understood, when goals are ambiguous, or when the environment creates uncertainty symbolically, organizations may model themselves on other organizations that are perceived to be more legitimate or successful [21]. Mimetic behavior under such situations is considered to be with little expense and a more stable option. Coercive forces are formal and informal pressures exerted on organizations by other organizations they depend on and by cultural expectations in the society within which organizations function [21]. In some circumstances, coercive mechanisms are a direct response to regulations and policies from government, law, and the industry or even for the sake of competition [26]. Normative forces originate from professionalization, inter-organizational networks, similar educational backgrounds, and mimetic behaviors in a certain profession [21]. Normative requirements mean that organizations are bound by specialized normative ethics [27].

In the process of organizational structure convergence and change, the above three mechanisms may work together or be dominated by one of them [27]. It is the pursuit of legitimacy that facilitates the process of institutionalization and ultimately leads to organizational isomorphism without necessarily making them more efficient. Legitimacy is the central notion of institutional theory, for which organizations and organizational actors seek to maintain the normative characteristics endorsed in their institutional field and ensure their survival [23].

Institutional theory offers a conceptually rich source to observe the non-linear routes of IT adoption and assimilation across markets and organizations [28]. In information systems research, institutional theory has been widely used to examine IS-related phenomena such as IS development and implementation, IS adoption, and use. Drawing on institutional theory, studies have investigated the influence of institutional forces on the adoption intention of radio frequency interface devices (RFID) by retailer's suppliers [29], organizational buyers' adoption, and use of B2B electronic marketplaces [30], inter-organizational linkage for financial electronic data interchange (FEDI) [31], and the adoption of big data analytics [32,33]. In addition to the organizational level, institutional pressures could also be exerted on individuals. Evidence has been shown that institutional forces affect senior managers' mental model of competition [34], and could also influence the top management through top management beliefs (TMB) and participation (TMP) [26], which give us some theoretical inspiration for this paper.

The institutional perspective posits organization's actions in the institutional field are guided and constrained by the values, norms,

beliefs as well as taken-for-granted assumptions, which are generated from the existence of institutions [23]. As a social structure, institutions provide organizations or individuals with a course or direction of action while also regulating their behaviors [35]. Similar to organizations, people are in different social environments, in which their behaviors are shaped by the above elements. Therefore, this paper argues that it is feasible to use institutional theory that illustrates organizational isomorphism to explain the common PSMU behavior of individuals.

Institutional theory assumes that organizations do not always make decisions based on rational judgments but may adopt irrational decisions and behaviors to seek legitimacy under the pressure of institutional forces. Likewise, people's behavior is not always rational but may also be affected by social environmental factors. As social beings, people are inevitably confined by various external social influences, such as social values, social norms and so on [36]. Meanwhile, people still play different roles and undertake different responsibilities in diverse organizations (i.e. schools, enterprises, associations, etc.), so they are restricted by systems, norms, and frames. For example, WeChat, as a kind of social media, could be endowed with new meanings in addition to its social function. It could be an internal working platform within an organization. Therefore, to complete work tasks and realize daily communication and connection with colleagues, it's inevitable for people to use social media frequently and may depend on social media as a result.

Previous studies pay much attention to internal factors such as psychological features, cognitive mechanisms [19,37–40], etc., whereas ignoring socio-environmental factors on people. Institutional theory provides an important perspective for us to understand the impact of social environmental forces on individuals' behavior, PUSM. As external social factors, in addition to directly affecting people's action, they can also indirectly exert their influence through individuals' internal factors. Thus, we further argue that external social influences affect the individual's problematic use through people's sense of copresence while using social media.

2.2. Copresence

The term copresence describes a sense of being together with others in a virtual environment and focuses on the more psychological connection of minds [41,42]. Copresence emphasizes the feeling of being in the same virtual place or environment because people are capable of perceiving others within their reach through sense medium involved beyond physical distance [43]. There are two dimensions of copresence, people could sense that they can perceive others and that others can actively perceive them [41]. Therefore, with copresence, people are not only in proximity but also reciprocally oriented toward each other [43]. Attention or responsiveness to others is important in copresence [44], thus it addresses more psychological interaction between people [45]. Based on it, copresence is a way of evaluating the sense of connection with another mind. In the context of social media, the paper defines copresence as the user's perception of being connected with others through social media [42,46].

Different from copresence, telepresence is a sensation of "being there" in a virtual environment [47]. It's can be considered as a part of copresence, because copresence is not only the feeling of being there but also the awareness of being together with others [46]. Besides, another commonly used presence is social presence. Social presence is generally considered as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships" [48]. It captures individuals' perception of the media which can build a relationship with others and produce sociable, warm, and intimate interaction. Although copresence and social presence share the key emphasis that individuals' feeling of being psychologically involved in an interaction and connection with others in a mediated environment, from the perspective of operationalization, copresence focuses on the perceived presence of others and the coexist of oneself and others, while social presence concerns more on the perception of togetherness and connectedness brought by media in this process [49]. That is, copresence highlights personal perception while social presence pays more attention to media characteristics and powers.

As one of the most important psychological constructs to understand human and computer interaction, copresence has great practical significance for the design and evaluation of media products, such as in education, entertainment, telecommunications, and health care fields [50-53]. Meanwhile, empirical evidence has shown that the copresence of users is significantly related to users' satisfaction, the intention to use, and behavior. In the context of online learning, users' perceived copresence with others would influence their satisfaction with the learning outcome and their virtual world experience [41,54]. In the telework context, copresence and the relationships afforded by social media could shape users' interactions and collective completion of tasks [55]. In the family context, copresence with family members through social media practices give people the emotional experiences of togetherness and produce family intimacy under conditions of long-distance, long-term separation [56]. Copresence gives people not only the sense of the presence of others but also the connectedness with others. Scholars have suggested that the concept of copresence can be a novel and beneficial theoretical perspective for understanding the use of media for social purposes [42]. In the computer-mediated communication field, research has indicated that the more copresence people experience, the more intention to continue using the medium [42,57].

Currently, most studies have paid much attention to social presence and telepresence, but less to copresence [49,58–60]. Only a few research indicated that copresence is a viable choice of theory perspective for exploring the use of media [42]. However, the extant copresence literature has focused on its positive effects without noticing that copresence may result in negative consequences such as problematic use of media. In this study, we introduce the notion of copresence, trying to understand its potential influence on PUSM.

2.3. Problematic use of social media

"Social media refers to the web 2.0 capabilities of producing, sharing, and collaborating on content online (i.e., user-generated content, implying a social element)" [2]. Nowadays, in a technology-biased society, people live an "always-on" lifestyle, engaging in social media to avoid missing out, updating instantly, and connecting with others at anytime [2]. Social media signifies a way of

being [61]. Over time, people become more dependent on social media, leading to problematic use and even addiction, which can cause a series of harm in people's daily lives [62-64].

However, problematic use of social media (PUSM) is still suffering from lacking agreement on the concept in the research field. In this paper, problematic use is considered as the preferred term rather than dependence, addiction, compulsive use, etc. Because it is broad enough to cover varying levels of compulsivity and negative outcomes experienced by individuals [65,66]. More importantly, it avoids the premature assumption of PUSM as a pathological problem [17]. PUSM refers to a psychological dependence on social media, manifested by uncontrollable seeking and compulsive use of social media, which interferes with normal activities [1].

Therefore, scholars have begun to think and explore the possible influencing factors that may cause this behavior. In the field of neurobiology, scholars have applied dual-system theory to explain the undesirable consequences of conflict between two internal systems, such as the uncontrolled behavior of excessive use of social media [8,19]. At the level of social psychology, social cognitive theory and social learning theory have been employed to understand the impact of people's interaction with the social environment on behavior [67,68]. Furthermore, the Interaction of Person-Affect-Cognition-Execution (I-PACE) mode indicates that the formation of PUSM involves the interaction of biological, psychological, and social factors [69,70]. In terms of personality traits, attachment theory has been used to explore the impact of an individual's early attachment experience on the processing of social relationships and social behavior [71]. From the perspective of motivation, use and gratification theory, compensation internet use theory have been used to analyze the possible consequences of bad behaviors caused by people's motivation to use the network [72,73]. In addition, the theory of planned behavior, and theory of reasoned action have been utilized to explain the decision-making process of people using the Internet [74].

Existing studies focus on the role and influence of factors at the individual level on PUSM more but do not jump out of the individual itself and investigate its possible impact from the perspective of the external environment in which people stay. Of course, some studies have paid attention to the effects of parents and peers on individuals' problematic behaviors [75-78], but it's still at the micro-level, rather than thinking and advancing from a macro angle. Therefore, we draw on the institutional theory to examine the effect of external environmental forces on individual behavior and its underlying mechanisms.

3. Theoretical frameworks and research hypotheses

Based on the existing theoretical achievements, the paper is going to examine the formation of problematic use of social media through the institutional perspective. A research model is established shown in Fig. 1, and hypotheses of the study are proposed subsequently.

3.1. Social environmental forces and problematic use of social media

Institutional perspective provides the structuralist explanation of the influence of external environmental factors on organizational behavior. According to institutional theory, the behaviors of actors do not fully depend on a rational assessment of costs and benefits [79]. Instead, actors are embedded in societal environments with regulations, norms and cultures that shape their decisions and practices beyond their actual demands.

In the social media context, the paper defines mimetic force as when individuals are unfamiliar with a certain social media platform and are not sure whether to use it, they tend to imitate their friends' using behavior if their friends benefit a lot from using social media. Then coercive force is defined as: individuals have to use social media to complete corresponding role tasks or activities in different situations, such as work situations, family situations and social situations, etc. Moreover, normative force is defined as: individuals

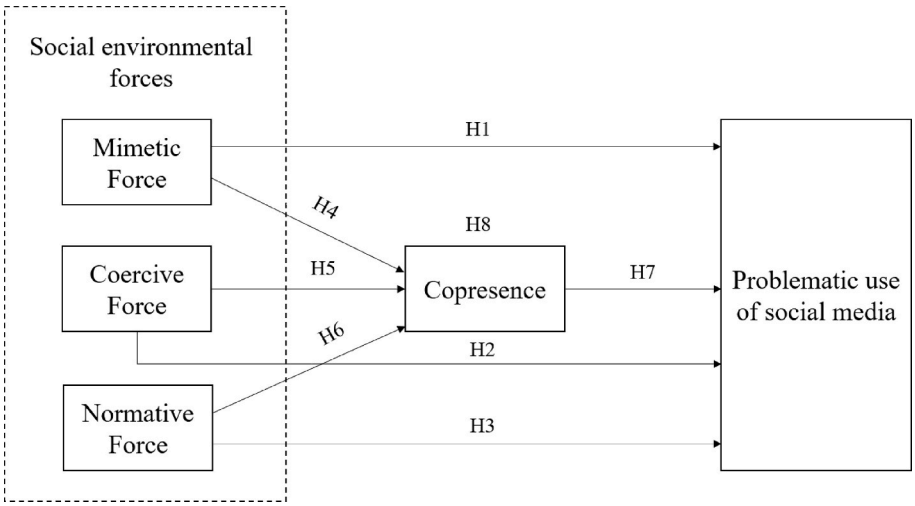

Fig. 1. Research model.

tend to use social media when they perceive that the overwhelming majority of individuals around them are using social media.

With mimetic forces, individuals may imitate the attitudes and behaviors of those around them who already use social media, given the benefits or successes they have gained from using social media. So, people are more likely to use social media like others under mimetic pressure [80]. In the process of imitation and conformity, if their needs are met [81] or they do get the expected benefits or unexpected returns, it may lead to a dependence on social media and further problematic use behavior [82]. Therefore, we propose a hypothesis as follows:

Hypothesis 1. Mimetic force is positively related to problematic use of social media.

At the individual level, coercive pressures that people face mainly come from the mandatory requirements of the social environment they stay in. They have to use social media as a tool to complete work or study tasks [83], keep in connection with families [84] and socialize with others [85,86]. Along with all these purposes, the role of social media has gradually increased, and people begin to rely on social media and may form problematic behavior. For example, in a working context, the company requires employees to check relevant work notifications through social media at any time and complete tasks punctually. Accordingly, people have to spend more time using social media to conduct relevant behaviors and practices in accordance with organizational or environmental requirements and norms [87,88]. As a result, we propose that:

Hypothesis 2. Coercive force is positively related to problematic use of social media.

Normative pressures arise when long-term behavioral paradigms or social consensus in society are formed. When the representation that using social media is inevitable and indispensable is shared broadly by the social environment in which people belong, they act and practice voluntarily and unconsciously in the way everyone behaves in common [89,90]. Over time, people take it for granted and come to believe that the practice of using social media turns out to be the 'only' way to do things [91,92]. With the ever-present normative forces in the social environment, people may form the using habit thus leading to problematic use of social media. So we hypothesize that:

Hypothesis 3. Normative force is positively related to problematic use of social media.

3.2. Social environmental forces and copresence

Under the mimetic force, people are more likely to use social media as a result. While using, people experience emotional proximity with or feel closer to their friends or families in the virtual environment created by social media because they know they are also there. Heeter (1992) has indicated that individuals' recognition of many others in the virtual world enhances the individual's copresence. The using behavior starts from imitation and then experiences copresence [93], which continuously satisfies people's need to stay connected to others. Therefore, we propose a hypothesis as follows:

Hypothesis 4. Mimetic force is positively related to copresence.

As a significant communication tool, social media is used to accomplish assignments in different situations. People experience the connection with others through the use of social media. For instance, individuals can perceive the task collaboration and information sharing with colleagues in the work context [94,95], while in the family scene, people can feel the emotional connection and intimate interaction with family members [56], all of which are manifestations of the sense of copresence. As a result, we put forward a hypothesis that:

Hypothesis 5. Coercive force is positively related to copresence.

With normative forces in social environments, the majority of others using social media make people think it's an unquestionable habitual behavior [96,97]. Research has demonstrated that a larger number of users in a virtual world may create the illusion for users that they are copresence with many others [42]. So in the certain virtual space created by social media, users can feel more consistent with others' behavior and achieve a better connection with others. Therefore, we hypothesize that:

Hypothesis 6. Normative force is positively related to copresence.

3.3. Copresence and problematic use of social media

The nature of social media is inherently social because it seeks to create, capitalize on, or maintain social interactions among its users [98]. In social media, the key is to make users perceive interactivity, which is precisely the feeling that copresence brings to users. The perception of interactive engagement with others during use can foster parasocial interactions, messages, and relationships [98]. With a high level of copresence, users are immersed in the interaction of social media, resulting in some positive and favored feelings. Tang et al. (2020) found that in online team collaboration, copresence had a positive significant relationship with media satisfaction [99]. The degree of copresence here demonstrates that people perceive both they and their partners have all contributed meaningfully to the team, so with higher copresence, they are more likely to be satisfied with the medium used for communication. Xu et al. (2011) suggested that copresence had a significant positive effect on continuous use intention [42]. Besides, copresence may also result in negative outcomes, for example, Kırcaburun and Griffiths (2018) pointed out that watching live streams and liking and commenting on others' posts on Instagram were associated with problematic Instagram use via copresence [100]. Thus, we build the following hypothesis:

Hypothesis 7. Copresence is positively related to problematic use of social media.

3.4. The mediating effect of copresence

The essence of network communication is that individuals use the medium to be with another [101], which is exactly the core concept of social media. More precisely, this is the social nature of humans. As social beings, individuals are always living in connection with society and other people around them, meanwhile, individuals always seek to acquire social identity and social support, trying to make themselves conform to social norms as much as possible [102]. This is also consistent with the key proposition of belonging theory [103]. The paper argues that sociality at the individual level is similar to legitimacy at the organizational level. In the institutional field, organizations seek legitimacy in order to be accepted and prove their value and capacity [104]. Correspondingly, individuals obtain recognition from society and others by constantly building connections with others, which is the nature of sociality. Legitimacy and sociality are the attributes necessary for the survival of organizations and individuals respectively. As a consequence, the sense of copresence provided by social media happens to be the psychological support and sense of security that people, as social beings, need to get in online social interaction and communication.

Under the influence of social environmental forces, people establish social connections and maintain the consistency of their behavior with others to obtain social support and social identity, further ensuring their own "legitimacy" (sociality). In the age of information communications technology (ICT), social media provides people with the necessary and important platforms and opportunities to build social connections and realize interpersonal connectivity with low cost and high efficiency [105-107]. Given the significant feature of social media and the impetus of external social pressures, people tend to use social media and get a sense of copresence from using it.

Based on the literature reviewed above, copresence has certain connecting and transformational functions in the relationship between social environmental forces and problematic use of social media, and it is the key intermediate role in this mechanism. Earlier studies have confirmed the mediating role of copresence between technology-related attitudes and behaviors and technology-related outcomes, such as continuous use intention or problematic use behavior [42,100]. Accordingly, the following hypothesis is proposed:

Hypothesis 8. Copresence mediates the associations between social environmental forces (i.e. a) mimetic force; b) coercive force; c) normative force) and problematic use of social media.

3.5. Control variables

When discussing the influence of external social environment forces on individuals, demographic variables can be taken into account because they may have a potential impact on individuals to some extent. In this study, we included gender, age, and duration of everyday use as control variables. As suggested by the previous research, gender [108], age [90], and duration of use [109] have varying degrees of influence on people's technology usage.

4. Method

4.1. Procedure and participants

We test our research model by conducting an online survey in China to obtain empirical data. Considering that the original items were in English and our participants were Chinese, the items were translated from English to Chinese and then back-translated to English to make sure the consistency of meaning between Chinese and English version and guarantee translation quality [110]. Before the formal survey, we conducted a pre-test for 24 subjects, and further revised and improved the questionnaire based on their feedback.

In the following formal survey, we conducted an online survey with the advantage of no regional limitations, fast response, low cost and high efficiency [111]. To ensure the response rate and sample quality, we employed Sojump, a professional online survey platform in China, to conduct the survey. They are responsible for inviting eligible respondents to participate in our survey. At the very beginning of the questionnaire, a filter question about whether to use social media was set and only those social media users were invited to continue answering, otherwise, the questionnaire ended. We informed the respondents that the survey was conducted anonymously and its confidentiality was assured, so they were encouraged to fill it out carefully and truthfully.

The investigation was carried out from December 2021 to January 2022. A total of 556 questionnaires were received. The responses were reviewed and invalid questionnaires such as those with the same answer to all questions, those who didn't use social media, and those who finished the questionnaire in a too short time were excluded. Finally, 462 valid responses were obtained in the study for further analysis.

4.2. Measurement development

To ensure the reliability and validity of the constructs, the paper attempts to develop scales adapted from prior well-established instruments with appropriate revisions to fit the context of this study.

4.2.1. Social environmental forces

The measure for social environmental forces is following Liang et al. (2007). We modify the scales to measure in the social media context according to the connotation of institutional theory [26]. For individuals, mimetic force mainly comes from friends around people, whose words and deeds may have a more important impact on individuals. Therefore, we adjusted the "main competitors" in

the original scale to "my friends" in this study. For instance, "My friends who use social media have greatly benefitted." In addition, it is worth mentioning that the upstream and downstream in the industrial chain where the enterprise is located, that is, suppliers and customers, at the individual level, we interpreted as people's superior leaders and teachers, as well as colleagues and classmates respectively. Concerning coercive force, it generally stems from the requirements of the social environment in which people are located, mainly including the school context, work context, family context and social context. For example, "My school/workplace requires me to use social media for tasks." All items used a seven-point Likert scale (strongly disagree = 1 to strongly agree = 7). The Cronbach's α for mimetic, coercive and normative scales were 0.75, 0.91, 0.92 respectively.

4.2.2. Copresence

The 3-item copresence scale developed by Slater et al. (2000) was used in this study to evaluate users' perception of being with others and the feeling of closeness with others [112], with a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). We modified the wording to fit the context of social media use. For instance, "To what extent did you have the sense of the other people being together with you while using social media?" The Cronbach's α for this scale was 0.85.

4.2.3. Problematic use of social media

Problematic use of social media scale is adapted from Eijnden et al. (2016) [113], which was based on the nine DSM-5 criteria for Internet Gaming Disorder (IGD) [114]. It is a psychometrically sound and valid instrument with 9 items. For example, "I try to spend less time on social media, but failed." All items were rated on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree), with higher scores indicating greater severity of problematic use of social media. The Cronbach's α for this scale was 0.91.

5. Results

5.1. Descriptive statistics

Among our participants, there are 238 males (51.52%) and 224 females (48.48%). Moreover, the majority of the respondents were in their 20s and 30s. The detailed demographic characteristics of the participants were shown in Table 1. The demographics of the users were consistent with the statistics released by the China Internet Network Information Center [115]. Therefore, we assume that our sample is representative of Chinese social media users.

From the survey, we can conclude that the most frequently used social media were WeChat, QQ, and Tik Tok. Of these respondents, more than half of them use social media for more than 3 h a day, with 6% spending more than eight hours a day, and 34.6% of them using social media every hour. It indicated that social media overuse has become a prominently common phenomenon among these

Table 1
Demographic information of the respondents (N = 462).

Measure	Items	Frequency	Percent
Gender	Male	238	51.5%
	Female	224	48.5%
Age	Under 18	6	1.3%
	18–25	263	56.9%
	26–35	109	23.6%
	36–45	65	14.1%
	Above 45	19	4.1%
Frequency of everyday use	Every 20–30 min	130	28.1%
	Every hour	160	34.6%
	Every 2–3 h	114	24.7%
	Every 4–5 h	39	8.4%
	Every 6 h and above	19	4.1%
Duration of everyday use	Less than 1 h	59	12.8%
	1–3 h	169	36.6%
	3–5 h	131	28.4%
	5–8 h	75	16.2%
	More than 8 h	28	6.1%
Occupation	Students	277	59.9%
	Civil servant	58	12.6%
	Company employer	80	17.3%
	Individual household/Self-employed	25	5.4%
	Retried	12	2.6%
	Other	10	2.2%
Education	Primary school and below	2	0.4%
	Middle school	12	2.6%
	High school/secondary vocational school	50	10.8%
	Bachelor degree/higher vocational school	368	79.7%
	Master degree and above	30	6.5%

Note: Frequency of everyday use refers to how often the respondents use social media each day; Duration of everyday use refers to the amount of time respondents spend using social media each day.

respondents.

5.2. Measurement model

The research model was tested using AMOS 24.0, which is considered a powerful technique for predictive models [116] combining principal components analysis and regression to examine the measurement and the structural model simultaneously [117,118].

The reliability and validity of the measurement model were assessed (see Table 2). The Cronbach's α coefficient of the constructs was above the point of 0.7 standard thresholds. Convergent validity refers to the extent to which the variables share a high proportion of common variance, including the indicators of average variance extracted (AVE) and composite reliability (CR). As presented in Table 2, the AVE value for each construct ranged from 0.575 to 0.770, exceeding the recommended value of 0.50 [119], CR value ranged between 0.857 and 0.937, exceeding the recommended value of 0.70 [119], suggesting a good convergent validity.

Besides, discriminant validity is the extent to which a construct is truly distinct from other constructs. High discriminant validity provides evidence that a construct is unique and captures some phenomena other measures do not. Discriminant validity is measured by comparing the square root of the AVE with the correlation between the construct and other constructs in the model [119]. Table 3 shows that the discriminant validity was achieved.

5.3. Common method bias

Because all the data was collected from a single source at the same time, common method variance might be a concern. Thus, we assessed the data using Harman's one-factor test to identify any potential common method bias [120]. The results indicated that the merged factor was 30.17%, with no general factor accounting for more than 50% of the variance, suggesting that the common method bias may not be a serious problem.

5.4. Structural model

According to the main fit indices, the proposed model was acceptable for the overall fit indices were noticed to be within the recommended level. $\chi 2 = 777.514$, df = 310, $\chi 2/df = 2.508$; CFI = 0.938; TLI = 0.930; IFI = 0.939; NFI = 0.902 and RMSEA = 0.057. With the results showing an acceptable model fit, we further tested our hypotheses via structural equation modeling (SEM) using AMOS. The indirect effects were tested using the bootstrapping technique [121].

According to Fig. 2, mimetic force is significantly related to PUSM ($\beta = 0.356$, $p < 0.001$), proving Hypothesis 1, while coercive force and normative force are not associated with PUSM, rejecting Hypothesis 2 and Hypothesis 3. Besides, the effect of mimetic force on copresence is highly significant ($\beta = 0.630$, $p < 0.001$), thereby supporting Hypothesis 4. Surprisingly, coercive force and copresence link is negatively significant ($\beta = -0.494$, $p < 0.001$), suggesting rejection of Hypothesis 5. Normative force is positively

Table 2
Results of internal consistency and convergent validity.

Construct	Items	Loading	AVE	CR	Cronbach's α
Mimetic force (MF)	MF1	0.803	0.666	0.857	0.748
	MF2	0.822			
	MF3	0.823			
Coercive force (CF)	CF1	0.805	0.654	0.929	0.910
	CF2	0.848			
	CF3	0.844			
	CF4	0.821			
	CF5	0.809			
	CF6	0.834			
	CF7	0.688			
Normative force (NF)	NF1	0.911	0.750	0.937	0.915
	NF2	0.872			
	NF3	0.862			
	NF4	0.806			
	NF5	0.875			
Copresence (CP)	CP1	0.892	0.770	0.909	0.849
	CP2	0.879			
	CP3	0.861			
Problematic use of social media (PUSM)	PUSM1	0.802	0.575	0.924	0.906
	PUSM2	0.799			
	PUSM3	0.778			
	PUSM4	0.708			
	PUSM5	0.757			
	PUSM6	0.757			
	PUSM7	0.771			
	PUSM8	0.686			
	PUSM9	0.759			

Table 3
Results of discriminant validity analysis.

	Mean	S.D.	MF	CF	NF	CP
MF	4.862	1.051	**0.816**			
CF	5.509	0.991	0.500	**0.809**		
NF	5.506	1.242	0.364	0.628	**0.866**	
CP	3.775	1.414	0.381	0.138	0.302	**0.877**
PUSM	3.426	1.293	0.311	0.085	0.054	0.378

Note: S.D. = Standard deviation; MF = mimetic force; CF = coercive force; NF = normative force; CP = copresence; PUSM = problematic use of social media.

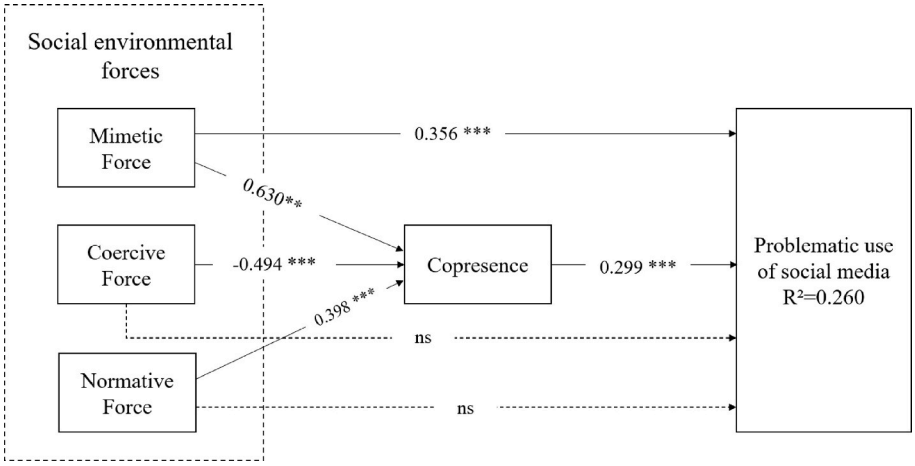

Fig. 2. Testing results of the research model. Note: ***p < 0.001.

correlated to copresence ($\beta = 0.398$, $p < 0.001$), supporting Hypothesis 6. Moreover, copresence is markedly correlated to PUSM ($\beta = 0.299$, $p < 0.001$), thus Hypothesis 7 is proved.

To further analyze the influencing mechanisms of social environmental forces on PUSM, we examined the mediation effects of copresence. As shown in Table 4, copresence mediated the effects of social environmental forces on PUSM, supporting Hypothesis 8.

6. Discussion

6.1. Summary of main findings

As a social issue, PUSM arises from the development of the times and has received considerable attention from scholars. However, previous studies on the antecedents of PUSM have focused obsessively on individual-level constructs. This study draws on the institutional perspective to understand the possible impact of external social environmental forces on PUSM. To lend further coherence to our research model, we also identify copresence as the individual internal psychological factor which mediates the effect of social environmental forces on PUSM. In general, results show that social environmental forces affect PUSM via copresence. Key findings can be concluded as follows.

First, social environmental forces were found to have a relationship with people's sense of copresence while using social media. Among the three social influences, mimetic force is positively related to copresence. People imitate the social media usage of friends around them, especially the ones who are influential or get benefits from using social media, to reduce uncertainty. Knowing that others are there in the social media virtual space, they are more able to perceive being together with others, resulting in a sense of

Table 4
Results of mediating effect test.

Indirect path	Estimated effect	95% CI		Mediation effect
		Lower	Upper	
MF→CP→PUSM	0.274	0.150	0.474	Yes
CF→CP→PUSM	−0.255	−0.455	−0.130	Yes
NF→CP→PUSM	0.134	0.066	0.237	Yes

Note: N = 462. Bootstrap sample size = 5000. Empirical 95% confidential interval does not overlap with zero. CI = confidential interval; MF = mimetic force; CF = coercive force; NF = normative force; CP = copresence; PUSM = problematic use of social media.

copresence. This is consistence with the previous study that the size of others a user can interact with while using the technology contribute to the sense of copresence [42,122].

Besides, results reveal that normative force is positively correlated with copresence. Normative force comes from a long standing consensus in an individual's environment. With people around them all using social media, based on herd mentality, individuals want to keep their behavior consistent with others to eliminate the threats of being considered outdated or being excluded [92]. Normative force also reflects the wide spread of social media and lets people know that there are many others they can communicate with. Accordingly, with normative force, individuals feel that others are with them and they act together while using social media and acquire a sense of security and belonging, thus creating copresence. Previous studies have taken a similar view that the number of users in the virtual space is an important determinant of copresence [47,123].

To our surprise, different from the above two forces, coercive force is negatively related to copresence. A possible explanation for this finding is that coercive force is a kind of compulsory requirement and pressure originated mainly from the environment people live in. With coercive pressure, people use social media more as a tool to meet external requirements or fulfill their role responsibilities. Therefore, the greater the coercive pressure, the more purposeful people are or the more likely they are to experience a feeling of repulsive, making it difficult to feel copresence while using. Consequently, higher coercive force results in a lower level of copresence. This may be a kind of passive copresence which echoes the earlier study [124]. The author considered that passive copresence created by the social media such as Skype or FaceTime sometimes was not a good choice while active copresence produced by textual media is better because people can have a greater control and engage in media usage at any time or place they like, the latter is more selective or discretionary. That is, under the influence of coercive force, people use social media passively and lose control of the condition to some extent, and thus feel the passive copresence, which decreases use's experience of copresence.

Second, mimetic force has a direct influence on PSUM while coercive force and normative force have not. Under mimetic pressures, people tend to imitate the using behavior of others. So imitation behavior mainly stems from people's own inner will that they want to follow others because of their own uncertainty. As a consequence, people actively use social media like others to get the same outcome others have obtained. If they get what they want and even surprises while using it, they are more inclined to believe in the advantages of social media, therefore rely more on social media, which then may generate PUSM. This is consistent with the previous research [125]. However, coercive force and normative force actually are not the individuals' voluntary will, but more pressure brought by the external environment. They cannot directly affect individuals' problematic behavior, which is not in line with the existing studies [90,91], but need to influence the outcome through the sense of copresence.

Finally, copresence is found to influence PUSM positively. Copresence is a feeling that the technology wants to create for the user. It's generally considered a positive perception in previous studies. With copresence, users may have a great experience of technology use and generate continuous use intention [41,42,126]. However, this study shows that copresence can not only immerse users in the virtual space but may also lead to problematic usage behavior, indicating that copresence has two sides. The result has enriched our knowledge of copresence and future research should treat this concept dialectically.

6.2. Theoretical implications

As PUSM has become a trend in this modern age, which has become a social ill instead of only individual behavior, the study on this special and vital issue is highly valuable. This study aims to contribute to the understanding of the formation mechanism of PUSM on account of the limited perspective of the literature in this field. The paper extends theoretical applications, enriching and developing theoretical understanding.

First, it enlarges the institutional theory from organizational studies to individual behavior research as well as to the context of social media use. Institutional theory is mainly used to examine the structural and behavioral changes in the field of organizations, explaining that the adoption and use of information systems by organizations mainly stems from the need for legitimacy rather than efficiency and competition, and ultimately leads to institutional isomorphism. While it is rarely used to study behavior at the individual level. The present study is the first to employ institutional perspective to understand the impact of social environmental forces on PUSM. Besides, the theory-driven investigation into the formation of PUSM remains far from adequate. This study is a supplement to the existing theoretical framework.

Second, this study provides a more macro and comprehensive understanding of PUSM compared with the previous literature. It highlights the important role of external social forces in individuals' actions. Individual behavior is often the result of a combination of internal and external contributors. The research on PUSM should also go beyond the limitations of individual-level, expand the research perspective to the environment outside the individual, and pay attention to the external social factors as an imperative inducement motivating the formation of individual behavior.

Third, the current paper enriches copresence research by confirming the critical role of copresence as a mediator in predicting PUSM. As an important concept in virtual reality, copresence enables people to have the perception of connection and interaction with others in the virtual world. It is often regarded to be associated with positive outcomes, without thinking about the negative effects it may have on users. This study empirically verifies the promoting effect of copresence on PUSM and finds that it can act as a mediator to link the relationship between social environmental factors and PUSM. In conclusion, this paper provides a unique perspective that may inspire future research on PUSM research.

6.3. Practical implications

The influence of social environmental forces on individuals' behavior is significant, especially blind behavior without rational

judgment. For users, first of all, to improve their self-regulation, rationally use social media and reduce their over-dependence on it. Secondly, keep a clear cognition and positioning of themselves, improve self-concept clarity, avoid blindly following the trend, and reduce the adverse impact of external social factors on themselves as far as possible. Finally, be careful about the sense of copresence while using communication technology. It can optimize the use experience on the one hand, but it may also make users too immersed in the virtual world unwittingly and unable to extricate.

6.4. Limitations and future directions

While this study provides some valuable findings, there exist some limitations as well. First, the participants of this study are all from China, so the single source may affect the promotion of the research results in different cultural contexts. Future research can consider distinct cultural backgrounds to further verify the research model. Second, this study is a cross-sectional study, and a longitudinal perspective can be utilized to explore the change and development of users' behavior over time. Third, most respondents are in their 20s and 30s, which can mirror the characteristics of Chinese social media users to a certain extent. However, as social media is more deeply integrated into people's daily life and the number of users keeps increasing, the results of this study may not be generalized. Future research can further investigate the use of social media in other subdivided age groups.

7. Conclusion

Based on institutional perspective, this paper explored the impact of social environmental forces on individuals' PUSM and introduced copresence to examine its mediating mechanism between social environmental influence and problematic behavior. The findings highlight how social influence, including mimetic, coercive and normative forces, can shape and change individual behavior through the sense of copresence. It's a necessary complement to existing research. In addition, the adverse outcome of copresence on individuals is confirmed, which expanded the deep understanding of copresence in related research fields.

Author contribution statement

Jingshu Zhang: Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Haiqing Bai: Building research model; Conceived and designed the experiments.

Jinting Lu; Longzhao Zheng: Performed the experiments; Contributed reagents, materials, analysis tools or data.

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Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare no competing interests.

Appendix. Measurement items

Constructs	Items
Mimetic force [26]	My friends who use social media: MF1. have greatly benefitted; MF2. are favorably perceived by other classmates/colleagues; MF3. are favorably perceived by other teachers/leaders.
Coercive force [26]	CF1. My teachers/leaders require me to use social media to connect with them; CF2. My classmates/colleagues require me to use social media to connect with them; CF3. My family require me to use social media to connect with them; CF4. My friends require me to use social media to connect with them; CF5. My school/work place requires me to use social media for tasks; CF6. My group/organization/association, etc. requires me to use social media to connect with them; CF7. My study/work require me to use social media for it.
Normative force [26]	Perceived Extent of usage by people around you: (1: None has adopted; 7: All have adopted) NF1. My teachers/leaders use social media;

(*continued on next page*)

(*continued*)

Constructs	Items
	NF2. My classmates/colleagues use social media; NF3. My friends use social media; NF4. My family use social media; NF5. Members of my group/organization/association, etc. use social media.
Copresence [112]	CP1. To what extent did you have the sense of the other two people being together with you while using social media? CP2. To what extent can you imagine yourself being now with the other two people in the same room while using social media? CP3. Please rate how closely your sense of being together with others in a real-world setting resembles your sense of being with them while using social media.
Problematic use of social media [113]	PUSM1: I regularly found that I can't think of anything else but the moment that I will be able to use social media again; PUSM2: I regularly feel dissatisfied because I want to spend more time on social media. PUSM3: I often feel bad when I could not use social media; PUSM4: I try to spend less time on social media, but failed; PUSM5: I regularly neglected other activities (e.g. hobbies, sport) because I want to use social media; PUSM6: I regularly have arguments with others because of my social media use; PUSM7: I regularly lie to my parents or friends about the amount of time I spend on social media; PUSM8: I often use social media to escape from negative feelings; PUSM9: I have serious conflicts with my parents, friends because of my social media use.

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