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ORIGINAL RESEARCH

Storing, Not Reading: Investigating the Link Between Upward Social Comparison via Social Media and Digital Hoarding Behavior in Chinese Youth

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Background: Digital hoarding has emerged as a pervasive psychological phenomenon and behavioral challenge among contemporary youth. This study focused on exploring the relationship between upward social comparison via social media, fear of missing out (FoMO), mindfulness, digital hoarding behavior, and its underlying mechanisms.

Methods: A total of 927 young people participated in this cross-sectional study. Research instruments included the Social Comparison Scale, the Fear of Missing Out Scale, the Mindfulness Measure, and the Digital Hoarding Behavior Questionnaire. The data analysis comprised descriptive statistics and correlation analyses. Advanced analyses were conducted using Model 4 for mediation and Model 8 for moderation from the PROCESS macro.

Results: (1) Upward social comparison via social media was a strong predictor of digital hoarding behavior, even after controlling for variables such as gender, age, and education. (2) FoMO mediated the relationship between upward social comparison via social media and digital hoarding. (3) Mindfulness moderated both the direct effect of upward social comparison via social media on digital hoarding and the first segment of the mediating role of FoMO.

Discussion: The study further clarified the antecedents and psychological mechanisms that drive digital hoarding behavior. The findings contribute new perspectives for understanding the emerging concept of digital hoarding, while providing empirical evidence and valuable guidance for encouraging young adults to use social media responsibly and reduce impulsive hoarding tendencies.

Keywords: social media, digital hoarding, upward social comparison via social media, fear of missing out, mindfulness

Introduction

Hoarding, historically an adaptive behavior, has evolved as a defense mechanism for individuals facing an uncertain environment.[1] Human hoarding behavior comes in many forms: from food, medicine, and cosmetics to clothing, furniture, and more. Hoarding is defined as the saving and accumulation of a large number of physical objects, and experiencing significant distress at the prospect of discarding them.[2] The accumulation of items affects people's ability to perform basic activities in a limited space, such as cleaning, cooking, walking around the house, and sleeping. For a long time, hoarding disorder has been classified as a subset of Obsessive-Compulsive Disorder (OCD).[3] Scholars argued that this difficulty is caused, on the one hand, by a compulsive need to store such objects, and, on the other hand, by the discomfort felt thinking of getting rid of them.[4]

In recent decades of rapidly developing technology, social media have become a fundamental infrastructure for human survival,[5] playing an active role in information acquisition, knowledge learning, and digital content production. Social media activity constitutes a large part of the lives of adolescents.[6] More importantly, these platforms tend to deploy proprietary recommendation algorithms to automate the selection, ranking, and presentation of content, every

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time a user opens or refreshes the site or app. This means that social media can recommend relevant or interesting content to users based on their past behavior, interests, and social network relationships. This feature of social media can lead younger generations to easily and covertly engage in various collecting behaviors,[3] such as digital hoarding.

Digital hoarding, as a subset of hoarding behavior, refers to an individual excessive accumulation of certain data files, such as photos, web pages, videos, and documents, to the extent that it becomes uncontrollable and ultimately leads to feelings of stress and disorganization.[7,8] Research shows that in non-clinical samples, the prevalence of pathological digital hoarding behavior in the general population ranges from 3.7% to 6%, while the occurrence rate of digital hoarding behavior in individuals with OCD disorder ranges from 20% to 30%.[9] Meanwhile, it's worth highlighting that the rate among the young population is at 21.5%, significantly higher than that of the general population.[9] Apparently, digital hoarding has emerged as a pervasive psychological phenomenon and behavioral challenge among the contemporary youth. However, the unchecked accumulation of redundant digital items can consume significant user energy,[10] weaken information-processing effectiveness,[11] and adversely affect the work, life and mental health of individuals.[12,13]

Although researchers have endeavored to understand this extreme form of digital obsession from diverse perspectives, there are still several gaps in the current research: (1) Compared to physical hoarding, research on digital hoarding is limited. Studies in this area are relatively fragmented, mechanisms of action remain unclear, and a strong theoretical foundation is lacking. (2) Most exploratory studies of digital hoarding have used semi-structured interviews and focus groups, relying primarily on subjective qualitative methods. While these methods have yielded some insightful academic observations, existing research has yet to translate the complexities of qualitative analysis into intuitively structured data. (3) Existing research has been predominantly based on the perspectives of disciplines such as library science or information management, showing that digital hoarding behavior is influenced by technologies,[14] information,[15] and emotions.[16] Few studies have approached digital hoarding among young adults from a social-psychological perspective, particularly neglecting the influence of peer group comparison and fear of missing out (FoMO) on individual digital data acquisition behavior. Currently, social media provide a lot of opportunities for social comparisons, and therefore, young people may promote possible concerns about being excluded or missing others' rewarding experiences and valuable information, known as Fear of Missing Out (FoMO).[17,18] Recently, an exploratory study based on grounded theory suggested that upward social comparison, associated with the "involution" phenomenon, is a significant trigger for digital hoarding behavior among the youth.[19] This means that in the current era of the ever-expanding "involution culture", the younger generation is inadvertently, and often unknowingly, caught up in this spiral, with this trend even permeating their digital ownership habits. However, "how" and "when" upward social comparison via social media influences digital hoarding behavior remains unclear.

The Individual-Environment Interaction theory posits that an individual's behavior is the result of an interaction between external circumstances and personal factors.[20] This means that digital hoarding, as a problematic behavior, may stem from the combined influence of external factors and individual characteristics. Therefore, to identify the antecedents of digital hoarding behavior, it is necessary to examine the mediating and moderating mechanisms of psychological and individual characteristics on digital hoarding behavior from a multifactorial perspective.

Considering this, the current study based on a moderated mediation model (as seen in Figure 1), aimed to contribute to the existing literature in the following ways. First, the hypothesized relation between upward social comparison via social media and digital hoarding behavior would be examined with a representative sample of adolescents in mainland China. Second, this study would use FoMO as a mediator to examine how upward social comparison via social media interacts with other factors to explain susceptibility to digital hoarding. Third, this study would be the first to investigate the effectiveness of mindfulness as a moderating variable in coping with digital hoarding behavior. Given the serious psychological, social, and academic consequences of digital hoarding for young population, the results of this study are expected to expand our understanding of the psychological mechanisms underlying digital hoarding and shed new light on the prevention and intervention of digital hoarding.

Literature and Hypothesis Development

Upward Social Comparison via Social Media and Digital Hoarding Behavior

The social comparison theory posits that, in the absence of objective standards, people have an innate tendency to compare themselves to others in order to gain an accurate assessment of their abilities and opinions.[21] In the digital age, it

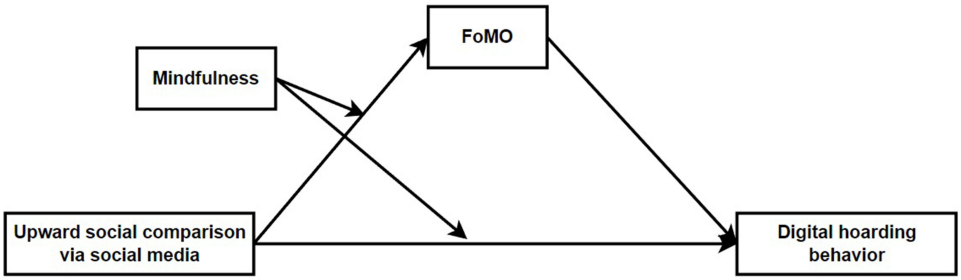

Figure 1 The hypothesized moderated mediation model.

is much easier to make social comparisons via social media.[22,23] Unlike real-world comparisons, social media comparisons are often skewed toward "upward social comparisons" due to the "positive bias" in the presentation of social media content, in which individuals often selectively present positive information and overlook negative content.[24,25] Qualitative research has shown a strong link between social comparison and digital hoarding behavior.[26]

On the one hand, Fromm[27] underscores an "ownership-centered" approach to knowledge acquisition in the modern education system, where knowledge serves as a means to increase self-worth and achieve potential future social status. Today, information, as a type of "currency", is an important source of knowledge acquisition. Individuals, driven by the need to increase competitiveness[28] and meet work and academic demands,[29] exhibit an intensified behavior of hoarding digital information. On the other hand, frequent exposure to others' digital activities, such as liking, saving, downloading, and sharing on social media, may trigger self-comparison and emulation.[30] This could drive them to accumulate more digital resources they deem important, thereby making them more resistant to deleting digital items.[31] Consequently, the hoarding motivation triggered by upward social comparison via social media may intensify digital hoarding behavior. Based on the above theoretical analysis, Hypothesis 1 was proposed in this study.

Hypothesis 1: Upward social comparison via social media can positively predict digital hoarding behavior.

The Mediating Role of Fear of Missing Out (FoMO)

Self-Determination Theory is a macro-level theory used to explain human motivation and behavior.[32] The theory posits that each individual has an innate need for development that encompasses three fundamental psychological needs: autonomy, competence, and relatedness.[33] Thus, self-determination refers to the process by which individuals make autonomous behavioral choices based on a comprehensive understanding of their psychological needs and external environmental information.[34] This theory provides a theoretical basis for understanding the concept of FoMO. Przybylski was the first to incorporate Self-Determination Theory into the study of FoMO. Through this theoretical lens, he proposed that the FoMO phenomenon can be understood as self-regulatory limbo arising from situational or chronic deficits in psychological need satisfaction.[17] FoMO is reflected in people's strong desire to know what others are doing, frequent checking of their social media, and similar behaviors.[35]

As an emotional response to specific cues, FoMO may be a key factor driving digital hoarding among young adults. Empirical studies have shown that upward social comparison via social media is an antecedent of FoMO.[36] This is because upward comparison via social media can create a contrast effect.[37] Regular exposure to positive images and stories shared by others tends to unconsciously lower one's self-evaluation and self-esteem, leading to feelings of disappointment, failure, and deprivation.[38]

In addition, cognitive psychology suggests that an individual's mental state usually affects their behavior, which means that FoMO can elicit a range of cognitive and behavioral responses.[39] Existing research has confirmed that FoMO has a positive effect on an individual's information-seeking behavior.[40] This is because those who experience FoMO are highly afraid of deleting important information they have collected or worry about not saving information in a timely manner, leading to irreversible consequences.[41] We therefore made the following hypothesis.

Hypothesis 2: FoMO mediates the relationship between upward social comparison via social media and digital hoarding behavior.

Hypothesis 2a: Upward social comparison via social media can positively predict the onset of FoMO.

Hypothesis 2b: FoMO can positively predict digital hoarding behavior.

The Moderating Role of Mindfulness

The multifaceted nature of mindfulness practices makes it difficult to define.[42] Nonetheless, a widely accepted definition describes mindfulness as being able to focus in a non-judgmental fashion on in-The-moment reality, often on internal and external experiences without distraction.[43] In short, the mindfulness we are discussing refers to a self-regulated state as well as an ability to focus attention.[44] Because individuals in daily life inherently have the capacity for mindfulness, but differ in their mindfulness tendencies, mindfulness is also considered a trait unique to each individual.[45]

Mindfulness has been recognized as an important moderating variable for other factors influencing an individual's psychology and behavior.[43] According to the re-perceptual model of mindfulness, mindfulness can facilitate cognitive reappraisal.[46] That means that an individual in a state of mindfulness can rationally and objectively perceive, accept, or reinterpret his or her experiences.[47] The Mindfulness Stress Buffer Model also states that mindfulness can buffer the effects of adverse factors on individual's behaviors.[48] The protective role of mindfulness in problematic Internet use is also well-supported by a large body of research.[49,50] Thus, mindfulness may play a moderating role in the relationship between upward social comparison via social media and digital hoarding behavior. Specifically, individuals with high levels of mindfulness are often able to flexibly regulate attention on current experiences or activities. This may reduce the motivation for upward social comparison, which in turn discourages unnecessary digital hoarding. Conversely, when individuals have lower levels of mindfulness, they are more susceptible to distractions or unrelated temptations, such as excessive preoccupation with others, which may amplify the contrast effect and lead to excessive collection of digital files.

Furthermore, mindfulness helps increase positive emotions and optimistic feelings,[51] and a meta-analysis of mindfulness suggests that as the levels of mindfulness increase, there are notable improvements in an individual's psychological health and overall sense of well-being.[52] Empirical studies have shown that different dimensions of trait mindfulness can help adolescents stay away from adverse real-life scenarios and alleviate negative emotional experiences such as fear, anxiety and depression.[53,54] Therefore, as a negative reaction to environmental stress, the effect of upward social comparison via social media on FoMO may be moderated by certain personal characteristics, such as mindfulness. Based on the above theoretical analysis, we made the following hypothesis.

Hypothesis 3: Mindfulness moderates the relationships between upward social comparison via social media, digital hoarding behavior, and FoMO.

Hypothesis 3a: The direct effect of upward social comparison via social media on digital hoarding behavior in the youth population will be moderated by mindfulness.

Hypothesis 3b: The first half of the mediation effect, namely the influence of upward social comparison via social media on FoMO, will be moderated by mindfulness.

Methods

Participants and Procedure

As is well known, there are various forms of social media. To further narrow the research focus, we restricted social media to mobile-based social platforms, which primarily include applications such as WeChat, Weibo, Zhihu, and Xiaohongshu. They share the following features:[18] First, a focus on user interaction, allowing users to freely add friends, follow others, bookmark, like, and share content. Second, a variety of content types, including news, personal updates, professional articles, videos, and images. Third, the use of algorithmic systems to recommend content of interest, enhancing the user experience. Fourth, a user base consisting primarily of young adults.

There is no single standard for defining the age of the youth population. The World Health Organization defines the youth population as those between the ages of 18 and 44. However, the Central Committee of the Communist Party of China and the State Council, in their 2017 "Medium and Long-Term Youth Development Plan (2016–2025)", set the age range for youth from 14 to 35 years old. Given that the study is being conducted in mainland China, and building on previous related research, we chose to focus on the 14–35 age group to better fit the Chinese context. At the same time, this age group (14 to 35), which is curious and eager for new things and knowledge, is also the mainstream user of social media platforms. The study used convenience sampling and was distributed online through microblogs, WeChat and QQ communities, covering the entire Chinese mainland. Participants were informed in advance about the anonymity of the study.

Of the 989 questionnaires collected, 927 were valid, resulting in a response rate of 93.7%. As shown in Table 1, of these respondents, 410 were male, representing 44.2% of the total, while 517 were female, representing 55.8%. In terms of age distribution, 277 respondents were between the ages of 14 and 20, representing 29.9%; 348 were between the ages of 21 and 25, representing 37.5%; 197 were between the ages of 26 and 30, representing 21.3%; and 105 were between the ages of 31 and 35, representing 11.3% of the total. Regarding educational level: 151 participants had an education level of middle school and below, accounting for 16.3%; 198 had completed high school or vocational school, accounting for 21.4%; 369 had an collage or bachelor's degree, accounting for 39.8%; and 209 had a master's degree and above, accounting for 22.5% of the total.

Measures

Upward Social Comparison via Social Media

We utilized the Social Comparison Scale, which was developed by Gibbons and Buunk.[55] This scale was translated and revised by Chinese researchers to assess Chinese social media users' degree of upward social comparison.[56] Several previous research have demonstrated that the Chinese version has good reliability and validity.[26,30] The scale consists of 6 items and the Cronbach's alpha of the total scale is 0.89. Responses are scored on a 5-point Likert scale (1 = "strongly disagree", 5 = "strongly agree"). The total score is the sum of each item, with higher scores indicating a greater likelihood that an individual engages in social comparison with others. In order to make the measure more specific to our study, we limited the scope of comparison in the original questionnaire to "within social media". The sample items were as follows: "On social media platforms, I often compare myself to those performing better", "When things go bad, I often think of those doing better", and "When evaluating the ability to use social media, I often compare myself to those more skilled". See Appendix 1 for details. A confirmatory factor analysis was conducted on this scale, and the results indicated satisfactory structural validity: $\chi 2/df = 7.349$, RMSEA = 0.083, RMR = 0.034, GFI = 0.975, AGFI = 0.953, CFI = 0.978. The Cronbach's α for the measure in this study was 0.86.

Fear of Missing Out (FoMO)

The FoMO scale, developed by Przybylski was used to measure fear of missing out (FoMO).[17] This scale was later revised by Li et al.[57] The Chinese version consists of 8 items, divided into two dimensions: fear of missing out on

Table 1 Statistical Table of Basic Information of Effective Samples

Statistical Items	Specific Content	Statistical Value	Percentage
Gender	Male	410	44.2%
	Female	517	55.8%
Age	14–20	277	29.9%
	21–25	348	37.5%
	26–30	197	21.3%
	31–3 5	105	11.3%
Educational background	Middle school and below	151	16.3%
	High school or vocational school	198	21.4%
	College or Bachelor	369	39.8%
	Master and above	209	22.5%

information and fear of missing out on situations. The Cronbach's alpha of the total scale is 0.80. Specifically, fear of missing out on information is tied to specific details and reflects internal psychological traits, such as "I fear missing important information", "I fear that others have more rewarding experiences than I do", and "I get anxious if I can't access the latest news". Fear of missing out on situations is related to specific contexts, especially those involving interactions with others, and reflects the emotions and behaviors triggered by situations, such as "I get upset if I miss a chance to see friends", and "I get upset if I miss a planned gathering".

Due to the focus of our study on the digital information or electronic file hoarding of the youth, we omitted the situational attribute measurement factor and primarily selected the information attribute measurement factor. This resulted in the final selection of 4 items. See Appendix 2 for details. The scale uses a 5-point scoring system (1 = "strongly disagree", 5 = "strongly agree"). The total score is obtained by adding up the scores for each item, with a higher score indicating a greater level of FoMO. In this study, the CFA indicators of the FoMO scale were satisfactory: $\chi 2/df = 2.6$, RMSEA = 0.042, RMR = 0.010, GFI = 0.994, AGFI = 0.970, CFI = 0.983. The Cronbach's α for the measure in this study was 0.83. These results suggest that the Chinese version of the questionnaire in this study has acceptable reliability and validity, and meets the standards of psychometric requirements.

Mindfulness

The Child and Adolescent Mindfulness Measure (CAMM) is a commonly used tool to assess an individual level of mindfulness. It was originally developed by Greco et al[58] and later revised by Liu et al.[59] The revised version consists of 10 items, such as "I get tired of some of my thoughts", "I have trouble focusing on one thing", and "I often think about the past rather than the present". See Appendix 3 for details. The Cronbach's alpha of the total scale is 0.89. This scale often tests the presence or absence of trait mindfulness by measuring an individual's ability to stay present in the moment during daily tasks. It uses a 5-point scale (0 = "never", 4 = "always"). All items on the scale are reverse-scored, and the average score of all items is calculated. A higher score indicates a higher level of mindfulness in one's daily life. This scale has been widely used among adolescents and college students[60,61] and has shown strong reliability and validity. To further validate the applicability of the scale among Chinese youth, a confirmatory factor analysis was conducted on the measure. The results indicated satisfactory structural validity: $\chi^2/df = 6.748$, RMSEA = 0.079, RMR = 0.048, GFI = 0.948, AGFI = 0.916, CFI = 0.943. The Cronbach's α for the measure in this study was 0.87.

Digital Hoarding Behavior

Neave et al developed the Digital Behaviors Questionnaire (DBQ) to measure digital hoarding behaviors.[62] However, the questionnaire has several limitations. First, the DBQ emphasizes emotional attachment to the exclusion of other motivations. Second, it primarily targets adult participants who work on computers, overlooking the diversity within the population. Third, it focuses specifically on office documents (eg, email) and neglects the variety of digital files that exist. Based on previous studies, Wu et al[63] refined the Digital Hoarding Behavior Questionnaire (DHBQ). Since the DHBQ is more aligned with the cultural context of China, we utilized the revised version. The scale has 13 items and 3 second-order factors: "accumulation", "emotional attachment", and "work necessity". The Cronbach's alpha of the total scale is 0.87. Specifically, "Accumulation", with 3 items, reflects the individual's overt behavior of continually hoarding digital files, such as "I keep files that others might not keep". "Work Necessity", consisting of 4 items, refers to the challenges individuals face in deleting digital files for work reasons, such as "Deleting certain files might make me forget information". "Emotional Attachment", consisting of 6 items, refers to the individual's difficulty in deleting digital files due to their emotional attachment to them, such as "Deleting certain files is like losing a friend". See Appendix 4 for details. Respondents are asked to rate each item on a scale of 1 (strongly disagree) to 5 (strongly agree), with no reverse scoring. The total score is obtained by adding up the scores for each item, with a higher score indicating a greater level of hoarding. In this study, the CFA indicators of the digital hoarding behavior scale were satisfactory: $\chi 2/df = 5.507$, RMSEA = 0.07, RMR = 0.044, GFI = 0.945, AGFI = 0.920, CFI = 0.956. The Cronbach's α for the measure was 0.92.

Data Analysis

Data were processed using SPSS 26.0. First, we computed descriptive statistics and conducted Pearson correlations to examine the relationships among upward social comparison via social media, FoMO, mindfulness and digital hoarding

behavior. Second, the SPSS macro program PROCESS Model 4 and Model 8 by Hayes[64] was used to examine the mediating role of FoMO and the moderating role of mindfulness. All regression coefficients were tested using the Bootstrap method of bias correction percentile. All variables were standardized prior to formal data processing.

Results

Correlation Analysis

The mean, standard deviation and correlation coefficients of each variable are presented in Table 2. The results demonstrated significant correlations between upward social comparison on social media, FoMO, mindfulness, and digital hoarding. Specifically, upward social comparison on social media was positively correlated with FoMO ($r = 0.50$, $p < 0.01$) and digital hoarding ($r = 0.54$, $p < 0.01$). FoMO was also positively correlated with digital hoarding ($r = 0.53$, $p < 0.01$). Meanwhile, mindfulness showed significant negative correlations with upward social comparison on social media ($r = -0.49$, $p < 0.01$), FoMO ($r = -0.46$, $p < 0.01$), and digital hoarding ($r = -0.54$, $p < 0.01$).

Mediation Effect Test

Firstly, using the Model 4 (a basic mediation model) from the PROCESS in SPSS, we resampled the original sample 5000 times. While controlling for factors such as gender, age, and education level, we tested the mediating effect of FoMO in the relationship between upward social comparison on social media and digital hoarding behavior.

The results of the regression analysis (as shown in Table 3 and Table 4) revealed that upward social comparison via social media had a significant positive predictive effect on digital hoarding behavior ($\beta = 0.50$, $p<0.001$). Hypothesis 1

Table 2 Descriptive Statistics and Intercorrelations Among Variables

Variables	M	SD	1	2	3	4
1.Upward social comparison	3.50	0.74	1.00			
2.FoMO	3.00	0.82	0.50**	1.00		
3.Mindfulness	1.86	0.72	−0.49**	−0.46**	1.00	
4.Digital hoarding behavior	3.40	0.76	0.54**	0.53**	−0.54**	1.00

Note: **p <0 0.01.

Table 3 Mediator Variable (FoMO) Model

Regression Equation		Fitness Index			Significance of Regression Coefficients			
Outcome Variables	Predictor Variables	R	R^2	F	β	SE	LLCI	ULCI
Digital hoarding		0.56	0.31	103.20				
	Gender				0.11***	0.06	0.00	0.22
	Age				0.12***	0.03	0.06	0.18
	Education level				0.03	0.03	−0.03	0.09
	Upward social comparison				0.50***	0.03	0.45	0.56
FoMO		0.56	0.31	104.20				
	Gender				0.49***	0.06	0.38	0.59
	Age				−0.01	0.03	−0.07	0.06
	Education level				0.06	0.03	−0.01	0.12
	Upward social comparison				0.47***	0.03	0.41	0.52
Digital hoarding		0.63	0.40	121.07				
	Gender				−0.06	0.05	−0.17	0.04
	Age				0.12***	0.03	0.06	0.18
	Education level				0.01	0.03	−0.05	0.06
	Upward social comparison				0.34***	0.03	0.28	0.40
	FoMO				0.36***	0.03	0.30	0.42

Note: ***p <0 0.001.

Table 4 Decomposition of Total, Direct and Indirect Effects

Effect Type	Effect	BootSE	BootLLCI	BootULCI
Total effect	0.51	0.04	0.44	0.57
Direct effect	0.33	0.04	0.29	0.43
Indirect effect	0.17	0.02	0.13	0.21

was validated. Even when the mediator was introduced, the direct predictive effect of upward social comparison on digital hoarding behavior remained significant (β= 0.34, p<0.001). In addition, upward social comparison via social media significantly predicted FoMO (β= 0.47, p<0.001), and FoMO, in turn, significantly predicted digital hoarding behaviors (β= 0.36, p<0.001). Hypotheses 2a and 2b were validated.

Furthermore, the upper and lower bounds of the bootstrapped 95% confidence intervals for the direct effect of upward social comparison on digital hoarding behavior and the mediated effect of FoMO did not include 0 (see Table 4), indicating that upward social comparison not only directly predicts digital hoarding behavior, but also indirectly predicts digital hoarding behavior through the mediating role of FoMO. The direct effect (0.33) and the mediated effect (0.17) accounted for 66% and 34%, respectively, of the total effect (0.50). As a result, Hypothesis 2 was validated. The results of this study provide empirical support for the notion that upward social comparison via social media is a risk factor for digital hoarding. To date, research on the relationship between upward social comparison via social media and digital hoarding is in its nascent stage. The findings further reveal the complexity of their relationship, contributing to a deeper understanding of how social comparison via social media interacts with cognitive-emotional factors to relate to digital hoarding behavior.

Moderation Effect Analysis

Next, Model 8 in the SPSS Process (Model 8 assumes that both the first half and the direct path of the mediation model are moderated, consistent with the theoretical model of this study) was used to test the moderated mediation model while controlling for gender, age, and educational attainment.

The results (see Table 5 and Table 6) showed that when mindfulness was included in the model, upward social comparison via social media significantly and positively predicted FoMO (β=0.37, p<0.001). FoMO positively predicted

Table 5 Moderated Mediation Model

Regression Equation		Fitness Index			Significance of Regression Coefficients			
Outcome Variables	**Predictor Variables**	**R**	**R^2**	**F**	**β**	**SE**	**LLCI**	**ULCI**
FoMO		0.61	0.37	90.27				
	Gender				0.43***	0.05	0.32	0.53
	Age				−0.04	0.03	−0.10	0.02
	Education level				0.06*	0.03	0.00	0.11
	Upward social comparison				0.37***	0.03	0.31	0.43
	Mindfulness				−0.22***	0.03	−0.28	−0.16
	Upward social comparison × Mindfulness				−0.10***	0.02	−0.15	−0.06
Digital hoarding		0.67	0.45	109.22				
	Gender				−0.08	0.05	−0.18	0.02
	Age				0.09**	0.03	0.03	0.15
	Education level				0.02	0.03	−0.04	0.07
	Upward social comparison				0.26***	0.03	0.20	0.32
	FoMO				0.27***	0.03	0.21	0.33
	Mindfulness				−0.27***	0.03	−0.33	−0.21
	Upward social comparison × Mindfulness				−0.05*	0.02	−0.09	−0.01

Notes: *p < 0.05, **p <0 0.01, ***p <0 0.001.

Table 6 Conditional Effects of the Predictor Considering the Moderator = M ± SD

	Mindfulness	Effect	BootSE	BootLLCI	BootULCI
Direct effect	M-1SD	0.31	0.04	0.23	0.39
	M	0.26	0.03	0.20	0.32
	M+1SD	0.21	0.03	0.14	0.28
Indirect effect	M-1SD	0.13	0.02	0.09	0.17
	M	0.10	0.02	0.07	0.14
	M+1SD	0.07	0.02	0.04	0.11

digital hoarding behavior (β=0.27, p<0.05). Moreover, upward social comparison on social media also positively predicted digital hoarding (β=0.26, p<0.001).

At the same time, the interaction between upward social comparison and mindfulness had a significant negative predictive effect on both digital hoarding behavior and FoMO (digital hoarding behavior: β=−0.05, p<0.05; FoMO: β=−0.10, p<0.001), suggesting that mindfulness not only moderated the direct effect of upward social comparison via social media on digital hoarding behavior but also moderated the predictive influence of upward social comparison on FoMO.

To better illustrate the moderating effect, simple slope plots were generated at different levels.

As illustrated in Figure 2, for individuals with low mindfulness (M-1SD), upward social comparison via social media significantly positively predicted digital hoarding behavior (β=0.31, p < 0.001), whereas for individuals with high mindfulness (M+1SD), although upward social comparison still positively predicted digital hoarding behavior, its predictive power was somewhat diminished (β=0.21, p < 0.001). The result means that the predictive effect of upward social comparison via social media on digital hoarding behavior tends to gradually decrease as an individual's level of mindfulness increases (see Table 6). Therefore, Hypothesis 3a was supported.

From Figure 3, among participants with low mindfulness (M-1SD), there is a significant positive relationship between upward social comparison on social media and FoMO (β=0.48, p < 0.001). For those with high mindfulness (M+1SD), the upward social comparison on social media still predicted FoMO, but the relationship was weaker (β=0.27, p < 0.001). This implies that as a person's mindfulness increases, the effect of upward social comparison via social media in predicting FoMO tends to lessen. Hypothesis 3b was supported.

Across the three levels of mindfulness, the mediating effects of FoMO on the relationship between upward social comparison on social media and digital hoarding behavior, along with their 95% confidence intervals, were 0.13[0.09, 0.17], 0.10[0.07, 0.14], and 0.07[0.04, 0.11], respectively. This suggests that as the levels of mindfulness increase, the mediating role of FoMO between upward social comparison via social media and digital hoarding behavior progressively weakens. And up to this point, Hypothesis 3 was validated.

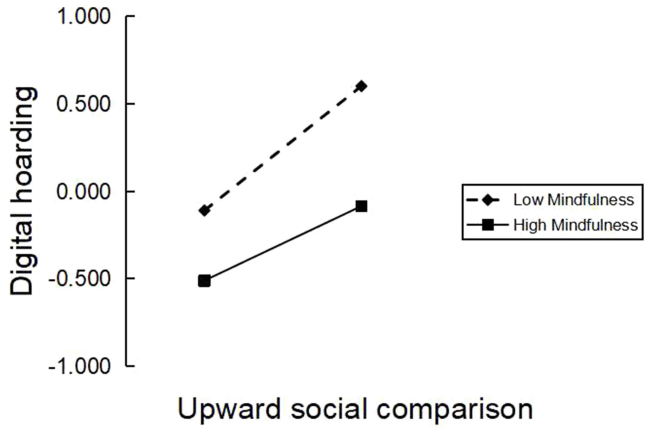

Figure 2 The effect of the two-way interaction between upward social comparison via social media and mindfulness on digital hoarding behavior.

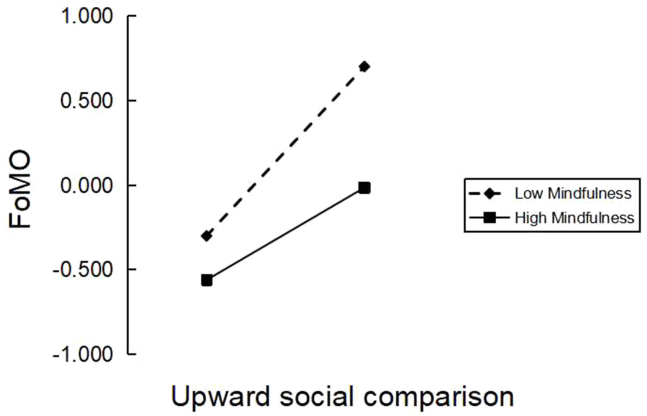

Figure 3 The effect of the two-way interaction between upward social comparison via social media and mindfulness on FoMO.

The study is the first to introduce mindfulness as a moderating variable and evaluate its effectiveness in reducing psychological distress and problematic behavior caused by upward social comparison via social media. These findings are significant for interventions and prevention of impulsive or compulsive possession among youth in the mobile social media era.

Discussion

This study developed a moderated mediation model of upward social comparison via social media and digital hoarding behavior among young adults. It was found that (1) upward social comparison via social media and digital hoarding behavior were positively related; (2) FoMO mediated the relationship between upward social comparison via social media and digital hoarding behavior; and (3) mindfulness moderated the direct relationship and the first segment of the pathway in the mediated model.

The Mediation of FoMO

This study identified the mediating role of "fear of missing out" (FoMO) in the relationship between upward social comparison via social media and digital hoarding behavior. Specifically, the research further confirmed that an increased focus on peer groups is increasingly becoming a driver of information acquisition for young users. The more one focuses on others, the greater the demand and desire for digital assets or items, such as saving countless articles for later reading, downloading multiple apps, or keeping tabs open indefinitely. This comparison also leads to an increased unwillingness to miss out on vital data and information, making individuals more susceptible to FoMO. In order to satisfy this psychological need, people have to invest a considerable amount of time and energy in constantly gathering various pieces of information. Ultimately, they fall into a vicious cycle of comparison-anxiety-hoarding that is difficult to break out of.

Consistent with previous research,[36,65] the current study found that upward social comparison via social media positively predicts FoMO. According to social comparison theory, a high propensity for social comparison could lead to negative psychological reactions, particularly psychological distress and anxiety.[66] Upward social comparison via social media can lead individuals to develop a cognitive pattern in which their psychological needs feel unmet, which further generates emotional responses of fear and anxiety to others' digital traces or cues, such as their friends may be in a more advantageous position or have accumulated more information resources. In contrast, when individuals do not frequently engage in upward social comparison, they may experience lower levels of negative emotions and potentially have more time and energy for offline experiences, thereby reducing the desire and frequency to accumulate digital items.

Additionally, this study provides empirical validation for the conclusions of prior qualitative research.[15] It confirms that Fear of Missing Out (FoMO) acts as a predictor of digital hoarding behavior. Younger people with a higher level of FoMO have a strong sense of urgency and uncertainty. Faced with the sheer volume of digital resources, they struggle to

immediately recognize their value. To maintain an edge on social media, they often choose to indiscriminately store information rather than evaluate its utility, ultimately leading to digital hoarding behavior. Feelings of "anxiety" or "just in case" often serve as barriers that prevent participants from deleting digital information.[16,67] This study presents distinct findings compared to existing research. In contrast to prior studies,[26] it reveals that Fear of Missing Out (FoMO) serves as a partial mediator. This suggests that upward social comparison through social media does not solely lead to digital hoarding behavior via negative emotions. Rather, it can also directly function as a proximate factor contributing to problematic behavior. The findings are also supported by social cognitive theory. According to social cognitive theory, people's behaviors are reactions to both external circumstances and internal factors, which offers a robust theoretical framework for understanding the intricate mechanisms behind digital hoarding behaviors.

The significant mediating effect of FoMO highlights that, whereas previous generations may have hoarded physical items due to scarcity, modern individuals may hoard digital assets out of social comparison and fear of missing out on relevant information. In the current era of heightened social competition and knowledge anxiety, most young people hoard digital content with optimistic expectations and intentions. They hope to fully exploit and utilize the hoarded digital materials in the future, aiming to improve their skills and gain strategic advantages, similar to the so-called "involution" phenomenon in mainland China. In reality, however, due to procrastination and a lack of action, they habitually accumulate excessive digital files and neglect to organize and learn from them. This creates a vicious cycle of recurring anxiety over and over again, making it difficult for them to thrive healthily in the digital age and foster personal growth. The compulsive need to collect and store digital content can become overwhelming, so it is important for individuals to recognize the psychological mechanisms that drive the behavior and potentially limit their exposure to triggers such as social media overuse, excessive comparison, and anxiety.

The Moderation of Mindfulness

This study examined the moderating role of mindfulness in the relationship between upward social comparison via social media, FoMO, and digital hoarding behavior. Specifically, compared to individuals with lower levels of mindfulness, both the direct effect of upward social comparison via social media on digital hoarding behavior and the mediating role of FoMO are weaker among young people with higher levels of mindfulness. These findings suggest that there are individual differences in the psychological mechanisms behind digital hoarding behavior and also reveal how mindfulness plays a protective role by modulating the effect of cognitive mechanisms on individual psychology and adaptive behavior. We can explain it from the following aspects.

First, when considering the essence of mindfulness, individuals in a mindful state can better focus on the present moment without comparing themselves to others or worrying about the future. Upward social comparison via social media tends to trigger a craving for digital items/objects, leading individuals to act against their true needs and acquire them in excess. However, people with high mindfulness have a greater ability to regulate or control their mental processes, so they are better able to allocate their attention to their current experience[68] and focus more effectively on what they should be doing in the present moment. This reduces the negative influence of upward social comparison via social media on their attention, thereby reducing the motivation to focus on and emulate others. This is consistent with previous research showing that mindfulness can positively influence an individual's cognitive performance and behavioral adaptation,[69] and is one of the key predictors of rational thinking.[70]

Second, these findings also support the cognitive-emotional-behavioral flexibility enhancement mechanism of the mindfulness re-perception model. The cognitive-emotional-behavioral flexibility supplementary mechanism posits that consciously and non-judgmentally focusing attention on the present moment is a process of de-automating and disentangling psychological content (eg, thoughts, emotions, and sensations).[46] This form of attentional processing, also known as "re-perception", promotes cognitive and emotional flexibility while reducing automatic behavioral responses.[71] "re-perception" helps individuals evaluate themselves more objectively, and respond to both internal and external disturbances, enabling them to accept diverse experiences more openly.[43] Therefore, young individuals with high mindfulness can more easily tolerate and process the negative emotions stemming from upward social comparison via social media, preventing external stimuli or peer pressure from interfering with daily work, life, and study, especially social media use behaviors, which in turn reduces the likelihood of overaccumulation of digital objects.

Finally, the beneficial role of mindfulness in fostering an individual's psychological resources may also be a contributing factor. Relevant studies have shown that mindfulness can increase levels of hope, enhance psychological resilience, and strengthen self-efficacy.[72] Hope, psychological resilience, and self-efficacy are all important psychological resources, and the more mental and emotional resources one has, the better equipped one is to cope with various stresses.[73] Positive psychology also emphasizes that an individual's positive strengths can alleviate the negative psychological or behavioral effects.[74] Therefore, the adverse effects of upward social comparison may be mitigated in youths with higher levels of mindfulness, possibly due to their greater internal psychological resources.

Discussion of Implications

This study provides new perspectives and evidence for understanding the emerging concept of digital hoarding.

For one, through empirical analysis, this research uncovers potential reasons for digital hoarding among young social media users. As a pathological behavior, digital hoarding may be influenced by a variety of factors. While existing research has primarily focused on the relationship between hoarding and information, technology, or individual interests, there is a dearth of studies examining the coherent or chained effects of social cognition and psychological distress on digital hoarding from the micro perspective of the Individual-Environment Interaction theory. This study, grounded in social comparison theory, explored the role of upward social comparison via social media in predicting digital hoarding risk. To some extent, it broadened the theoretical research horizon and enriched the foundational theories in the field of digital hoarding behavior.

Secondly, because the research on digital hoarding behavior is a relatively new field, there is a need for a deeper understanding of the psychological mechanisms behind the behavior. This finding bridges the gap between psychological processes and observable digital behaviors, suggesting that the more individuals compare themselves to others on social media, the more they might feel the urge to hoard digital content, fueled by FoMO. That is, ineffective imitation and competition among peer groups on social media can lead to psychological imbalances that subsequently result in disordered information acquisition behavior characterized by continuous accumulation and difficulty deleting. This finding further enriches our understanding of the cognitive and emotional dimensions and provides some inspiration and structural support for future empirical research and theoretical model exploration.

Lastly, this research underscores the importance of digital well-being programs, helping young users understand the impact of their online behaviors and equipping them with strategies to break the cycle. Interventions focusing on fostering mindfulness can also serve as a buffer, as demonstrated by the study, helping individuals become more present and reducing the urge to constantly compare and hoard. Individuals can engage in intervention training and daily practice, such as Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT). These practices help change harmful cognitive patterns,[69] emotional responses,[75] and stress coping tactics,[76] ultimately elevating their level of mindfulness.[52] This is an important insight for researchers, educators, and parents alike. Parents and teachers need to support the cultivation of mindfulness traits in adolescents through group therapy sessions and other interventions. Only then will it be possible to reduce mindless imitation and internal friction among peers and improve their skills in organizing and systematically storing digital files. Moreover, social media platforms should consider minimizing cues that encourage social comparisons, such as the "saved by x friends" label on WeChat, to discourage excessive upward comparisons.

Limitations and Future Direction

Like many studies, this one has its limitations. For example, the self-report nature of the measures and the cross-sectional design limit causal inference. Future research could incorporate experimental manipulations and longitudinal tracking to further investigate whether such hoarding behavior is transient, situationally episodic, or a long-term behavioral habit shaped by upward social comparison and FoMO. In addition, in terms of our sample selection, this study focused on young adults, so the generalizability of our conclusions requires further validation. In the future, when selecting survey participants, we should consider social media users from a broader age range to further evaluate our current findings. In the meantime, it may also be beneficial to examine cultural differences in digital hoarding. Future research should aim to conduct cross-cultural comparative studies among social media users from different countries or contexts. This will help

us explore whether there are differences in digital hoarding behaviors among young people from different cultural backgrounds.

Conclusion

The research reveals the psychological mechanism and individual differences that lead to excessive hoarding of digital resources by youth groups. The results show that upward social comparison via social media not only directly affects digital hoarding, but also indirectly leads to digital hoarding through the mediating variable of FoMO. Meanwhile, the indirect and direct relations between upward social comparison via social media and digital hoarding behavior, mediated by FoMO, will vary from person to person. Mindfulness, as an individual trait and a self-regulatory ability, is a vital force in promoting positive psychological states and alleviating adverse behaviors. Mindfulness not only mitigates the effect of upward social comparison on digital hoarding, but it also has a moderating effect on the mediation process of "upward social comparison via social media - FoMO - digital hoarding behavior". The findings have certain theoretical and practical implications for furthering research on the relationship between upward social comparison and individual psychological and behavioral maladjustment, as well as for providing guidance to adolescents on how to use social media wisely and promote their optimal psychosocial health.

Data Sharing Statement

The data that support the findings of this study are available on request from the corresponding author.

Ethics Statement

The studies involving human participants were reviewed and approved by the Scientific Research Ethics Committee of School of Media and Communication, Shenzhen University. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments. The participants provided their online informed consent to participate in this study. Parents of all participants under 18 years of age also signed an online informed consent form describing the purpose, method, process, and publication plan of the study.

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Disclosure

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