

Different facets of impulsivity in problematic social media use

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Abstract. Problematic Social Media Use (PSMU) has been increasingly linked to impulsivity, yet most prior research has treated impulsivity as a unitary construct and relied primarily on self-report questionnaires. Few studies have examined whether PSMU is differentially associated with distinct facets of impulsivity, specifically cognitive and motor impulsivity, using both self-report and behavioural paradigms. The present study addressed this gap by examining the relationship between PSMU and both cognitive and motor impulsivity in 71 university students (91.5% female; $M_{age} = 22.4$, $SD = 2.49$). Participants completed the Bergen Social Media Addiction Scale (BSMAS) and the Barratt Impulsiveness Scale (BIS-11), and performed two behavioural tasks: the Balloon Analogue Risk Task (BART), indexing cognitive risk-taking impulsivity, and the Stop Signal Task (SST), indexing motor inhibitory impulsivity. Pearson correlation analyses, supplemented by Bayesian analyses, showed that problematic social media use was significantly and positively correlated with trait cognitive (attentional) impulsivity as measured by the BIS-11, but not with trait motor impulsivity. Behavioural performance on the BART and SST showed no significant associations with problematic social media use, and Bayes factors provided evidence in favour of the null hypothesis for these relationships. These findings suggest that PSMU is more closely linked to attentional and decisional deficits captured by self-report measures than to risk-taking or inhibitory control performance on behavioural tasks, highlighting the multidimensional and measure-dependent nature of impulsivity in this context. The results are consistent with theoretical models such as the I-PACE framework, which emphasise the interplay between reward-driven impulsive tendencies and reflective control systems, and they point to attentional impulsivity, rather than motor inhibition, as the primary correlate of compulsive social media engagement. These findings suggest that interventions targeting attentional control and reward sensitivity may be more effective than those targeting general inhibitory control, and they underscore the need for more ecologically valid and longitudinal approaches to clarify the causal relationship between impulsivity and PSMU.

Keywords: problematic social media use, cognitive impulsivity, motor impulsivity, inhibitory control, risk-taking behaviour

1. Introduction

1.1. Problematic social media use

Social media sites, including Facebook, Instagram, and TikTok, are used by around five billion people globally [1]. The average user engages with others on these platforms for about two and a half hours every day. These interactions include actions like sending and receiving network connection requests, sharing content (such as images, text, and videos) with one's online social network, giving and receiving social feedback on shared content (likes, comments, and reactions), and comparing oneself to others. Numerous actions, such as getting a "like," give users social rewards that encourage them to use these platforms more [2]. This rewarding and reinforcing feature of social media may cause excessive and maladaptive use in certain people, which is commonly known as problematic social media use.

According to Schou and Pallesen [3], PSMU is typified by an overwhelming obsession with social media, which is motivated by a strong desire to use these platforms, frequently to the point where it interferes with other social activities, employment or education, interpersonal relationships, and even mental health and well-being. Unlike regular or recreational social media users, people with PSMU continue to use these platforms to seek planned or spontaneous gratifications even when they are experiencing psychological distress or decreased functioning [4].

According to Griffiths et al. [5], problematic social media users may exhibit symptoms similar to those of Substance Use Disorders (SUDs), including: (1) preoccupation, which involves thinking about social media constantly; (2) mood modification, where social media is used to change one's mood; (3) tolerance, where one spends more time on platforms to feel satisfied; (4) withdrawal, which involves unpleasant mental or physical states when not using social media; (5) conflict, where using social media negatively affects areas like relationships or work; and (6) relapse, which refers to the tendency to return to these platforms after trying to stop using social media.

However, it should be noted that PSMU has not yet been included in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), and there is ongoing discussion about whether or not it qualifies as an "addiction" [6]. This maladaptive social media use is therefore often referred to as "problematic," while some researchers also refer to it as social media addiction or social media use disorder. About 5% of social media users suffer from PSMU, according to a recent meta-analysis of 34,798 individuals from 32 countries [7]. Accumulating evidence suggests that PSMU is consistently associated with increased psychological discomfort, sadness, and anxiety, as well as worse mental health outcomes, such as decreased well-being and self-esteem [8].

1.2. Impulsivity

According to Chowdhury et al. [9], impulsive behaviour is defined by a propensity for swift action and a preference for automaticity and speed over control and consideration. Previous research suggests that impulsivity is a multifaceted construct that can be generally divided into two main categories: motor impulsivity and cognitive impulsivity (or decisional impulsivity in some studies) [10-12]. These dimensions are commonly assessed using behavioural tasks—delay discounting and reflection impulsivity tasks for cognitive impulsivity, and response inhibition tasks (e.g., Go/No-Go, Stop-Signal Task) for motor impulsivity [13, 14]. Cognitive impulsivity is characterised by difficulties in delaying gratification, where people tend to make snap decisions in uncertain circumstances or show a preference for immediate, smaller rewards over delayed, larger ones [9]. Conversely, motor impulsivity describes impulsive behaviours that are typified by a reduced ability to control incorrect reactions, including postponing, denying, or interrupting them. People must

be able to control their improper reactions in order to weigh the consequences of their behaviour and give more suitable responses [15].

1.3. Problematic social media use and impulsivity

Addictive behaviours are recognised to be significantly impacted by impulsivity. Impulsive people frequently have trouble controlling their actions or decisions, which is closely related to addictive behaviours [16]. Impulsivity has been reported to be a powerful predictor of both substance use disorders [17] and behavioural addictions [18]. Importantly, studies have also shown a close relationship between impulsivity and PSMU [19]. For example, people with impulsive tendencies frequently have trouble planning and managing their time, and they frequently act without thinking things through [20]. Interestingly, people who use social media excessively have similar impulsive characteristics, including poor time management, a lack of planning, and the development of social media addiction [21].

Taken together, the above-mentioned studies suggest that impulsivity is not only a contributing factor to the onset of PSMU but also plays a role in sustaining its symptoms over time. However, there is a noticeable gap in the existing literature regarding the examination of various facets of impulsivity in the context of problematic social media use. Most studies on PSMU have treated impulsivity as a general construct and mainly relied on self-report questionnaires; few studies have examined the cognitive mechanisms underlying impulsivity in individuals with PSMU. In particular, it remains unclear whether individuals with PSMU exhibit deficits specifically in cognitive impulsivity, motor impulsivity, or both.

This study seeks to address these gaps by examining both cognitive and motor impulsivity in individuals with PSMU using two established experimental paradigms: the Balloon Analogue Risk Task (BART) and the Stop Signal Task (SST) as assessments for these respective facets. Drawing on prior studies, our hypothesis posits that increased social media usage is positively associated with heightened levels of both cognitive and motor impulsivity. Specifically, we anticipate that higher engagement with social media correlates with greater cognitive impulsivity, as evidenced by increased risk-taking behaviour during the Balloon Analogue Risk Task (BART). Similarly, we expect higher engagement with social media to correlate with enhanced motor impulsivity, demonstrated by diminished inhibitory control in the Stop Signal Task (SST).

In addition, according to Wegmann et al. [22], cognitive impulsivity is expected to be more correlated with problematic social media use than motor impulsivity. The findings are expected to shed light on the multidimensional nature of impulsivity within the context of PSMU, providing a clearer understanding of how different impulsive tendencies relate to compulsive social media use. Ultimately, this research may inform the development of targeted interventions, focusing on managing specific impulsivity deficits to support healthier social media habits.

2. Methodology

2.1. Participants

A total of 71 participants were recruited for this study, with the majority being students from The University of Hong Kong. The sample consisted of 65 females (91.5%) and 6 males (8.5%). Participants' ages ranged from 18 to 35 years old ($M = 22.4$, $SD = 2.49$, $Median = 22$). Participants were recruited through online advertisements and campus flyers, targeting individuals who regularly engage in social media use (at least 2 hours per day) and have no history of neurological or psychiatric disorders. Each participant received 30 HKD as compensation upon completion of the experiment.

2.2. Materials

Bergen Social Media Addiction Scale (BSMAS): The Bergen Social Media Addiction Scale (BSMAS), developed by Andreassen et al. [23], was utilised to evaluate participants' level of social media usage. The BSMAS consists of six items, each corresponding to the six core addiction components outlined by Griffiths [24]: salience, mood modification, tolerance, withdrawal, conflict, and relapse. Participants responded to each item on a 5-point Likert scale ranging from 1 (very rarely) to 5 (very often), with higher scores indicating a greater likelihood of problematic social media use. The total score was calculated by summing the responses across all six items. The BSMAS has demonstrated strong psychometric properties, including good internal consistency and construct validity [23].

Barratt Impulsiveness Scale (BIS-11): The Barratt Impulsiveness Scale (BIS-11), developed by Patton et al. [20], was used to assess cognitive and motor impulsivity traits. The BIS-11 is a 30-item self-report questionnaire designed to capture the multifaceted nature of impulsivity as a trait. It consists of six first-order factors (attention, motor, self-control, cognitive complexity, perseverance, and cognitive instability), which are further grouped into three second-order factors: attentional impulsiveness (derived from attention and cognitive instability), motor impulsiveness (derived from motor and perseverance), and non-planning impulsiveness (derived from self-control and cognitive complexity). In this study, cognitive and motor impulsivity were indexed by the attentional impulsiveness subscale (8 items: 6, 5, 9, 11, 20, 24, 26, 28) and the motor impulsiveness subscale (11 items: 2, 3, 4, 16, 17, 19, 21, 22, 23, 25, 30). Participants rated each item on a 4-point Likert scale ranging from 1 (Rarely/Never) to 4 (Almost Always/Always), with higher scores indicating greater impulsivity. The BIS-11 has demonstrated strong psychometric properties, including good internal consistency and validity across different populations [20]. In this study, Cronbach's alpha was computed to assess the internal reliability of the subscales.

Balloon Analogue Risk Task (BART): The Balloon Analogue Risk Task (BART), developed by Lejuez et al. [25], was utilised to evaluate cognitive impulsivity in the study. Participants completed 90 trials, during which they were presented with a virtual balloon that could be inflated to earn monetary rewards. Each trial began with the balloon at its initial size, and participants had the option to press the "Enter" key to inflate the balloon or the "Return" key to bank their accumulated earnings and proceed to the next trial. With each pump, the balloon increased in size, and participants earned an additional 0.05 points per pump. However, the probability of the balloon bursting increased with each inflation, resulting in the loss of all unbanked earnings for that trial.

The task included three risk conditions, differentiated by the maximum possible number of pumps before bursting: low-risk (8 pumps), medium-risk (32 pumps), and high-risk (128 pumps). The order of these conditions was randomised across trials. Participants were given a 15-second decision window per pump attempt. Failure to respond within this timeframe led to the balloon deflating and the temporary earnings being forfeited. Throughout the task, feedback was provided through visual changes in balloon size and auditory cues, including a slot machine sound for banking earnings and a pop sound for balloon bursts. The key behavioural measures recorded included the average number of pumps per trial (excluding burst trials), total earnings, and the proportion of trials in which the balloon burst. Higher scores on these variables indicate increased decisional impulsivity in the domain of risk-taking [25].

Stop Signal Task (SST): The Stop Signal Task (SST), as developed by Logan and Cowan [26] and adapted from Lawrence et al. [27], was utilised in this study to evaluate motor impulsivity. The task involved a 15-minute session conducted on a computer with a two-button response box. During the task, participants were required to quickly press buttons corresponding to left or right arrow stimuli (left arrow = left button, right arrow = right button) on Go trials. Occasionally, Stop trials occurred (25% of the time), in which participants

were presented with an auditory stop signal (300 Hz tone) after the arrow stimuli, prompting them to inhibit their Go response. The task manipulated the difficulty of stopping by adjusting the delay between the Go and Stop signals using a tracking step function with a 50 ms step size: unsuccessful Stop trials resulted in a 50 ms decrease in the subsequent delay, while successful Stop trials led to a 50 ms increase in the delay. Participants completed five blocks of 64 trials each.

2.3. Procedure

Prior to participating in the experimental session, participants were required to complete two questionnaires: the Bergen Social Media Addiction Scale (BSMAS) and the Barratt Impulsiveness Scale (BIS-11). The entire experimental procedure lasted approximately 30 minutes. Initially, participants undertook the Balloon Analogue Risk Task (BART). They were provided with detailed instructions for the BART, which they were required to read and confirm their understanding of before commencing the task. Upon completion of the BART, participants were introduced to the Stop Signal Task (SST). Instructions were again provided, followed by a practice session consisting of 16 trials to ensure familiarity and understanding of the task. Once participants demonstrated a clear understanding of the procedures, the SST commenced. The experiment concluded after the completion of both tasks. Participants who successfully completed all components of the experiment were compensated with 30 HKD.

2.4. Statistical analysis

All statistical analyses were conducted using *R* (version 4.4.2) [28]. Prior to analysis, data were screened for accuracy, missing values, and the assumptions of normality, linearity, and homoscedasticity. Descriptive statistics were computed for all variables.

To examine the relationship between problematic social media use and different dimensions of impulsivity, a series of Pearson product-moment correlations were conducted. Specifically, correlations were computed between BSMAS scores and (1) cognitive and motor impulsivity traits from the BIS-11, (2) behavioural measures of cognitive impulsivity from the Balloon Analogue Risk Task (BART), and (3) behavioural measures of motor impulsivity from the Stop Signal Task (SST). In addition to frequentist approaches, Bayesian correlation analyses were performed to quantify the strength of evidence for or against the null hypothesis, with Bayes factors (BF_{10}) reported under medium, wide, and ultrawide priors.

For the BART, the key behavioural metrics included the average number of pumps per trial (excluding bursts) and total balloon explosions, which served as indices of cognitive impulsivity in the domain of risk-taking.

For the SST, Stop-Signal Reaction Time (SSRT) and mean Stop-Signal Delay (SSD) were analysed as indices of inhibitory control. Pearson correlations were used to explore the associations between BSMAS scores and SST performance. Additional exploratory analyses included linear regressions to test whether social media use predicted inhibitory control performance.

All statistical tests were two-tailed with an alpha level of .05 unless otherwise specified. Effect sizes (Cohen's r , d , or β) and 95% confidence intervals were reported where applicable to aid in the interpretation of the results. For Bayesian analyses, interpretations of Bayes factors were guided by Jeffreys' [29] classification scheme.

3. Results

3.1. Social media use and impulsivity trait measured by BIS-11

To investigate the relationship between social media use and different dimensions of impulsivity as measured by the BIS-11, Pearson correlation analyses were conducted. It was found that cognitive impulsivity (measured using the attentional impulsiveness subscale) exhibited a statistically significant positive correlation with social media use ($r = 0.26$, $CI_{95} = [0.032, 0.468]$, $t = 2.27$, $df = 69$, $p = 0.026$). This finding suggests that individuals who report greater social media engagement tend to display heightened trait attentional impulsiveness, which is characterised by difficulty delaying gratification and a tendency toward rapid, less deliberative decision-making. Conversely, motor impulsivity did not demonstrate a significant association with social media use ($r = 0.16$, $CI_{95} = [-0.076, 0.379]$, $t = 1.34$, $df = 69$, $p = 0.183$).

A Bayesian correlation analysis was conducted using the default prior settings in JASP (Jeffreys–Beta prior, $r = 0.333$) to quantify the relative evidence for the alternative hypothesis (that a correlation exists) compared to the null hypothesis (that no correlation exists). The analysis yielded a Bayes factor (BF_{10}) of 0.54, indicating that the data were approximately 1.85 times more likely under the null hypothesis than under the alternative. According to Jeffreys' [29] classification, this provides anecdotal evidence in favour of the null hypothesis. These results suggest that social media use is not significantly correlated with motor impulsivity. These patterns are illustrated in Figure 1, which presents the scatterplots of social media use against cognitive and motor impulsiveness scores.



Figure 1. Relationship between social media usage and impulsiveness measured by BIS-11

Note. The left panel shows the positive correlation between total social media score and the cognitive impulsiveness score ($R = 0.26$, $p = 0.026$). The right panel shows a weak positive correlation between the total social media score and the motor impulsiveness score ($R = 0.16$, $p = 0.18$).

3.2. Social media use and cognitive impulsivity measured by BART

To examine the association between social media use and risk-taking tendencies, correlation analyses were performed using performance metrics from the Balloon Analogue Risk Task (BART). As depicted in Figure 2, the results revealed no significant correlation between social media use and key risk-taking measures, including average pumps ($r = 0.066$, $CI_{95} = [-0.172, 0.296]$, $t = 0.54$, $df = 68$, $p = 0.588$) and explosion count ($r = 0.070$, $CI_{95} = [-0.166, 0.299]$, $t = 0.58$, $df = 69$, $p = 0.561$). These findings suggest that individuals with higher social media engagement do not necessarily engage in more risk-taking behaviours in this task context. Bayesian analysis further substantiated these results, with Bayes factors of 0.31 and 0.32, respectively, indicating no substantial evidence supporting a relationship between social media use and risk-taking behaviour in the BART (Figure 2).

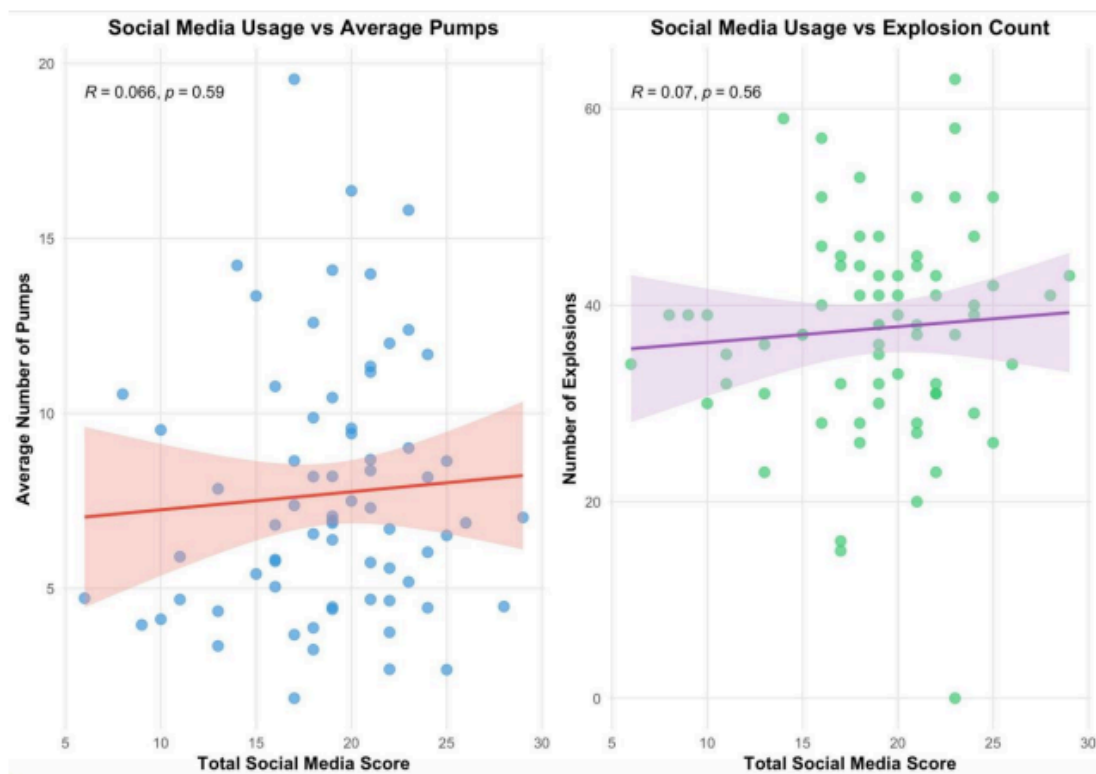


Figure 2. Correlation between social media usage and Balloon Analogue Risk Task (BART) performance

Note. The left scatter plot displays the relationship between social media usage and the average number of pumps, with a correlation coefficient (R) of 0.066 and a p -value of 0.59, indicating no significant relationship. The right scatter plot depicts the relationship between social media usage and the number of explosions, with a correlation coefficient (R) of 0.07 and a p -value of 0.56, also indicating no significant relationship.

3.3. Social media use and motor impulsivity measured by SST

To assess whether social media use is associated with inhibitory control deficits, Pearson correlation analyses were conducted using response time and Stop-Signal Delay (SSD) metrics from the Stop Signal Task (SST). As displayed in Figure 3, no significant correlations were found between social media use and either response

time ($r = 0.15$, $CI_{95} = [-0.089, 0.374]$, $t = 1.25$, $df = 67$, $p = 0.217$) or SSD ($r = 0.16$, $CI_{95} = [-0.08, 0.382]$, $t = 1.32$, $df = 67$, $p = 0.190$). These findings indicate that social media use does not appear to be significantly linked to inhibitory control impairments as measured by the SST. Bayesian analysis provided additional evidence against these relationships, with Bayes factors of 0.56 for response time and 0.61 for SSD, suggesting no substantial support for a meaningful association (Figure 3).



Figure 3. Scatterplots illustrating the relationship between social media usage and response time (left) and stop signal delay (SSD) (right)

Note. The left scatterplot shows the correlation between social media usage and average response time. The Pearson correlation coefficient (r) is 0.15 with a p -value of 0.22, indicating a non-significant positive relationship. The right scatterplot shows the correlation between social media usage and average SSD. The Pearson correlation coefficient (r) is 0.16 with a p -value of 0.19, indicating a non-significant positive relationship. The shaded areas represent 95% confidence intervals.

4. Discussion

The present study sought to examine the relationship between Problematic Social Media Use (PSMU) and different facets of impulsivity, specifically cognitive and motor impulsivity, using behavioural tasks (BART and SST) and self-report measures (BSMAS and BIS-11). The findings partially supported our hypotheses, revealing a significant positive correlation between social media use and cognitive impulsivity trait measured by the BIS-11 (attentional impulsiveness subscale), but no significant associations with cognitive impulsivity measured by the BART or with the motor impulsivity trait measured by both the BIS-11 (motor impulsiveness

subscale) and the SST. These results contribute to the growing body of literature on PSMU and impulsivity while highlighting the nuanced nature of these relationships.

4.1. Cognitive impulsivity and problematic social media use

Consistent with previous research [19, 30], our study found that higher levels of social media use were associated with increased cognitive impulsivity, as measured by the BIS-11. This aligns with theoretical models suggesting that individuals with PSMU exhibit difficulties in delaying gratification and tend to make rapid, less deliberative decisions [9]. The reinforcing nature of social media—where immediate rewards (e.g., likes, comments) are frequent and unpredictable—may condition users to prioritise short-term gratification over long-term consequences [2]. This pattern mirrors findings in substance use disorders [17] and behavioural addictions [18], where impulsivity plays a key role in compulsive engagement.

However, contrary to expectations, cognitive impulsivity as measured by the BART did not significantly correlate with social media use. This discrepancy may stem from the distinct facets of impulsivity captured by these measures. The BIS-11's cognitive impulsivity trait subscale emphasises attentional impulsivity (e.g., "I don't 'pay attention'" and "I 'squirm' at plays or lectures"), reflecting difficulties in sustaining focus or resisting distractions—a domain highly relevant to social media's constant notifications and multitasking demands [31]. In contrast, the BART assesses risk-taking impulsivity, typically in monetary contexts, which may not directly translate to the impulsive behaviours underlying PSMU [25].

This divergence underscores the multidimensional nature of impulsivity [32] and suggests that PSMU may be more closely tied to attentional lapses and reward sensitivity (e.g., craving social feedback) than to risk-taking *per se* [33]. Prior studies have similarly noted that behavioural tasks like the BART, while valid for assessing financial risk propensity, may lack ecological validity for digital behaviours [34]. Future research could employ alternative paradigms (e.g., social delay discounting tasks or ecological momentary assessment) to better capture impulsivity specific to social media use.

4.2. Motor impulsivity and inhibitory control

No significant associations were found between social media use and motor impulsivity, whether assessed via self-report (BIS-11) or behavioural task (SST). This contrasts with some prior studies suggesting that inhibitory control deficits contribute to compulsive technology use [35]. However, our findings align with research indicating that motor impulsivity may be less relevant to PSMU compared to cognitive impulsivity [21]. The lack of correlation in the SST may imply that PSMU is more strongly tied to impulsive decision-making (e.g., excessive posting or scrolling) rather than an inability to inhibit prepotent motor responses.

4.3. Cognitive impulsivity as a stronger correlate of problematic social media use

The findings of the current study align with the hypothesis derived from Wegmann et al. [22], which posited that cognitive impulsivity would exhibit a stronger correlation with Problematic Social Media Use (PSMU) compared to motor impulsivity. Our results support this prediction, revealing a significant positive association between cognitive impulsivity trait and PSMU, while no such relationship was observed for motor impulsivity. This pattern is consistent with prior research emphasising the role of attentional impulsivity in driving compulsive social media behaviours [30, 36, 37].

The heightened correlation between cognitive impulsivity and PSMU can be understood through the lens of dual-system theories [38] and the I-PACE model [39], which highlight the interplay between impulsive reward-seeking and reflective control systems. Cognitive impulsivity, characterised by difficulties in delaying gratification and a tendency toward rapid decision-making, aligns with the immediate rewards (e.g., likes and

notifications) inherent to social media platforms. These rewards may hyperactivate the amygdala-striatal system [40], reinforcing impulsive engagement with social media even when it conflicts with long-term goals. In contrast, motor impulsivity, which involves inhibitory control over physical responses, appears less relevant to the behavioural patterns typical of PSMU, such as excessive scrolling or compulsive checking.

The absence of a significant association between motor impulsivity and PSMU in our study echoes Wegmann et al.'s [22] findings, which identified attentional impulsivity as the primary driver of social-networks-use disorder symptoms, with no direct effects of general executive functions or inhibitory control. This suggests that PSMU may be more strongly tied to deficits in attention and reward processing than to motor inhibition. For instance, individuals with high cognitive impulsivity may struggle to disengage from social media due to heightened sensitivity to auditory or visual cues (e.g., notification tones), as these cues amplify impulsive approach tendencies [41].

However, our results diverge from some studies that implicate motor impulsivity in other behavioural addictions [42, 43]. This discrepancy may stem from differences in measurement tools or the specific nature of PSMU, which relies more on cognitive engagement (e.g., decision-making about content consumption) than on motor responses. Future research could further explore this distinction by employing ecological measures of impulsivity, such as real-time tracking of social media use alongside behavioural tasks.

The implications of these findings are twofold. First, interventions targeting PSMU may benefit from focusing on cognitive impulsivity, such as training individuals to delay gratification or resist immediate rewards. Second, reducing exposure to auditory and visual cues (e.g., disabling notifications) could mitigate impulsive social media use, as suggested by Wegmann et al. [22]. These strategies align with the I-PACE model's emphasis on moderating impulsive tendencies through environmental adjustments and cognitive training [39].

In summary, our study underscores the primacy of cognitive impulsivity in PSMU, supporting theoretical frameworks that prioritise reward sensitivity and attentional deficits in addictive behaviours. While motor impulsivity may play a role in other forms of impulsivity-related disorders, its limited association with PSMU highlights the need for domain-specific investigations into the mechanisms underlying problematic digital behaviours.

4.4. Measurement and conceptual considerations

One possible explanation for the null findings lies in the assessment tools used. While the Barratt Impulsiveness Scale (BIS-11) is a widely used self-report measure [20], it may not capture the specific impulsive tendencies most relevant to PSMU. For instance, social media use may be more strongly linked to delay discounting (a preference for immediate rewards) or heightened reward sensitivity [2], which were not directly assessed.

Similarly, while the Balloon Analogue Risk Task (BART) and Stop Signal Task (SST) are well-validated behavioural measures of risk-taking and response inhibition [25, 44], they may not fully capture the real-world impulsive behaviours associated with PSMU (e.g., compulsive checking or inability to resist notifications).

In addition to the impulsivity measurements, the BSMAS [23] is based on Griffiths' [24] six-component addiction model, but some researchers argue that PSMU may be better conceptualised as a compulsive habit rather than an impulsive disorder [45]. This distinction is critical because compulsivity (repetitive, rigid behaviours despite negative consequences) and impulsivity (rash action without forethought) have different neurocognitive underpinnings [46]. If PSMU is driven more by habit formation [47] or social reinforcement learning [2], traditional impulsivity measures may not detect relevant associations.

4.5. Sample characteristics and generalisability

The demographic composition of our sample—primarily young female university students (91.5%)—may also explain the null results. Research suggests gender differences in impulsivity, with women typically exhibiting lower impulsivity in risk-taking domains [48]. Additionally, university students may represent a high-functioning group with restricted variability in impulsivity compared to clinical populations [23]. Future studies should include more diverse samples, including individuals with clinically significant PSMU, to determine whether impulsivity plays a stronger role in severe cases.

4.6. Limitations

However, several limitations must be acknowledged when interpreting these results. First, the cross-sectional nature of our study precludes causal inferences; while cognitive impulsivity may predispose individuals to PSMU, it is equally plausible that prolonged social media use exacerbates impulsive tendencies through neurocognitive changes. Longitudinal or experimental designs are needed to disentangle this relationship. Second, the overrepresentation of female participants (91.5%) limits the generalisability of our findings, as gender differences in impulsivity and social media use patterns are well-documented. Future research should strive for balanced samples to explore potential gender-specific mechanisms.

Third, reliance on self-report measures for social media use introduces the possibility of recall bias, and future studies could benefit from incorporating objective usage metrics (e.g., screen-time tracking data). Finally, our laboratory-based tasks, while validated, may not fully capture the complexity of real-world social media behaviours, which are influenced by contextual factors such as mood, social pressure, and platform algorithms. Ecological Momentary Assessment (EMA) methods could bridge this gap by capturing impulsivity and social media use in naturalistic settings. Despite these limitations, our study provides a foundation for more nuanced investigations into the interplay between impulsivity and PSMU, ultimately informing more targeted and effective interventions.

5. Conclusion

The present study explored the relationship between Problematic Social Media Use (PSMU) and different facets of impulsivity, specifically cognitive and motor impulsivity, using both self-report measures (BSMAS and BIS-11) and behavioural tasks (BART and SST). The findings revealed a significant positive correlation between social media use and cognitive impulsivity, as measured by the BIS-11, suggesting that individuals with higher levels of social media engagement tend to exhibit greater difficulties in delaying gratification and making deliberative decisions. This aligns with existing literature that highlights the role of cognitive impulsivity in driving compulsive behaviours, particularly in contexts where immediate rewards, such as social media notifications, are prevalent.

However, no significant associations were found between social media use and motor impulsivity, or between social media use and risk-taking behaviours as measured by the BART. These results suggest that PSMU may be more closely tied to attentional and decisional aspects of impulsivity rather than to motor inhibition or risk-taking tendencies. The lack of correlation with motor impulsivity underscores the nuanced nature of impulsivity in the context of PSMU, emphasising that not all impulsive traits are equally relevant to problematic social media behaviours.

The study's findings contribute to the growing understanding of PSMU by differentiating the roles of cognitive and motor impulsivity. Cognitive impulsivity appears to be a more salient factor in PSMU, likely due to the immediate and reinforcing nature of social media rewards, which may exacerbate impulsive

decision-making. These insights have important implications for interventions aimed at reducing PSMU. For instance, strategies focusing on improving attentional control, delaying gratification, and reducing exposure to immediate rewards (e.g., disabling notifications) may be particularly effective.

Despite these contributions, the study has limitations, including its cross-sectional design, which precludes causal inferences, and the overrepresentation of female participants, which may limit generalisability. Future research should employ longitudinal designs, more diverse samples, and ecologically valid measures to further elucidate the causal relationships between impulsivity and PSMU. Additionally, exploring other facets of impulsivity, such as delay discounting or reward sensitivity, could provide a more comprehensive understanding of the mechanisms underlying PSMU.

In summary, this study highlights the importance of cognitive impulsivity in problematic social media use while calling for more targeted and nuanced approaches to intervention. By addressing specific impulsive tendencies, such as attentional deficits and reward-driven behaviours, it may be possible to mitigate the adverse effects of excessive social media engagement and promote healthier digital habits.

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