

# Creative Art Engagement as a Protective Resource against Digital Overload: The Roles of Emotion Regulation and Psychological Resilience in University Students' Mental Health

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## Article

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# Abstract

## Introduction:

This study examines university students' mental health from a risk–resource perspective by considering digital overload as an emerging psychological risk and creative art engagement as a potentially protective resource.

## Methods

A cross-sectional survey was conducted among 478 university students in China. Digital overload, creative art engagement, emotion regulation, psychological resilience, and mental health were assessed using self-report measures. Structural relationships and indirect effects were examined using path analysis and bootstrap mediation analysis.

## Results

Digital overload was negatively associated with mental health ( $\beta = -0.211, p < 0.001$ ), whereas creative art engagement was positively associated with mental health ( $\beta = 0.177, p < 0.001$ ) and emotion regulation ( $\beta = 0.311, p < 0.001$ ). Emotion regulation and psychological resilience significantly mediated the association between creative art engagement and mental health. The sequential indirect effect through emotion regulation and psychological resilience was also significant ( $\beta = 0.022, 95\% \text{ CI } [0.012, 0.035]$ ). The final model explained 26.5% of the variance in mental health. Art/design students additionally reported higher levels of creative art engagement, emotion regulation, psychological resilience, and mental health than non-art/design students.

## Discussion

The findings support a risk–resource perspective on mental health in digital environments. Creative art engagement may represent an accessible non-clinical resource associated with better mental health through strengthened emotion regulation and psychological resilience.

## Introduction

Digital technologies have become deeply embedded in university students' academic, social, and personal lives. Smartphones, social media, online learning platforms, and other digital tools provide rapid access to information, facilitate communication, and expand opportunities for learning and social connection (1). At the same time, intensive and continuous digital engagement has introduced new challenges to students' psychological functioning. Excessive screen exposure has been associated with poorer mental health, impaired sleep quality, and adverse academic outcomes among university

students (2), while problematic patterns of digital engagement may also contribute to self-isolation and difficulties in maintaining psychological well-being (3). More recent research has therefore moved beyond the amount of technology use alone and emphasized digital well-being as a multidimensional condition involving behavioral balance, emotional functioning, perceived control, self-regulation, and digital dependence (4). In online educational environments, students are additionally required to process large volumes of information, manage multiple digital tasks, and maintain continuous interpersonal and academic connectivity, increasing their exposure to information overload and technology-related demands (5). These developments suggest that the psychological consequences of digitalization should be understood not only in terms of specific devices or platforms but also in terms of the cumulative demands placed on individuals by increasingly complex digital environments.

Digital overload represents one manifestation of these cumulative demands. From the perspective of Conservation of Resources (COR) theory, psychological stress emerges when individuals experience actual or threatened losses of valued resources or when substantial resource investment fails to produce sufficient resource gains (6). Continuous information processing, frequent digital interruptions, simultaneous communication demands, and persistent connectivity may consume attentional and emotional resources, leaving individuals with fewer resources available for recovery and adaptive functioning. This resource-based perspective is particularly relevant to university students, whose digital demands often coexist with academic, interpersonal, and future-oriented pressures. Recent evidence from college populations has demonstrated that psychological resilience can operate as an important resource linking stress exposure with subsequent anxiety-related outcomes (7), while digital competence and supportive resources may facilitate stronger adaptation to technology-intensive learning environments (5). Consequently, understanding mental health in the digital era requires attention not only to emerging risks such as digital overload but also to the resources that may enable individuals to restore depleted psychological capacities and maintain well-being.

Creative art engagement may represent one such resource. Engagement in creative activities encompasses active forms of artistic expression such as drawing, painting, music, photography, design, dance, crafts, and other creative practices. A substantial interdisciplinary literature has linked arts engagement with psychological and social processes relevant to health and well-being (8, 9). Population-based evidence has further shown that participation in receptive and creative cultural activities is associated with favorable indicators including perceived health, life satisfaction, and lower levels of anxiety and depression (10). Among university populations, engagement in arts and creative activities has also been described as a means of maintaining mental well-being during periods of substantial social disruption and restricted everyday routines (11). Within psychiatric research, art has been conceptualized as a medium for emotional expression, communication, engagement, and the promotion of mental health awareness (12). Longitudinal evidence additionally suggests that cultural engagement may be associated with a reduced subsequent risk of depression, although such findings have primarily been established in older populations rather than university students (13). Taken together, these findings indicate that creative engagement may provide opportunities for psychological detachment, positive emotional experience, self-expression, cognitive stimulation, and restoration. However, most existing

research has examined general arts participation, cultural engagement, or structured art-based interventions rather than considering creative art engagement specifically as a psychological resource within digitally overloaded environments.

Two psychological processes may be particularly important in explaining how creative art engagement is associated with mental health: emotion regulation and psychological resilience. Emotion regulation refers to the processes through which individuals influence the emotions they experience, when these emotions occur, and how they are experienced and expressed (14). Adaptive regulation of emotional responses is central to psychological functioning, particularly when individuals face sustained demands or uncertain environments. Psychological resilience, in turn, reflects an individual's capacity to adapt successfully to stress, adversity, and changing circumstances (15). Studies of student populations increasingly demonstrate that emotion regulation and resilience are closely connected to psychological adaptation. For example, cognitive emotion regulation and resilience have been identified as mechanisms linking stressful life events with health-related outcomes among medical students (16). Research among undergraduates has similarly shown that emotion-regulation strategies can mediate associations between future-oriented anxiety and depression or stress (17). Moreover, recent chain-mediation research suggests that resilience and emotion regulation jointly contribute to adaptive coping among college students (18). Art-related research provides further support for this possibility: among university students, attitudes toward music-based therapeutic approaches have been associated with social anxiety partly through emotion-regulation processes (19), while systematic evidence indicates that structured visual art interventions can reduce depressive and anxiety symptoms in adults (20). Although creative art engagement should not be equated with clinical art therapy, these findings provide a theoretical basis for investigating whether everyday creative engagement is associated with stronger emotional regulation and resilience resources.

Despite these advances, several gaps remain. First, research on technology-related mental health has predominantly focused on adverse digital behaviors, excessive screen exposure, problematic smartphone use, or deficits in digital well-being, whereas less attention has been given to accessible non-digital resources that may coexist with and counterbalance the psychological demands of highly digitalized lifestyles. Second, although the mental-health relevance of arts and cultural engagement is increasingly recognized, limited research has situated creative art engagement within the specific context of digital overload among university students. Third, the psychological mechanisms underlying this relationship remain insufficiently understood. In particular, it is unclear whether creative art engagement is associated with mental health through the accumulation of regulatory and adaptive psychological resources, including emotion regulation and psychological resilience. To address these gaps, the present study develops a risk–resource framework grounded in COR theory to examine digital overload as a mental-health risk and creative art engagement as a potentially protective resource among university students. Specifically, the study examines the association between digital overload and mental health, evaluates the positive association between creative art engagement and mental health, and investigates the mediating and sequential roles of emotion regulation and psychological resilience. By integrating digital-era risk with creative and psychological resources, this study seeks to advance a more

balanced understanding of university student mental health that considers not only the pressures generated by contemporary digital environments but also the resources through which individuals may adapt and maintain psychological well-being.

## **Literature Review and Research Hypotheses**

### **Conservation of Resources Theory and the Risk–Resource Framework**

Conservation of Resources (COR) theory provides a useful framework for explaining how individuals respond to sustained environmental demands and how psychological resources contribute to adaptation. COR theory proposes that individuals are motivated to obtain, retain, and protect resources that they value, and psychological stress may occur when these resources are threatened, lost, or insufficiently replenished following continued investment (6). Resources can include personal capacities, psychological states, social conditions, and other assets that enable individuals to respond effectively to environmental demands. From this perspective, stress is not solely determined by exposure to external demands but also by the balance between resource depletion and resource acquisition.

This perspective is particularly relevant to contemporary digital environments. University students frequently engage with multiple digital platforms for learning, communication, entertainment, and social interaction. Continuous information processing, frequent notifications, simultaneous digital tasks, and expectations of persistent connectivity may require substantial cognitive and emotional investment. When these demands exceed individuals' available processing and coping resources, digital engagement may become a source of psychological strain. Previous research has shown that information and social overload in digital environments are associated with anxiety and other adverse psychological outcomes among university students (21). Digital overload can therefore be conceptualized as an environmental demand that contributes to resource depletion.

COR theory also emphasizes that individuals may acquire new resources that help them cope with stressful environments. Psychological and behavioral resources that facilitate emotional recovery, self-expression, adaptability, and positive functioning may be particularly important when individuals face persistent technological demands. In the present study, creative art engagement is conceptualized as a potentially restorative resource, while emotion regulation and psychological resilience represent regulatory and adaptive psychological resources. Rather than assuming that creative art engagement directly eliminates digital overload, the proposed framework suggests that students may maintain better mental health when they possess or develop resources that support psychological restoration and adaptation. This study therefore integrates a digital risk pathway and a psychological resource pathway within a unified risk–resource framework.

### **Digital Overload and Mental Health**

Digital overload refers to a condition in which the volume and intensity of digitally mediated information, communication, and interaction exceed an individual's perceived capacity to process and respond effectively. Although digital technologies provide important benefits, excessive digital demands may generate information strain, attentional fragmentation, fatigue, and emotional exhaustion. Research on social media overload has distinguished information overload from social and communication overload, demonstrating that excessive informational and interpersonal demands may generate psychological strain when individuals cannot effectively manage the volume of incoming stimuli (21, 22).

University students may be particularly exposed to such pressures because digital technologies are simultaneously embedded in their academic work, interpersonal relationships, and leisure activities. Online learning, instant messaging, social media, and mobile applications often require students to shift rapidly between tasks and maintain continuous accessibility. Smith et al. found that college students experienced digital overload in relation to extensive smartphone notifications and technology use, emphasizing the relevance of overload for mental-health-related digital behavior (23). Similarly, research among Chinese university students demonstrated that social media overload was positively associated with anxiety and that information strain partly explained this relationship (21). More broadly, technology-intensive educational environments may create psychological demands related to information overload, social isolation, and difficulty adapting to online learning conditions (5).

From the perspective of COR theory, digital overload represents a repeated demand on finite attentional, cognitive, and emotional resources. Persistent resource expenditure without sufficient recovery may increase psychological strain and reduce individuals' capacity to maintain positive mental functioning. Therefore, students who experience greater levels of digital overload are expected to report poorer mental health.

H1: Digital overload is negatively associated with university students' mental health.

## **Creative Art Engagement and Mental Health**

Creative art engagement refers to active participation in artistic and creative practices, including drawing, painting, photography, music, design, dance, crafts, calligraphy, and other forms of creative expression. Unlike passive media consumption, creative engagement generally requires active attention, personal expression, interpretation, and the production or performance of creative content. These characteristics may provide opportunities for psychological restoration, emotional expression, intrinsic enjoyment, and temporary detachment from external demands.

A growing body of evidence supports the relationship between arts engagement and mental health. Reviews of arts and health research indicate that artistic participation may contribute to psychological well-being through emotional expression, cognitive stimulation, social connection, and stress reduction (8, 9). Population-based research has also found that participation in creative and receptive cultural activities is associated with more favorable indicators of life satisfaction, anxiety, depression, and

perceived health (10). Among college students in China, Chen et al. examined arts engagement during the COVID-19 outbreak and found that higher participation in several art-related activities was associated with lower anxiety and higher psychological resilience (24). This evidence suggests that creative engagement may be particularly meaningful under conditions characterized by uncertainty and psychological stress.

From a COR perspective, creative activities may contribute to resource restoration and resource gain. Engaging in creative activity can provide experiences of mastery, autonomy, emotional expression, and positive affect, which may replenish psychological resources depleted by everyday demands. The relevance of such activities may be especially pronounced in highly digitalized lifestyles, where students spend substantial time engaged in externally directed digital tasks. Creative art engagement may therefore represent an accessible psychological resource associated with more favorable mental health, even when digital overload remains present.

H2: Creative art engagement is positively associated with university students' mental health.

## **The Mediating Role of Emotion Regulation**

Emotion regulation refers to the processes through which individuals influence the emotions they experience, when those emotions occur, and how they are experienced and expressed (14). Adaptive emotion regulation enables individuals to respond to stressful situations without becoming overwhelmed by negative affect and is therefore closely related to psychological health. Cognitive reappraisal, for example, involves changing the interpretation of an emotionally relevant situation and is generally associated with more adaptive psychological outcomes, whereas persistent maladaptive regulation may contribute to distress.

Creative art engagement may facilitate emotion regulation because artistic activities provide channels through which individuals can identify, express, reinterpret, and organize emotional experiences. Creative processes frequently involve translating internal feelings into visual, musical, bodily, or symbolic forms, thereby providing a structured context for emotional processing. Art-related activity may also enable psychological distance from stressful experiences and create opportunities for reflective reinterpretation.

Emerging empirical evidence supports this mechanism. Recent research on aesthetic education found that greater participation in aesthetic activities was associated with higher cognitive reappraisal and lower expressive suppression, with emotion regulation subsequently associated with stronger psychological resilience (25). Research among undergraduate students has also demonstrated that emotion-regulation strategies can mediate associations between psychological stressors and depression or stress, indicating that emotion regulation represents an important mechanism through which external pressures are translated into mental-health outcomes (17).

In the context of the present study, students who engage more frequently in creative artistic activities may possess greater opportunities to process and regulate emotional experiences. Improved emotion regulation may subsequently support better mental health. Therefore, creative art engagement is expected to be positively associated with emotion regulation, which in turn contributes to mental health.

H3: Creative art engagement is positively associated with emotion regulation.

H4: Emotion regulation mediates the positive association between creative art engagement and mental health.

## **The Mediating Role of Psychological Resilience**

Psychological resilience generally refers to the capacity to adapt, recover, and maintain functioning when individuals encounter stress, adversity, or significant environmental demands (15). Rather than representing the absence of stress, resilience reflects an adaptive capacity that enables individuals to mobilize internal and external resources when confronting challenging circumstances. Resilience is particularly relevant for university students because they are frequently exposed to academic pressure, changing social relationships, career uncertainty, and rapidly evolving technological environments.

Creative art engagement may contribute to resilience by providing repeated opportunities for exploration, mastery, self-expression, and adaptive engagement with challenge. Creative processes often involve uncertainty, experimentation, revision, and persistence, requiring individuals to tolerate unsuccessful attempts and generate alternative solutions. These experiences may strengthen perceptions of competence and adaptive flexibility. Evidence from Chinese college students during the COVID-19 pandemic showed that frequent engagement in digital art, music, and reading activities was associated with higher resilience (24). More recent educational research similarly suggests that aesthetic participation may enhance psychological resilience through emotional processes (25).

Higher psychological resilience is also consistently associated with more favorable psychological functioning. Resilient individuals tend to recover more effectively from negative emotional experiences and maintain adaptive functioning during periods of stress. Research among students has identified resilience as an important psychological resource related to lower anxiety and stronger adaptive coping (7, 26). Within COR theory, resilience may therefore be conceptualized as an accumulated adaptive resource that helps individuals protect psychological functioning when facing repeated environmental demands.

Accordingly, creative art engagement may contribute to mental health partly by supporting the development or maintenance of psychological resilience.

H5: Psychological resilience mediates the positive association between creative art engagement and mental health.

# Sequential Roles of Emotion Regulation and Psychological Resilience

Although emotion regulation and psychological resilience are conceptually distinct, they are closely connected. Emotion regulation represents a relatively proximal process through which individuals manage emotional responses, whereas resilience reflects a broader capacity to adapt and recover when encountering stress or adversity. Adaptive regulation of negative emotions may therefore contribute to the development and maintenance of resilience by enabling individuals to recover more efficiently from stressful experiences.

Empirical evidence increasingly supports this relationship. Research has shown meaningful links between emotion regulation and psychological resilience across student populations, and recent studies suggest that emotion-regulation processes may contribute to resilience by helping individuals manage negative affect and respond more adaptively to environmental challenges (25, 27). Research in educational contexts has further shown that emotion regulation and resilience are jointly related to student well-being and adaptive functioning (28). These findings are compatible with a resource-gain perspective in COR theory, whereby one psychological resource may facilitate the accumulation of additional resources.

Applied to creative art engagement, this logic suggests a sequential process. Participation in creative activities may first provide opportunities for emotional identification, expression, and reinterpretation, thereby strengthening emotion regulation. More adaptive emotion regulation may subsequently enhance students' capacity to recover from difficulties and maintain psychological stability, contributing to stronger psychological resilience. Resilience, in turn, may be associated with better mental health.

This sequential pathway provides a mechanism-oriented explanation for the potential protective role of creative art engagement. Rather than assuming that art participation is directly therapeutic, the model proposes that creative engagement is associated with a series of psychological resources that may support adaptive functioning in the context of contemporary digital demands.

H6: Emotion regulation and psychological resilience sequentially mediate the positive association between creative art engagement and mental health.

Based on COR theory and the hypotheses above, this study proposes a risk–resource model in which digital overload represents a mental health risk, while creative art engagement represents a potentially restorative resource. Emotion regulation and psychological resilience are further conceptualized as psychological mechanisms through which creative art engagement may be associated with better mental health. The proposed theoretical model is presented in Fig. 1.

## Methods

# Participants and data collection

This study employed a cross-sectional questionnaire design to investigate the relationships among digital overload, creative art engagement, emotion regulation, psychological resilience, and mental health among university students in China. Participants were recruited from both art/design-related and non-art/design-related academic majors to ensure variation in students' levels of exposure to and participation in creative artistic activities.

Participation was voluntary and anonymous. Before completing the questionnaire, all participants were informed of the purpose of the study, the voluntary nature of participation, the confidentiality of their responses, and their right to withdraw at any time without penalty. Only participants who provided informed consent and were currently enrolled as university students were included in the study.

After data screening, 478 valid questionnaires were retained for analysis. The final sample included 244 male students, 223 female students, and 11 participants who selected another gender category or preferred not to disclose their gender. Participants ranged in age from 18 to 28 years. Regarding academic background, 224 participants were enrolled in art/design-related majors and 254 were enrolled in non-art/design-related majors. The sample included students from different study levels, including undergraduate students from Years 1–4 and postgraduate students.

Questionnaires with substantial missing responses, obvious response patterns, or logically inconsistent responses were excluded before statistical analysis. The final dataset contained complete responses for all core measurement items.

## Measurement instruments

The questionnaire consisted of two main sections. The first section collected demographic and digital-use information, including gender, age, year of study, academic major, perceived family socioeconomic status, daily screen time, and daily social media use. The second section measured the five core constructs of the proposed model: digital overload, creative art engagement, emotion regulation, psychological resilience, and mental health.

Unless otherwise specified by the original instruments, items were assessed using a 5-point Likert scale, with higher scores representing higher levels of the corresponding construct.

## Digital overload

Digital overload was assessed using eight items measuring the extent to which participants perceived digital information, communication, and technology-related demands as exceeding their ability to process or manage them effectively. The construct reflects experiences such as excessive digital information, persistent connectivity, multiple simultaneous digital demands, and difficulty disengaging from digital environments. Higher scores indicate greater perceived digital overload. The exact source and adaptation procedure of the scale will be reported according to the original validated instrument.

# Creative art engagement

Creative art engagement was assessed using ten items reflecting participants' active involvement in creative and artistic activities. Such activities included forms of active creative expression rather than passive media consumption and may involve visual arts, music, photography, design, crafts, dance, calligraphy, and related creative practices. Higher scores indicate greater engagement in creative artistic activities.

Creative art engagement was conceptualized as a non-clinical behavioral and psychological resource rather than as participation in formal art therapy. This distinction is important because the present study examines everyday creative engagement among university students rather than therapeutic interventions administered by trained professionals.

## Emotion regulation

Emotion regulation was assessed using eight items reflecting participants' perceived capacity to understand, manage, and adaptively respond to their emotional experiences. Higher scores represent stronger emotion-regulation capacity. Emotion regulation was conceptualized as a regulatory psychological resource through which creative activities may contribute to more adaptive psychological functioning.

## Psychological resilience

Psychological resilience was measured using six items assessing participants' ability to adapt to stressful situations, recover from difficulties, and maintain psychological functioning when facing challenges. Higher scores indicate greater psychological resilience. In the proposed risk–resource framework, resilience represents an adaptive psychological resource that may support university students' mental health under demanding contemporary environments.

## Mental health

Mental health was measured using five items assessing positive psychological functioning and general mental well-being. Higher scores indicate more favorable mental health. The scoring direction was kept consistent throughout the analyses so that higher mental-health scores represented better psychological functioning.

## Data analysis

Statistical analyses were conducted in several stages. First, the dataset was screened for missing values, abnormal response patterns, and data-entry errors. Descriptive statistics were then calculated for demographic characteristics and the five major study constructs.

Second, potential common method bias arising from the use of self-reported questionnaire data was examined. Harman's single-factor test was used as an initial diagnostic, and variance inflation factors (VIFs) were additionally examined where appropriate.

Third, the reliability and validity of the measurement model were evaluated. Internal consistency was assessed using Cronbach's alpha and composite reliability (CR). Convergent validity was evaluated using standardized factor loadings and average variance extracted (AVE), while discriminant validity was assessed using the heterotrait–monotrait ratio (HTMT) and the Fornell–Larcker criterion.

Fourth, structural equation modeling (SEM) was used to test the proposed relationships among digital overload, creative art engagement, emotion regulation, psychological resilience, and mental health. Standardized path coefficients, corresponding significance levels, confidence intervals, and model explanatory power were reported. The direct negative association between digital overload and mental health and the positive resource pathway originating from creative art engagement were examined simultaneously.

Fifth, mediation effects were assessed using a bootstrap procedure with 5,000 resamples and 95% confidence intervals. Three indirect pathways were of particular interest: creative art engagement through emotion regulation to mental health, creative art engagement through psychological resilience to mental health, and the sequential pathway from creative art engagement through emotion regulation and psychological resilience to mental health. An indirect effect was considered statistically significant when its 95% bootstrap confidence interval did not include zero.

Finally, additional subgroup analyses were conducted to explore differences between students in art/design-related and non-art/design-related majors. Group differences in digital overload, creative art engagement, emotion regulation, psychological resilience, and mental health were examined. Where measurement requirements were satisfied, multi-group comparisons were further considered to assess whether the structural relationships differed between the two academic-major groups.

## **Ethical considerations**

The study was conducted in accordance with the ethical principles governing research involving human participants and with relevant institutional requirements. Ethical approval was obtained from the Research Ethics Committee of the School of Art and Design, Ningbo University of Finance and Economics (Ethics Approval No. NBUFE-SAD-REC-2026-006).

All participants were informed of the purpose and procedures of the study before participation. Participation was entirely voluntary, and informed consent was obtained from all participants prior to questionnaire completion. No personally identifying information was collected, and all responses were treated confidentially and used exclusively for academic research purposes.

## **Results**

### **Participant information**

A total of 478 valid questionnaires were included in the final analysis. Participants ranged in age from 18 to 28 years, with a mean age of 20.78 years (SD = 1.71). Among the participants, 244 (51.0%) were male

and 223 (46.7%) were female. Regarding academic background, 224 students (46.9%) were enrolled in art/design-related majors and 254 (53.1%) were enrolled in non-art/design-related majors. Detailed demographic characteristics are presented in Table 1.

Table 1  
Participant information (N = 478).

| Variable                    | Category                | N   | %    |
|-----------------------------|-------------------------|-----|------|
| Gender                      | Male                    | 244 | 51.0 |
|                             | Female                  | 223 | 46.7 |
|                             | Other/Prefer not to say | 11  | 2.3  |
| Year of study               | First year              | 119 | 24.9 |
|                             | Second year             | 126 | 26.4 |
|                             | Third year              | 104 | 21.8 |
|                             | Fourth year             | 107 | 22.4 |
|                             | Postgraduate            | 22  | 4.6  |
| Academic major              | Art/design-related      | 224 | 46.9 |
|                             | Non-art/design-related  | 254 | 53.1 |
| Family socioeconomic status | Low                     | 36  | 7.5  |
|                             | Lower-middle            | 69  | 14.4 |
|                             | Middle                  | 230 | 48.1 |
|                             | Upper-middle            | 109 | 22.8 |
|                             | High                    | 34  | 7.1  |
| Daily screen time           | < 2 h                   | 10  | 2.1  |
|                             | 2–4 h                   | 70  | 14.6 |
|                             | 4–6 h                   | 175 | 36.6 |
|                             | 6–8 h                   | 155 | 32.4 |
|                             | > 8 h                   | 68  | 14.2 |
| Daily social media use      | < 1 h                   | 47  | 9.8  |
|                             | 1–2 h                   | 127 | 26.6 |
|                             | 2–4 h                   | 219 | 45.8 |
|                             | 4–6 h                   | 71  | 14.9 |
|                             | > 6 h                   | 14  | 2.9  |

Note: Mean age = 20.78 years, SD = 1.71, range = 18–28 years.

# Common method bias

Because all core variables were collected using self-report measures, Harman's single-factor test was conducted to assess potential common method bias. Five factors had eigenvalues greater than 1, and the first unrotated factor explained 22.57% of the total variance, substantially below the commonly adopted threshold of 40%. Therefore, no serious common method bias was identified in the present dataset.

## Descriptive statistics, reliability, and correlations

Table 2

presents the means, standard deviations, internal consistency coefficients, and Pearson correlations of the five core constructs. All Cronbach's alpha coefficients exceeded 0.84, indicating satisfactory internal consistency. Digital overload was negatively correlated with mental health ( $r = -0.278, p < 0.001$ ). In contrast, creative art engagement was positively correlated with emotion regulation ( $r = 0.311, p < 0.001$ ), psychological resilience ( $r = 0.310, p < 0.001$ ), and mental health ( $r = 0.315, p < 0.001$ ). Emotion regulation and psychological resilience were also positively associated with mental health.

| Variable                         | Mean  | SD    | Cronbach's $\alpha$ | 1         | 2        | 3        | 4        | 5 |
|----------------------------------|-------|-------|---------------------|-----------|----------|----------|----------|---|
| 1. Digital Overload (DO)         | 2.940 | 0.897 | 0.894               | 1         |          |          |          |   |
| 2. Creative Art Engagement (CAE) | 3.059 | 0.831 | 0.889               | -0.051    | 1        |          |          |   |
| 3. Emotion Regulation (ER)       | 3.202 | 0.852 | 0.865               | -0.139**  | 0.311*** | 1        |          |   |
| 4. Psychological Resilience (PR) | 2.965 | 0.899 | 0.856               | -0.144**  | 0.310*** | 0.361*** | 1        |   |
| 5. Mental Health (MH)            | 3.089 | 0.938 | 0.848               | -0.278*** | 0.315*** | 0.339*** | 0.387*** | 1 |

Table 2. Descriptive statistics, reliability, and correlations among study variables (N = 478).

\*Note: \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

## Structural model and hypothesis testing

The proposed structural relationships were examined to evaluate the risk and protective-resource pathways. As shown in Table 3, digital overload was significantly and negatively associated with mental health ( $\beta = -0.211, p < 0.001$ ), supporting H1. Creative art engagement was positively associated with mental health ( $\beta = 0.177, p < 0.001$ ), supporting H2, and was also positively associated with emotion regulation ( $\beta = 0.311, p < 0.001$ ), supporting H3.

Emotion regulation was positively associated with psychological resilience ( $\beta = 0.292$ ,  $p < 0.001$ ), while psychological resilience was positively associated with mental health ( $\beta = 0.242$ ,  $p < 0.001$ ). The final model explained 26.5% of the variance in mental health.

Table 3  
Structural path coefficients and hypothesis testing.

| Hypothesis | Path                 | $\beta$ | p       | Result      |
|------------|----------------------|---------|---------|-------------|
| H1         | DO $\rightarrow$ MH  | -0.211  | < 0.001 | Supported   |
| H2         | CAE $\rightarrow$ MH | 0.177   | < 0.001 | Supported   |
| H3         | CAE $\rightarrow$ ER | 0.311   | < 0.001 | Supported   |
| —          | CAE $\rightarrow$ PR | 0.219   | < 0.001 | Significant |
| —          | ER $\rightarrow$ PR  | 0.292   | < 0.001 | Significant |
| —          | ER $\rightarrow$ MH  | 0.167   | < 0.001 | Significant |
| —          | PR $\rightarrow$ MH  | 0.242   | < 0.001 | Significant |

Note: DO, digital overload; CAE, creative art engagement; ER, emotion regulation; PR, psychological resilience; MH, mental health.  $R^2$  for mental health = 0.265.

## Mediation effects

Bootstrap analysis with 5,000 resamples was used to assess the indirect effects of creative art engagement on mental health. As shown in Table 4, all three proposed indirect pathways were statistically significant because none of their 95% confidence intervals included zero.

Creative art engagement was indirectly associated with mental health through emotion regulation ( $\beta = 0.052$ , 95% CI [0.025, 0.085]), supporting H4. The indirect pathway through psychological resilience was also significant ( $\beta = 0.053$ , 95% CI [0.027, 0.085]), supporting H5.

Most importantly, the sequential pathway from creative art engagement through emotion regulation and psychological resilience to mental health was significant ( $\beta = 0.022$ , 95% CI [0.012, 0.035]), supporting H6.

Table 4  
Bootstrap analysis of indirect effects.

| Hypothesis | Indirect pathway                                       | Standardized indirect effect | 95% CI         | Result    |
|------------|--------------------------------------------------------|------------------------------|----------------|-----------|
| H4         | CAE $\rightarrow$ ER $\rightarrow$ MH                  | 0.052                        | [0.025, 0.085] | Supported |
| H5         | CAE $\rightarrow$ PR $\rightarrow$ MH                  | 0.053                        | [0.027, 0.085] | Supported |
| H6         | CAE $\rightarrow$ ER $\rightarrow$ PR $\rightarrow$ MH | 0.022                        | [0.012, 0.035] | Supported |

Note: Bootstrap = 5,000 resamples. An indirect effect was considered significant when the 95% confidence interval did not include zero.

# Differences between art/design and non-art/design students

Additional analyses examined differences between students from art/design-related and non-art/design-related majors. As shown in Table 5, there was no significant difference in digital overload between the two groups ( $p = 0.436$ ).

However, art/design students reported significantly higher creative art engagement than non-art/design students, with a large effect size ( $d = 0.959$ ). Art/design students also reported significantly higher emotion regulation, psychological resilience, and mental health, although the corresponding effect sizes were small to moderate.

Table 5  
Differences between art/design and non-art/design students.

| Variable                 | Art/design students M (SD) | Non-art/design students M (SD) | t      | p       | Cohen's d |
|--------------------------|----------------------------|--------------------------------|--------|---------|-----------|
| Digital Overload         | 2.906 (0.917)              | 2.970 (0.879)                  | -0.779 | 0.436   | -0.072    |
| Creative Art Engagement  | 3.442 (0.745)              | 2.722 (0.754)                  | 10.470 | < 0.001 | 0.959     |
| Emotion Regulation       | 3.340 (0.815)              | 3.080 (0.867)                  | 3.386  | < 0.001 | 0.309     |
| Psychological Resilience | 3.078 (0.917)              | 2.865 (0.873)                  | 2.588  | 0.010   | 0.238     |
| Mental Health            | 3.245 (0.934)              | 2.951 (0.922)                  | 3.449  | < 0.001 | 0.316     |

Overall, the results support the proposed risk–resource framework. Digital overload was negatively associated with mental health, whereas creative art engagement was positively associated with mental health both directly and indirectly through emotion regulation and psychological resilience. The significant sequential mediation effect further suggests that emotion regulation and psychological resilience represent complementary psychological mechanisms within the protective-resource pathway.

## Discussion

## Hypothesis evaluation

The results generally supported the proposed risk–resource model. As summarized in Table 6, all six hypotheses were supported. Digital overload was negatively associated with mental health, whereas

creative art engagement was positively associated with mental health and emotion regulation. In addition, emotion regulation and psychological resilience significantly mediated the relationship between creative art engagement and mental health, and the sequential mediation pathway was also significant.

Table 6  
Summary of hypothesis testing.

| Hypothesis | Proposed relationship                                               | Main result                                    | Decision  |
|------------|---------------------------------------------------------------------|------------------------------------------------|-----------|
| H1         | Digital Overload → Mental Health (-)                                | $\beta = -0.211, p < 0.001$                    | Supported |
| H2         | Creative Art Engagement → Mental Health (+)                         | $\beta = 0.177, p < 0.001$                     | Supported |
| H3         | Creative Art Engagement → Emotion Regulation (+)                    | $\beta = 0.311, p < 0.001$                     | Supported |
| H4         | CAE → Emotion Regulation → Mental Health                            | Indirect effect = 0.052, 95% CI [0.025, 0.085] | Supported |
| H5         | CAE → Psychological Resilience → Mental Health                      | Indirect effect = 0.053, 95% CI [0.027, 0.085] | Supported |
| H6         | CAE → Emotion Regulation → Psychological Resilience → Mental Health | Indirect effect = 0.022, 95% CI [0.012, 0.035] | Supported |

Overall, these results indicate that university students' mental health can be understood through two complementary pathways: a risk pathway characterized by digital overload and a protective-resource pathway characterized by creative art engagement, emotion regulation, and psychological resilience.

## Digital overload as a mental health risk

H1 was supported, indicating that higher digital overload was associated with poorer mental health. This result is consistent with previous studies showing that excessive information, communication demands, and continuous digital connectivity are associated with anxiety, depressive symptoms, and psychological strain among university students (29–31).

From the perspective of Conservation of Resources theory, continuous digital demands may consume attentional and emotional resources and reduce opportunities for psychological recovery. Digital overload should therefore be understood not simply as extensive technology use, but as a condition in which digital demands exceed an individual's perceived coping capacity. This finding reinforces the need to consider digital overload as an emerging mental-health risk in highly digitalized university environments.

## Creative art engagement as a protective resource

H2 and H3 were both supported. Students with higher levels of creative art engagement reported better mental health and stronger emotion regulation. These findings are consistent with previous research

showing positive associations between arts engagement, aesthetic education, creative activities, and psychological wellbeing among university students (33–37).

The present findings suggest that creative art engagement may provide students with opportunities for emotional expression, attentional restoration, intrinsic enjoyment, and experiences of mastery. Importantly, creative art engagement did not eliminate digital overload itself. Rather, it appeared to constitute an additional positive psychological resource within a digitally demanding environment.

Therefore, the term protective resource in the present study refers to a positive resource pathway associated with better mental health, rather than a statistical moderation effect in which creative art engagement directly weakens the relationship between digital overload and mental health.

## **Emotion regulation and psychological resilience as mechanisms**

H4, H5, and H6 were supported, confirming that emotion regulation and psychological resilience significantly mediated the association between creative art engagement and mental health. Creative activities may help students process and regulate emotions more effectively, while stronger emotion regulation may further support psychological resilience and adaptive functioning (38–42).

The significant sequential mediation effect suggests that the association between creative art engagement and mental health is partly explained by the accumulation of regulatory and adaptive psychological resources. From a Conservation of Resources perspective, creative engagement may therefore support mental health by strengthening emotion regulation and resilience rather than by directly reducing digital overload.

## **Differences between art/design and non-art/design students**

Art/design students reported significantly higher levels of creative art engagement, emotion regulation, psychological resilience, and mental health than non-art/design students, while no significant difference was observed in digital overload.

The largest difference occurred in creative art engagement, which is reasonable given the greater exposure of art/design students to creative practice. However, the higher levels of emotion regulation, resilience, and mental health should be interpreted cautiously. Previous research has shown both positive psychological benefits of arts education (35, 36) and substantial stress among fine-arts students (43).

Therefore, the present results do not demonstrate that studying an art/design major directly improves mental health. Differences may also reflect creative participation, educational experiences, self-selection, or other unmeasured characteristics. Nevertheless, the findings suggest that access to and

participation in creative activities may represent a potentially important psychological resource across university populations.

## **Limitations and future research**

Several limitations should be acknowledged. First, the cross-sectional design does not permit causal conclusions; future studies should employ longitudinal or experimental designs. Second, all variables were measured using self-report questionnaires, which may introduce response bias. Third, the sample consisted of Chinese university students, limiting generalizability to other populations and cultural contexts.

Finally, creative art engagement was treated as a broad construct. Future research could distinguish among visual arts, music, photography, dance, design, and other creative activities to determine whether different forms of engagement are associated with different psychological mechanisms and mental-health outcomes.

## **Conclusion**

This study examined university students' mental health through a risk–resource perspective by considering digital overload as an emerging psychological risk and creative art engagement as a potentially protective resource. The findings showed that digital overload was negatively associated with mental health, whereas creative art engagement was positively associated with mental health and was further linked to better outcomes through emotion regulation and psychological resilience.

The significant mediating and sequential effects suggest that creative art engagement may support mental health by strengthening regulatory and adaptive psychological resources rather than by directly reducing digital overload. In addition, art/design students reported higher levels of creative art engagement, emotion regulation, resilience, and mental health than non-art/design students, although these differences should not be interpreted causally. Overall, the findings highlight the importance of considering both digital-era risks and accessible psychological resources when examining university student mental health. Creative art engagement may represent a meaningful non-clinical resource for supporting adaptation and psychological wellbeing in increasingly digitalized educational environments.

## **Declarations**

## **Ethics statement**

The studies involving human participants were reviewed and approved by the Research Ethics Committee of the School of Art and Design, Ningbo University of Finance and Economics (Ethics Approval No. NBUFE-SAD-REC-2026-006). The study was conducted in accordance with the local legislation and institutional requirements. All participants provided informed consent prior to

participation. Participation was voluntary and anonymous, and no personally identifiable information was collected.

## Competing interests

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Generative AI statement

The author(s) declared that generative AI was not used in the creation of this manuscript. If you identify any issues, please contact us.

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## Author Contribution

ZW: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Visualization, Writing – original draft, Writing – review & editing.

## Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

### Author contributions statement

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Figures

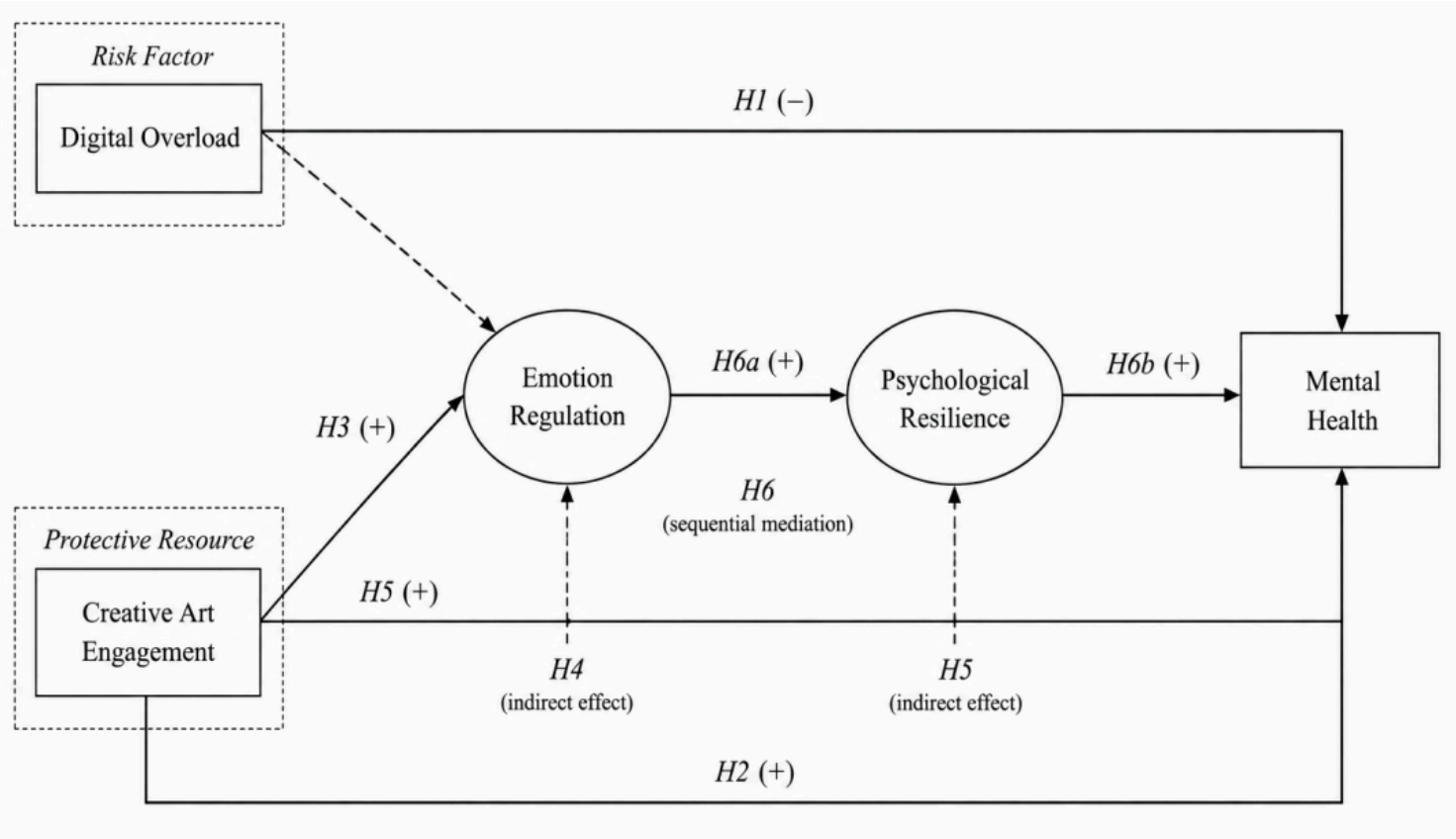
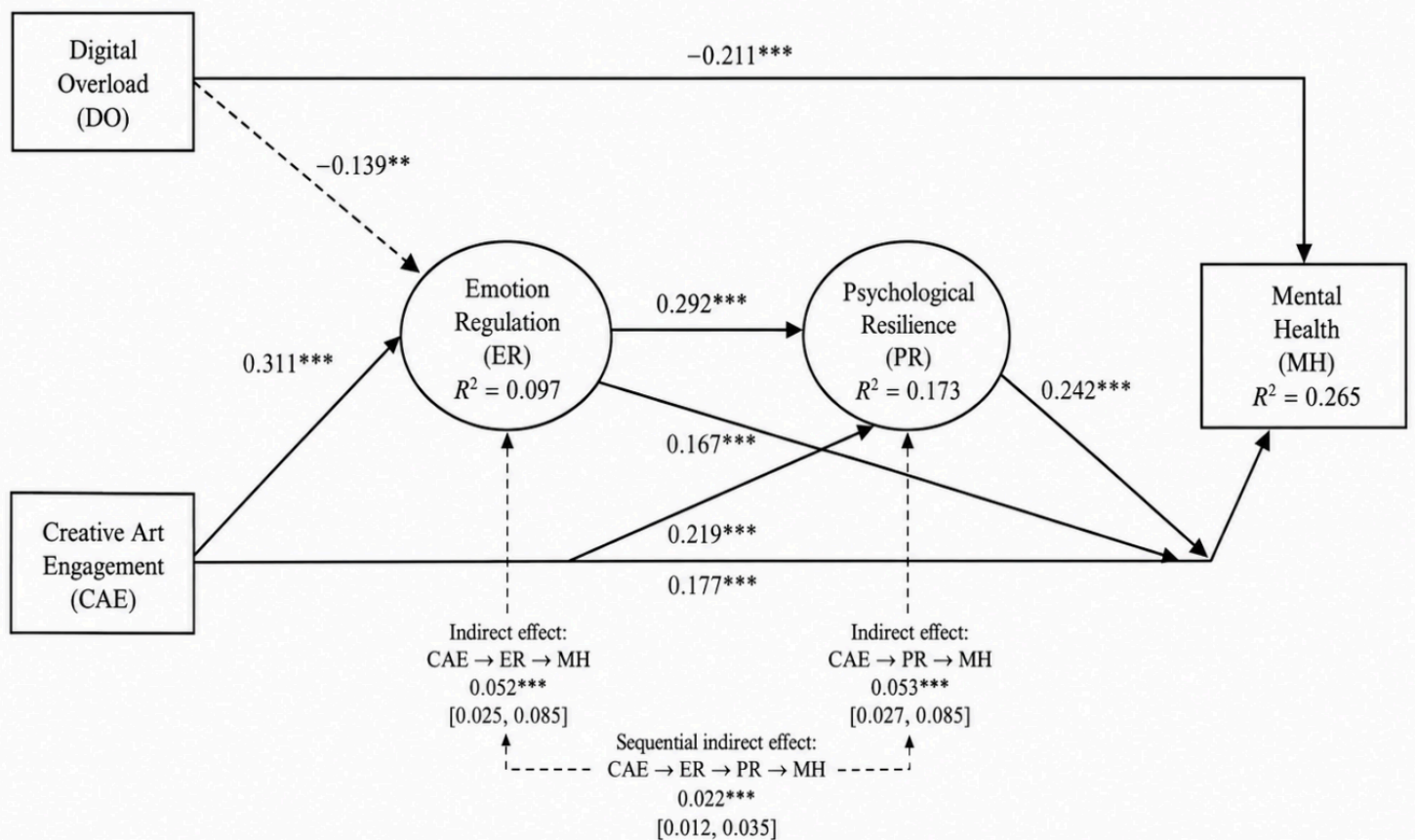


Figure 1

Proposed risk–resource model of digital overload, creative art engagement, and university students’ mental health



*Note.* Standardized path coefficients are reported. Dashed lines indicate indirect effects. Values in brackets are 95% bootstrap confidence intervals based on 5,000 resamples.  $**p < .01$ ,  $***p < .001$ .

**Figure 2**

Standardized path coefficients of the proposed risk–resource model.