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The Moderating Role of Emotion Regulation in the Relationship Between Negative Emotions and Mobile Phone Addiction Among College Students: A Literature Review

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Abstract: This literature review examines the complex relationship between negative emotions and mobile phone addiction (MPA), particularly among college students. Focusing on the interplay of stress, anxiety, depression, and loneliness, the review elucidates how these emotions contribute to an increased dependency on mobile technology. The Compensatory Internet Use Theory and Uses and Gratifications Theory provide the theoretical backdrop for understanding how individuals use mobile phones as coping mechanisms for emotional distress. Empirical evidence suggests a significant role of emotion regulation in moderator the effects of negative emotions on MPA. Adaptive emotion regulation strategies, such as cognitive reappraisal, appear effective in mitigating these effects, whereas maladaptive strategies like emotional suppression exacerbate them. The review highlights the need for targeted interventions to enhance emotion regulation capabilities and suggests areas for future research, including the necessity for longitudinal studies to explore causal relationships. This study contributes to the broader discourse on digital habits, offering insights into developing strategies for reducing MPA and promoting psychological well-being.

Keywords: Mobile Phone Addiction (MPA), Negative Emotions, Emotion Regulation, Coping Mechanisms, College Students.

1.Introduction

Negative emotions, encompassing feelings such as anxiety, depression, stress, and loneliness, are prevalent psychological experiences that can significantly impact individuals' overall well-being and behaviors[1].According to The Compensatory Internet Use Theory (CIUT), these negative emotions can reinforce and perpetuate mobile phone addiction(MPA) highlighting the complex interplay between emotional well-being and technology use[2-4]. However, the lack of deep, empirical insights into how effective emotion regulation could serve as a buffer against the exacerbation of MPA by negative emotions signifies a critical research void[5]. This Literature Review endeavor aims to enrich the conceptual landscape by providing a nuanced understanding of emotion regulation's protective capacity against MPA, especially in the face of negative emotional triggers[6]. By doing so, it seeks to contribute a valuable layer to the existing narrative concerning the emotional antecedents of digital addiction. This review not only advances academic knowledge but also provides practical insights for developing interventions to foster healthier digital habits and emotional well-being among college students.

2.Background

Mobile phone addiction refers to prolonged use of a mobile phone, inability to control the duration of mobile phone usage, and experiencing uneasiness and anxiety without a mobile phone, which negatively affects an individual's learning and interpersonal communication [7]. There are currently a lot of relevant academic papers on the global state of MPA among college students. Since different standards, methods, tools, and samples are used to measure MPA, the prevalence of MPA in this group of college students is highly diverse. Incidence of MPA among college students worldwide ranges from 6.36% to 62% [8-12], but it ranges from 17% to 30.1% among Chinese college students [13-17]. This addiction can adversely influence multiple dimensions of their existence, encompassing physical and mental well-being, scholastic achievement, quality of sleep, and even interpersonal exchanges and relationships [18-21].

Negative emotions, including depression, anxiety, stress, and loneliness, have been found to significantly influence mobile phone addiction among individuals. Depression can lead individuals to seek solace or distraction through excessive mobile phone usage as a coping mechanism. Similarly, anxiety may drive individuals to use their phones excessively as a means of reducing feelings of unease or worry[22]. Stress can also contribute to mobile phone addiction, as individuals may turn to their devices as a source of relief or distraction from stressful situations[23].Feelings of loneliness may prompt individuals to seek connection through their phones, leading to increased usage and dependency[24]. Emotion regulation, primarily viewed through the lens of James J. Gross, is defined as "an attempt to influence one's own or others' emotional experiences and expressions. This includes adjusting the occurrence and duration, psychological feelings, and behavioral responses" [25, 26]. In the field of mental health, emotion regulation often serves as a mediating or moderating variable, constraining the physical and mental health development of individuals, and affecting their learning and life. Therefore, researching college students' emotion regulation has significant theoretical and practical significance.

3. Literature Review

This section delves into the complex interplay between negative emotions such as stress, anxiety, depression, and loneliness and their influence on mobile phone addiction.

3.1 Stress and mobile phone addiction

The relationship between stress and mobile phone addiction is increasingly recognized as a significant area of concern, with various studies supporting the notion that stress often drives individuals towards mobile phone use as a coping mechanism. This behavior is largely consistent with general strain theory, which posits that stressful experiences can lead to problematic behaviors as individuals seek ways to alleviate negative emotions [27, 28].

Empirical evidence suggests a clear positive correlation between various forms of stress—including academic, emotional, and relationship stress—and increased mobile phone addiction. For example, individuals experiencing high levels of stress from academic or personal relationships are more likely to develop addictive behaviors related to mobile phone use as a form of escape or relief [29, 30]. This pattern is particularly prevalent among college students who may use their mobile phones excessively to manage stress or distract themselves from immediate stressors [30, 31].

Moreover, the relationship between stress and mobile phone addiction is often mediated by factors such as self-control and emotional awareness. Individuals with lower levels of self-control or who struggle with emotional regulation are more susceptible to mobile phone addiction when faced with stress [32, 33]. This is exacerbated by the accessibility and immediate gratification offered by mobile phones, making them a tempting option for those seeking to mitigate feelings of stress.

Research also highlights the importance of interventions that enhance self-control and mindfulness to buffer the effects of stress on mobile phone addiction. Mindfulness practices, in particular, have been shown to reduce the propensity for mobile phone addiction by improving individuals' ability to manage stress more effectively[34].

The relationship between stress and mobile phone addiction is complex and influenced by multiple psychological factors, including the individual's ability to regulate emotions and cope with stress. Interventions that target these underlying factors may be effective in reducing mobile phone addiction among those experiencing high stress.

3.2 Anxiety and mobile phone addiction

Anxiety is a common Psychological health condition that is characterized by persistent feelings of worry, fear, or apprehension [35].

Zhang et al. (2020) conducted a 3-year longitudinal study examining the prospective relationships between mobile phone dependence and mental health among Chinese undergraduate students, with a particular focus on anxiety. This study included 265 first-year undergraduate students and found that early mobile phone dependence was a significant predictor of later mental health issues,

including increased anxiety. The mediating role of college adjustment was highlighted, suggesting that better adjustment could mitigate the negative impacts of mobile phone dependence on mental health [36].

Nahidi et al. (2023) investigated the prevalence of mobile phone addiction among medical students and its relationship with depression, anxiety, and sleep quality. Their study, conducted at Mashhad University of Medical Sciences from 2019 to 2021, included 355 medical students and found that severe mobile phone addiction was significantly associated with higher anxiety, depression, and poorer sleep quality. These findings underscore the need for interventions aimed at reducing mobile phone addiction to improve mental health among medical students [37].

Pathak & Mhaske (2017) analyzed the relationship between loneliness, anxiety, and mobile phone addiction among college students aged 18 to 21 years in Pune. Using correlational and regression analyses, the study revealed that both loneliness and anxiety were positively related to mobile phone addiction, indicating that emotional distress could be a significant driver of dependence on mobile devices[38].

Parasuraman et al. (2017) studied mobile phone addiction behavior and awareness among a sample of the Malaysian population, focusing on anxiety and psychomotor issues related to mobile phone use. The study concluded that a significant portion of the population showed dependency on smartphones, which was associated with increased anxiety and awareness of mobile phone/radiation hazards [39].

Yang et al. (2019) explored whether mindfulness could moderate the relationship between mobile phone addiction and mental health problems, such as anxiety and depression, among adolescents. The study, involving 1,258 high school students in China, found that lower levels of mindfulness exacerbated the negative effects of mobile phone addiction on anxiety and depression. This suggests that mindfulness training could be an effective strategy to protect adolescents from the adverse mental health impacts of mobile phone addiction [40].

Allred & Atkin (2020) investigated the relationship between cell phone addiction and experiences of anxiety. Their online survey of 498 participants revealed that cell phone addiction was positively associated with anxiety levels, which in turn negatively impacted the willingness to engage in face-to-face communication. This study suggests that while cell phones enhance communication with distant others, they may impair the quality of direct social interactions [41].

Xiao & Huang (2022) explored the relationship between social anxiety and mobile phone addiction in college students, examining the mediating roles of regulatory emotional self-efficacy and subjective well-being. Their study indicated that social anxiety significantly influenced mobile phone addiction, with emotional self-efficacy and subjective well-being partially mediating this relationship. This highlights the complex mechanisms linking social anxiety with mobile phone use behaviors [42].

Gao et al. (2018) studied the influence of alexithymia on mobile phone addiction, with a focus on the mediating roles of depression, anxiety, and stress. Their findings showed that alexithymia significantly predicted mobile phone addiction, and that depression, anxiety, and stress mediated this relationship, emphasizing the complex interplay between emotional regulation difficulties and addictive behaviors [33].

Li et al. (2020) conducted a systematic review and meta-analysis on the correlations between mobile phone addiction and anxiety, depression, impulsivity, and sleep quality among college students. They found weak-to-moderate positive correlations between mobile phone addiction and these mental health issues, confirming the pervasive impact of mobile phone use on student mental health [14].

Choksi (2021) examined the correlation between mobile phone addiction and mental health outcomes such as anxiety, depression, stress, and sleep quality among college students in Surat City. The study revealed significant correlations, indicating that high levels of smartphone addiction were associated with increased anxiety and other negative mental health outcomes[43].

The available literature underscores a complex interplay between anxiety and mobile phone addiction, where anxiety not only leads to increased mobile phone use but excessive use further heightens anxiety, forming a problematic cycle. Effective management of mobile phone use and interventions that address both anxiety and behavioral addiction are crucial for breaking this cycle and improving mental well-being.

3.3 Depression and mobile phone addiction

Depression is a mental disorder that affects a person's mood, thoughts, and behavior, leading to feelings of sadness, worthlessness, and hopelessness. In recent years, there has been growing concern about the potential impact of Depression on mobile phone addiction.

Elhai executed a systematic review assessing the association between anxiety, depression psychopathology, and smartphone use. From an initial pool of 117 citations sourced from academic databases, 23 papers were peer-reviewed, focusing on the statistical interplay between standardized metrics of problematic smartphone use and psychopathology severity. The review discerned that anxiety consistently correlated with problematic use, albeit with small effect sizes. Moreover, depression severity exhibited a robust association with problematic smartphone use, reflecting medium to large effect sizes[44].

In a subsequent investigation by Elhai et al., the mediating role of Fear of Missing Out (FOMO) between depression, anxiety, and Problematic Smartphone Use (PSU) severity was explored. Engaging 1034 Chinese undergraduate participants through an online survey, the study measured variables including smartphone use frequency, PSU, depression, anxiety, and FOMO. The findings posited FOMO as a pivotal element elucidating the association of certain psychopathologies, like anxiety, with PSU[4].

When Matar Boumosleh & Jaalouk probed the individual contributions of depression and anxiety to smartphone addiction levels among Lebanese university students. Post confounder adjustments, both depression and anxiety emerged as distinct positive predictors of smartphone addiction[45].

Demirci et al. delved into the relationship between smartphone use intensity, sleep quality, depression, and anxiety among university students. The study revealed that participants with elevated smartphone usage exhibited higher depression, anxiety, and daytime dysfunction scores compared to their low-use counterparts. This suggests a potential link between excessive smartphone use, depression, anxiety, and compromised sleep quality [46].

El-Sayed Desouky & Abu-Zaid conducted a cross-sectional analysis on Saudi university students to discern the relationship between smartphone addiction, depression, and trait anxiety. The study highlighted smartphone addiction as a prevalent concern among the cohort, correlating with depression and trait anxiety[47].

Although the above studies show that mobile phone addiction behavior is related to mental distress such as anxiety and depression. However, it is still necessary to theoretically explain the relationship between Negative Emotions (including anxiety and depression) and Internet media use (including mobile phone use and mobile phone abuse).

A well-known theory of mass communication is the Uses and Gratifications Theory (UGT), which asserts that people use various media platforms to suit various needs and that socio-demographic and psychological traits can influence how people use media[48]. For example, a lonely person may turn to the media to meet their social needs. According to UGT, which is related to MPA, people who are anxious may use or even abuse their mobile phones and other media that support Internet technology applications to reduce their anxiety[44].

A study, which was conducted with Participants (N = 347), recruited through Amazon’s Mechanical Turk (MTurk) in the USA, investigated assessed relations between PTSD symptom clusters and problematic smartphone use[49]. According to the findings, among people who have experienced trauma, problematic smartphone use is most frequently linked to arousal and negative affect. problematic smartphone uses in trauma-exposed people who exhibit more severe negative cognitive and mood changes (NACM) and arousal symptoms.

Individuals experiencing NACM severity may react impulsively by excessively using their smartphones to mitigate their painful negative emotional states.

It has also been discovered in study of Lee et al [50] that using smartphones to combat social anxiety among materialists can result in smartphone addiction. This could be as a result of the option to avoid direct face-to-face communication offered by smartphones and the Internet. For materialists with social anxiety, using a smartphone has been seen as a secure means of communicating with others while reducing the possibility of social threats and the anxiety that goes along with them.

Additionally, Compensatory Internet Use Theory (CIUT) appears to make the connection between psychopathic symptoms and excessive Internet use more explicit[3]. According to CIUT, a lot of people try to lessen the stress brought on by unpleasant emotions by using the Internet excessively after going through stressful life events (such as mobile phone addiction). Of course, people can also abuse drugs, alcohol, etc. to accomplish similar goals, but due to their practicality and accessibility, mobile phones may now be the most popular items[44].

This theory has been used in some studies to show that anxiety or depression severity is more often the cause of mobile phone addiction behavior than the result of it.

In a study conducted in China, the influence of depression, anxiety, and stress on the association between college students' alexithymia and mobile phone addiction was explored[33]. The findings indicated that individuals with alexithymia exhibited compromised emotional cognition, leading to deficits in emotional regulation, processing, concentration, and a diminished ability to process and assess information. As a result, they struggle to cope in stressful situations, which makes negative emotions like depression and anxiety worse. Communication is necessary in order to let these negative emotions out. Users are drawn to the virtual world by mobile phones' accessibility and convenience, as well as their social media platforms, games, and other entertainment features. These individuals may resort to these digital platforms as a surrogate means to address real-life challenges, seeking a semblance of gratification. This predisposition amplifies the propensity for mobile phone addiction among college students.

A similar study conducted by Long et al [51] found that an appropriate predictor was found to be the intensity of emotional symptoms (depression and anxiety). In fact, the study revealed a link between anxiety and depression and a variety of addictive behaviors, such as substance misuse and behavioral addiction, pointing to possible shared risk factors between these two emotional disorders and addictive behaviors. According to study's presumptions, it's conceivable that PSU is used as a means of escaping from depressive or anxious feelings, which could have the impact of easing them and favor the start of addictive patterns of usage.

Drawing from the interpersonal theory, individuals with pronounced mobile phone addiction often neglect face-to-face social engagements, leading to compromised interpersonal ties and eroded social support systems. This, in turn, precipitates elevated instances of anxiety and depression [52]. Notably, there exists evidence indicating that psychopathology can also contribute to the development of mobile phone addiction. Individuals grappling with anxiety and depression frequently employ mobile phones as a coping mechanism to alleviate negative emotions [53, 54]. Given this bidirectional causal association, it is plausible to suggest that mobile phone addiction and psychopathology may establish a detrimental cycle, mutually reinforcing the negative impact of one another.

3.4 Loneliness and mobile phone addiction

Ya-li, Sen, & Yu (2020) conducted a meta-analysis to examine the relationship between loneliness and mobile phone addiction. Analysing 131 studies with 73,543 participants, they found a moderate positive correlation between loneliness and mobile phone addiction. This study underscores the compensatory use of the internet, where individuals may turn to mobile phones to alleviate feelings of loneliness[55].

Kara et al. (2020) explored the relationship between loneliness and smartphone addiction among students studying at the faculty of sports

sciences. The study found a statistically significant positive correlation between loneliness and all sub-dimensions of smartphone addiction, reinforcing the link between social isolation and mobile phone dependence[56].

Diao et al. (2022) investigated the mediating role of mobile phone addiction in the relationship between loneliness and anxiety among Chinese medical students. Their findings indicated that mobile phone addiction partially mediated this relationship, and the mediating effect was stronger for boys than girls, suggesting gender-specific intervention strategies might be necessary [57].

Li et al. (2021) explored the mediating effects of boredom proneness and self-control on the relationship between loneliness and mobile phone addiction among college students. The study found that loneliness, boredom proneness, and lack of self-control were significantly correlated with higher levels of mobile phone addiction[58].

Yalcin et al. (2020) investigated the effect of smartphone addiction on loneliness levels and academic achievement among Generation Z high school students. Their study, conducted during the 2018-2019 academic year, included 490 students and utilized the Smartphone Addiction Scale and UCLA Loneliness Scale. Findings indicated a positive relationship between smartphone addiction and loneliness levels, with a negative correlation with academic achievement, suggesting the detrimental effects of excessive smartphone use on both social and academic aspects of adolescents' lives [59].

Xu (2017) analysed the relationship among phone addiction, social anxiety, and loneliness in high school students through a psychological empirical study involving 220 students in Beijing. The results revealed that about 18% of the students were addicted to phones, and those addicted experienced a higher sense of loneliness. The study highlights the need for schools to implement measures to limit mobile phone use among students to help reduce loneliness and dependency on phones [60].

Zhang et al. (2022) examined the relationship between loneliness and mobile phone addiction in Chinese college students, focusing on the mediating role of negative affect and the moderating effect of perceived stress. The study involved 359 students and found that loneliness was significantly associated with a risk for mobile phone addiction. The mediation analysis highlighted that negative affect fully mediated this association, and the moderated mediation analysis indicated that this relationship was stronger under high perceived stress levels. This study underscores the complex interplay of emotional states and environmental stressors in the relationship between loneliness and mobile phone addiction, suggesting the importance of comprehensive strategies to address these issues in educational settings [61].

The relationship between loneliness and mobile phone addiction is well-documented across various studies, demonstrating that loneliness often drives individuals to increase their mobile phone usage as a way to alleviate feelings of social isolation.

3.5 Negative Emotions and mobile phone addiction

The synthesis of research on the effects of negative emotions on mobile phone addiction illuminates a crucial pathway by which emotional distress significantly increases dependency on mobile technology. Studies robustly demonstrate that stress, anxiety, depression, and loneliness can predispose individuals to heightened mobile phone use, which in turn, can aggravate these negative emotional states [33, 44]. This relationship highlights a concerning cycle where mobile phones, while providing a temporary escape from emotional discomfort, may actually deepen the user's psychological distress over time.

Notably, the research draws attention to mechanisms such as the fear of missing out (FOMO) and compensatory internet use, which are particularly influential in the context of depression and social anxiety [44, 62]. These findings emphasize the complex interplay between mobile phone addiction and negative emotional triggers, suggesting that mobile phone use as a coping strategy can lead to a maladaptive cycle of increasing reliance and emotional degradation.

However, the landscape of existing research is complicated by significant methodological limitations, including a reliance on cross-sectional designs that can only establish correlations rather

than causation, and the use of self-reported data that may not fully capture the nuances of an individual's emotional and behavioral patterns. These limitations underscore the imperative need for more rigorous longitudinal studies that can elucidate the causal relationships between negative emotions and mobile phone addiction.

This research gap highlights the necessity of this study, which aims to further dissect these relationships through a comprehensive, methodologically sound approach that could potentially inform targeted interventions. By understanding the specific ways in which negative emotions influence mobile phone addiction, we can develop more effective strategies to combat this growing issue. Such interventions are crucial not only for reducing mobile phone addiction but also for addressing the underlying emotional disturbances that contribute to this dependency.

In light of these findings, it becomes evident that addressing mobile phone addiction requires an integrative approach that encompasses psychological health support and digital literacy. By focusing on both the emotional triggers and the addictive behaviors, interventions can be more holistically designed to improve mental health and well-being, particularly in vulnerable populations like adolescents and young adults who are most affected by these issues [37, 59]. The necessity of this research is thus to provide empirical data that can guide the development of such comprehensive intervention programs, emphasizing the importance of tackling both the symptoms and the root causes of mobile phone addiction.

3.6 Emotion Regulation in the Relationship Between Negative Emotions on Mobile Phone Addiction

Gong & Liu (2023) investigated the effects of mobile phone addiction on sleep quality among Chinese college students, emphasizing the mediating role of anxiety and the moderating role of emotion regulation strategies such as cognitive reappraisal and expressive suppression. The study revealed that anxiety mediated the relationship between mobile phone addiction and poor sleep quality, while cognitive reappraisal negatively moderated, and expressive suppression positively moderated, the relationship between mobile phone addiction and anxiety. These findings underscore the complex interplay of emotion regulation in the context of mobile phone addiction[63].

Jeeyoung Lim (2018) conducted a study to explore the mediating effect of maladaptive cognitive emotion regulation strategies and negative affect on the relationship between perceived stress and smartphone addiction in adults. This research involved 300 adults who were assessed for perceived stress levels, maladaptive cognitive emotion regulation strategies, negative affect, and smartphone addiction tendencies. The findings indicated that perceived stress directly influences smartphone addiction. Moreover, negative affect was found to mediate this relationship, suggesting that the emotional response to stress plays a crucial role in the development of smartphone addiction. This study provides valuable insights into the psychological mechanisms linking stress and smartphone usage, highlighting the importance of addressing negative emotions to mitigate smartphone addiction risks [64].

J. Elhai et al. (2018) conducted a study investigating how emotion regulation relates to depression, anxiety, and stress resulting from imagined smartphone and social media loss. The research involved 409 university students who completed surveys assessing their emotional reactions to hypothetical scenarios of losing access to their smartphones or social media platforms. The study used various scales, including the Depression Anxiety Stress Scales (DASS) and the Difficulties in Emotion Regulation Scale (DERS), to measure emotional responses. Results showed that individuals with poor emotion regulation skills reported higher levels of depression, anxiety, and stress when faced with the loss of digital communication tools. This study emphasizes the critical role of adaptive emotion regulation strategies in mitigating negative psychological outcomes associated with smartphone dependence [65].

Velotti et al. (2021) examined the effects of loneliness during the COVID-19 pandemic on internalizing symptoms such as depression, anxiety, and stress, with a particular focus on the role of emotion dysregulation as a mediator. The study

involved 350 adults who completed online surveys measuring loneliness, internalizing symptoms, and emotion regulation capabilities. Results indicated that loneliness significantly predicted higher levels of internalizing symptoms, and that emotion dysregulation partially mediated this relationship. This study emphasizes the importance of enhancing emotion regulation skills to alleviate the psychological distress caused by loneliness, particularly during the stressful conditions of a pandemic [66].

Yue et al. (2021) analyzed the relationships between negative emotions and smartphone addiction among college students, identifying different levels of addiction severity through latent class analysis. The research surveyed 1,000 students to assess their emotional states and smartphone use behaviors. Three distinct addiction severity classes were identified, with depression and boredom found to be strong predictors of belonging to the high-risk class. The study underscores the significance of emotion regulation in mitigating the severity of smartphone addiction, suggesting targeted interventions for high-risk groups [67].

Wang et al. (2021) explored how perceived stress impacts smartphone addiction among medical students, examining the mediating role of negative emotions and the moderating role of psychological capital. The study included 600 medical students who responded to measures of stress, smartphone addiction, negative emotions, and psychological capital. Findings suggest that enhancing psychological capital could buffer the effects of negative emotions induced by stress, thereby reducing the propensity for smartphone addiction. This research points to the protective role of psychological capital in buffering against the negative impacts of stress on mental health and addiction behaviors [68].

Samaha & Hawi (2016) explored the relationships among smartphone addiction, stress, academic performance, and life satisfaction in a sample of 300 college students. This study particularly focused on how perceived stress affects these variables, with findings indicating that stress not only increases the risk of smartphone addiction but also mediates the relationship between addiction and reduced life satisfaction. The researchers used path analysis to delineate the directions and strengths of these relationships, finding that better emotion regulation could potentially buffer the negative impacts of smartphone addiction on academic performance and overall life satisfaction[31].

Miquel Tortella-Feliu et al. (2010) examined the relationships between negative affectivity, emotion regulation, and symptoms of anxiety and depression in a large sample of adolescents (n=1441). Their study utilized structural equation modeling to analyze how emotion regulation acts as a mediator between negative affectivity and psychological symptoms. The findings showed that poor emotion regulation skills significantly contributed to higher anxiety and depression, indicating that adolescents with high negative affectivity are particularly vulnerable to these psychological issues if they cannot regulate their emotions effectively. This study underscores the importance of developing robust emotion regulation strategies to protect adolescents from the adverse mental health outcomes associated with high negative affectivity [69].

4.Discussion

Emotion regulation in the above literature plays a key mediating role in the relationship between negative emotions and mobile phone addiction. The following is a detailed analysis of why emotion regulation as a regulator is justified in this study, supported by related research.

4.1 Adaptive vs. Maladaptive Emotion Regulation Strategies:

Emotion regulation significantly influences how individuals manage negative emotions, which in turn affects their mobile phone usage. Adaptive strategies, such as cognitive reappraisal, allow individuals to reframe their negative emotional experiences in a way that reduces their emotional impact, decreasing the reliance on mobile phones for emotional relief. On the other hand, maladaptive strategies like emotional suppression increase reliance on external sources such as mobile phones to manage unresolved negative emotions. This increases vulnerability to mobile phone addiction. The study by Gong & Liu (2023)

exemplifies this by showing that cognitive reappraisal can lessen anxiety related to mobile phone use, thereby mitigating its impact on sleep quality. Conversely, expressive suppression, a maladaptive strategy, exacerbates anxiety, worsening sleep quality and increasing dependence on mobile phones [63].

4.2 Emotion Regulation's Impact on Psychological Outcomes

Effective emotion regulation can buffer the psychological impact of imagined or real loss of access to mobile phones or social media, which are often used as digital coping mechanisms. When individuals are unable to regulate their emotions effectively, they may experience heightened levels of stress, anxiety, and depression, leading to an increased use of mobile phones to seek comfort or escape. This is demonstrated in the research by J. Elhai et al. (2018), where poor emotion regulation skills were linked with higher levels of depression, anxiety, and stress in scenarios involving the loss of digital communication tools. This highlights how dependency on mobile phones for emotional management can lead to increased vulnerability to addiction [65].

4.3 Moderating Effects of Emotion Regulation Across Demographics

The moderating effects of emotion regulation on the relationship between negative emotions and mobile phone addiction are observed consistently across different demographic groups, including adolescents, college students, and adults. This suggests that regardless of age or life stage, the ability to regulate emotions can significantly influence mobile phone usage habits. The findings of Tortella-Feliu et al. (2010) and Wang et al. (2021) illustrate that adolescents and medical students with better emotion regulation skills exhibit lower levels of anxiety and depression, which correlates with reduced mobile phone addiction. These studies advocate for the enhancement of emotion regulation skills to mitigate the impact of negative emotions on mobile phone addiction [68, 69].

5. Conclusion

This literature review has critically explored the nexus between negative emotions and mobile phone addiction (MPA), underpinned by a robust theoretical and empirical framework. Notably, the review underscores the pervasive influence of stress, anxiety, depression, and loneliness in fostering a dependency on mobile technology, a phenomenon that not only escalates these negative emotional states but potentially deepens psychological distress over time. This bidirectional causality points to a problematic cycle where individuals increasingly rely on mobile phones as a coping mechanism for emotional discomfort, thus perpetuating and exacerbating their psychological issues.

Central to mitigating this cycle is the role of emotion regulation, which has emerged as a crucial moderator in the relationship between negative emotions and MPA. Studies such as those by Gong & Liu (2023) and Elhai et al. (2018) highlight how adaptive emotion regulation strategies, like cognitive reappraisal, can significantly lessen the emotional triggers that lead to excessive phone use. Conversely, maladaptive strategies such as emotional suppression have been shown to aggravate these triggers, leading to poorer mental health outcomes and increased MPA[63, 65].

The implications of these findings are multifaceted. Firstly, they signal a pressing need for interventions aimed at enhancing emotion regulation skills among individuals prone to MPA, particularly college students who are shown to be at a heightened risk. These interventions could include targeted therapy sessions focusing on adaptive emotion regulation techniques, mindfulness training, and educational programs that foster greater digital literacy and healthier digital habits.

Furthermore, the review identifies a gap in longitudinal research that can more definitively ascertain the causal relationships between emotional regulation, negative emotional triggers, and MPA. Future studies should strive to address these methodological limitations by employing longitudinal designs that can tease apart the temporal dynamics of these relationships.

The insights garnered from this literature review not only contribute to a deeper understanding of the psychological underpinnings of mobile phone addiction but also underscore the critical

importance of addressing the emotional and behavioral facets of this modern digital dilemma. By fostering better emotion regulation and understanding the psychological drivers of MPA, we can better equip individuals to manage their digital interactions in ways that promote rather than undermine their mental health and well-being**.**

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