**The role of metacognitions and emotion recognition in problematic SNS use among adolescents**

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**ABSTRACT**

**Background and aims**:Problematic social networking sites (SNS) use is associated with important psychological problems among adolescents. Nevertheless, research on the aetiology of problematic SNS use is limited. Our aim was to investigate the role of metacognitions and emotion recognition in predicting problematic SNS use during the late adolescence period.

**Methods:** Eight hundred and sixty-one high school students were recruited for the study. Participants completed the Bergen Social Media Addiction Scale (BSMAS), the Metacognitions Questionnaire for Children (MCQ-C), and the Children’s Version of Reading the Mind in the Eyes Test (RMET).

**Results:** A stepwise multiple linear regression analysis showed that all factors of metacognitions (positive meta-worry, negative meta-worry, superstition, punishment, and responsibility beliefs, and cognitive monitoring), but not emotion recognition, independently predicted the BSMAS total score controlling for daily SNS use.

**Conclusions:** Our findings indicate that maladaptive metacognitions are associated, independently frequency of daily SNS use, to problematic SNS use among late adolescents. Interventions targeting dysfunctional metacognitions may aid adolescents who suffer from the detrimental effects of problematic SNS use.

**Keywords:** adolescence; problematic SNS use; metacognitions; emotion recognition.

**INTRODUCTION**

Social networking sites (SNS) are the online communication tools that allow users to create a public or semi-public profile, construct and view their own along with other users' online social networks, and interact with individuals in their networks (Boyd & Ellison, 2007). SNS fall under the umbrella term of "social media", which comprises apps including Facebook, Instagram, Twitter, LinkedIn, Reddit, Snapchat, Tumblr, Pinterest, TikTok and also apps such as YouTube and WhatsApp that are not always defined as SNS (Kuss & Griffiths, 2017). In addition, SNS grant users with entertainment opportunities such as listening to music, watching videos, browsing the daily news, and playing games (Orchard, et al., 2014; Shin & Shin, 2011). The use of SNS in the general population is very high, with an estimate that in year 2020 4.1 billion people worldwide use SNS (Statista, 2020).

SNS use is very widespread among adolescents, who are depicted as being more vulnerable to technological overreliance than other age groups (Valkenburg & Peter, 2011). Moderate use of SNS has been found to be associated with: greater participation in civic and political life (Boulianne, 2015), affirming the self through online profiles (Toma, 2010), increased subjective well-being of “social type” SNS users (Kim & Lee, 2011; Wang et al., 2014), and better interaction with existing friends as well as the potential of making new friends (Ellison et al., 2007; Valkenburg & Peter, 2009).

The afore mentioned studies point to the potential positive effects of adaptive SNS use. However, given that both the gratification people seek from SNS and the amount of time spent using SNS have been increasing, a debate about the problematic use of SNS has come to the fore in the scientific community (Ceranic, 2013). Problematic SNS use is defined as being overly concerned about SNS, displaying a strong motivation to log on to or use SNS, and devoting considerable amounts of time and energy to SNS use that, combined, lead to impairments in social activities, work, studies, psychological well-being, and interpersonal relationships (Schou Andreassen & Pallesen, 2014). Problematic SNS use has been found to be associated to diverse negative outcomes including: increased susceptibility to depression (Vahedi & Zannella, 2019), anxiety (Lee-Won et al., 2015), loneliness (Ndasauka et al., 2016), poor sleep quality (Vernon et al., 2015), body image dissatisfaction (Ryding & Kuss, 2020), narcissism (Casale & Banchi, 2020), deprived executive functioning (Aydın et al., 2020), cognitive failure (Marino, 2020), and lower academic performance (Glass et al., 2014). Generally, a broad combination of social, psychological, and biological dynamics underpins the emergence of addictive behaviours (Griffiths, 2005). These same dynamics can also be pertinent to problematic SNS use (Andreassen, 2015). Indeed, it is acknowledged that problematic SNS use shares common underlying aetiological pathways with other behavioural addictions, and researchers have supported the worthiness of studying this phenomenon as a standalone entity (Griffiths et al., 2014).

Several potential treatment options for alleviating the negative consequences of problematic SNS use have been proposed in the literature including self-help protocols (Grant et al., 2013; Griffiths et al., 2014; Schou Andreassen & Pallesen, 2014), cognitive-behavioural therapy (CBT) (Gupta et al., 2013; Young, 2007), motivational interviewing (Miller & Rollnick, 2012), and pharmacotherapy (Bupropion, Escitalopram, Methylphenidate) (Dell’Osso et al., 2008; Han et al., 2010). Nevertheless, the treatment outcomes of problematic SNS use are not favourable and the quest for novel treatment approaches continues (Andreassen, 2015).

The possible aetiology of problematic SNS use has been studied extensively with psychological traits such as lower self-esteem, lower general self-efficacy, higher introversion (Milošević-Đorđević & Žeželj, 2014), the need to compensate thwarted intrinsic needs (Masur et al., 2014), cognitive-emotional and cognitive-behavioural factors (Ryan et al., 2014; Turel & Qahri-Saremi, 2016), neurobiological processes (Kuss & Griffiths, 2012), and sociocultural factors (Ji et al., 2010) listed as the probable causes underlying the development of problematic SNS use. Regardless of these important endeavours to identify the causes of problematic SNS use, we still know little about the mechanisms underlying the development of problematic SNS use (Hussain & Starcevic, 2020). We suggest that two factors, still scrutinized relatively little in the current literature, may potentially be associated with problematic SNS use among adolescent populations: metacognitions and emotion recognition (ER).

**Metacognitions**

Metacognitions are beliefs about one’s cognition and internal states, and about coping strategies that impact both (Wells, 2000; 2009). Since the early 1990s a large literature base has emerged indicating the relevance of metacognitions across the spectrum of psychological disorders including schizophrenia (Aydin et al., 2016; Lobban et al., 2002), obsessive-compulsive disorder (Hermans et al., 2003), generalized anxiety disorder, panic disorder (Aydın et al., 2019; Cotter et al., 2017), and depression (Papageorgiou & Wells, 2001). Metacognitions have also been widely implicated in addictive behaviours including gambling (Caselli et al., 2018; Jauregui et al., 2016; Lindberg et al., 2011; Mansueto et al., 2016; Spada et al., 2015; Spada & Roarty, 2015), nicotine dependence (Nikčević & Spada, 2008; 2010; Nikčević et al., 2015; Spada et al., 2007), problematic alcohol use (Spada & Wells, 2005; Spada et al., 2007; Spada et al., 2015), problematic Internet use (Akbari, 2017; Casale et al., 2016; Casale et al., 2018; Caselli et al., 2020; Spada et al., 2008; Spada & Marino, 2017), problematic smartphone use (Casale et al., 2020), gaming (Spada & Caselli, 2017; Marino & Spada, 2017; Aydın et al., 2020), and problematic Facebook use (Marino et al., 2016; 2019). Recent reviews (e.g. Spada et al., 2015; Hamonniere & Varescon, 2018) have shown the ubiquity of this construct in addictive behaviours.

In broad terms, metacognitions can be separated into two factors: positive and negative. Positive metacognitions refer to the perceived benefits of engaging in a given coping strategy (e.g. rumination, gambling, etc.) as a means cognitive-affective regulation such as “If I ruminate I will be able to understand” or “gambling will distract me from worries”. Negative metacognitions concern the uncontrollability and dangers of thoughts and outcomes relating to the coping strategy employed. For example, “once I start thinking about X, I cannot stop” or “thoughts need to be controlled otherwise they will control me or cause me harm” (Marino et al., 2018). These metacognitions are thought to exacerbate negative cognitive-affective states and increase the likelihood of engaging in maladaptive coping strategies.

In an early study investigating the role of personality, motives, and metacognitions in predicting problematic Facebook use (PFU) in university students, Marino and colleagues (2016) observed that that two dimensions of metacognitions were independent predictors of PFU: negative beliefs about thoughts and cognitive confidence. The researchers argued that if an individual believes their thinking and emotional states are dangerous and overwhelming (negative beliefs about thoughts) they may be more likely to engage in PFU as a means of cognitive-affective self-regulation. In addition, they also advocated that low cognitive confidence may lead to perseverative Facebook use as a means of attempting to control for the presumed accuracy of information remembered, thus helping to reduce, albeit temporarily, ‘metacognitive dissonance’. In a second study, Marino and colleagues (2019) investigated the role of attachment and PFU in adolescents showing that the composite score of the Metacognitions Questionnaire 30 (MCQ-30; Wells & Cartwright-Hatton, 2003), which assesses five key generic metacognitions domains, predicted PFU independently of attachment style.

At present, no measures to assess metacognitions about problematic SNS for adolescents have been developed and evaluated. For the purposes of the current study, we therefore decided to employ the Metacognitions Questionnaire for Children (MCQ-C; Bacow et al., 2009) which assesses different generic metacognitions in children (it is has been developed to adapt the MCQ-30 for adolescent populations). These include beliefs about worry (positive and negative meta-worry beliefs), superstitious thinking, punishment, responsibility, and cognitive monitoring. We know from the literature that these generic metacognitions exacerbate negative affect by leading to the activation of maladaptive forms of coping (e.g. worry, rumination, avoidance, and thought suppression) which in turn increase the probability of engaging in addictive behaviours as a means of self-regulation (for a review see Spada et al., 2015; Hamonniere & Varescon, 2018). We are therefore hypothesising that the presence of such metacognitions will predict problematic SNS use as a means of cognitive-affective control.

**Emotion recognition**

ER reflects the competence for proper perception and identification of emotions that are considered vital in social interactions (El Ayadi et al., 2011; Green et al., 2008), the ability to comprehend and predict the behaviours of others, and the capacity for balancing conflicting needs in the surroundings that results in enhanced interpersonal relationships (Chronaki et al., 2015). Therefore, better ER accuracy results in stronger goal-oriented performance and workplace effectiveness (Elfenbein et al., 2007), job success (Kohler et al., 2004), improved leadership skills (Rubin et al., 2005), positive counselling outcomes for therapists (DiMatteo et al., 1979), and enhanced academic performance of children (Halberstadt & Hall, 1980). Conversely, impaired ER ability is associated with various psychiatric disorders such as schizophrenia (Balikci et al., 2018; Edwards et al., 2002), generalized anxiety disorder, and panic disorder (Aydın et al., 2019), autism spectrum disorder (Evers et al., 2015; Harms et al., 2010), bipolar disorders(Martino et al., 2011; Rocca et al., 2009), SUD (Castellano et al., 2015), and problematic SNS use among young adults (Ünal-Aydın et al., 2020).

From a theoretical standpoint, difficulties in emotion regulation may yield greater engagement in addictive behaviours as a means of extending positive emotional states (in the short-term) at the expense of developing ‘real world’ coping strategies which are associated with better emotion regulation (Estévez et al., 2017; Hormes et al., 2014). Furthermore, several researchers have acknowledged that addictive behaviours (e.g. problematic Internet use, pathological gambling) may emerge as compensatory mechanism for negative emotional states in those individuals who lack emotion regulation capability (Kardefelt-Winther, 2014; Rogier & Velotti, 2018). Data from several studies has suggested that also ER may be implicated in addictive behaviours including substance use (Ernst et al., 2010), problematic internet use (Spada & Marino, 2017), Internet Gaming Disorder (Yavuz et al., 2019) as well as problematic social media use (Ünal-Aydın et al., 2020). In these studies, it was shown that individuals who engage in addictive behaviours have poorer ability ER, particularly of negative emotions. It has been suggested (Ünal-Aydınt al., 2020) that adolescents may engage in with social media as a means of providing a rapid reward and relief from psychological distress caused by poor ER competence. We are therefore predicting that poorer ER will lead to problematic SNS use as a means of relief from psychological distress caused by this deficit.

**Aims of the Study**

Regardless of the growing importance of problematic SNS use, the aetiology of this behavioural addiction is yet to be understood. In view of the fact that SNS use is very widespread among adolescents, who are depicted as more vulnerable to technological reliance than other age groups (Valkenburg & Peter, 2011), we decided to conduct this study among an adolescent population. Our aim was to explore the relative contribution of metacognitions and ER to problematic SNS use. Metacognitions and ER have been shown to be related to, but distinct from, each other in previous research (Basile et al., 2018; Sawyer et al., 2014; Aydın et al. 2019). To the best of our knowledge, these constructs have not yet been simultaneously evaluated as predictors of problematic SNS use in any research endeavour among adolescents. To ascertain the possible overlap between these cognitive constructs in problematic SNS use, and during adolescence, may contribute to the understanding of the developmental aetiology of this complex phenomenon. Since “time spent on SNS” was acknowledged as a prominent factor in the tendency towards problematic SNS use (Wilson et al., 2010; Donnelly & Kuss, 2016), we determined to control its potential effect to provide a clearer perspective on the relationship between metacognitions, ER and problematic SNS use. We hypothesized that both metacognitions (particularly positive and negative meta-worry) and ER (particularly negative emotions) will be independently associated with problematic SNS use after controlling for frequency of daily SNS use.

**METHODS**

**Participants**

Nine hundred individuals participated in the study. All data was procured from ninth to twelfth-grade adolescent students who were enrolled in the Başakşehir Anatolian High School, Turkey. Allowances or incentives were not offered to the participants. The inclusion criterion was to be able to complete the tests/forms. The exclusion criterion was determined as the presence of any psychiatric disorder which may affect the given test results. The psychiatric status of the participants was ascertained from self-reports and school counselling centres registries. The psychiatrists in the study group (O.A. and P.U.A.) excluded twenty-eight participants who reported a psychiatric disorder as follows: depression (*n* = 15), autism (*n* = 3), generalized anxiety disorder (*n* = 7), and obsessive-compulsive disorder (*n* = 3). Eleven individuals could not complete the tests. The tests were implemented during teaching sessions, which lasted approximately fifty minutes.

**Measures**

*Sociodemographic form*

A sociodemographic form was prepared to assess each participant's age, gender, educational level, the total count of siblings, residential area, presence of current psychiatric disorder, presence of a psychiatric disorder in relatives,number of owned SNS accounts, and daily SNS use.

*Bergen Social Media Addiction Scale (BSMAS)*

The BSMAS (Andreassen et al., 2016) is a self-report measure adapted from the Bergen Facebook Addiction Scale (BFAS) (Andreassen et al., 2012). The BSMAS comprises of six items based on the six core components (salience, mood, modification, tolerance, withdrawal conflict and relapse) proposed by Griffiths (2005) to assess social media addiction/problematic social media use. More specifically, the six items examine the experience of using social media over the past year and are rated using a five-point Likert type scale ranging between 1 (very rarely) and 5 (very often) (e.g., “How often during the last year have you used social media in order to forget about personal problems?”). The definitions for these six core components are: (1) salience—thinking and behaviour are dominated by the activity; (2) tolerance–– rising amounts of the activity are necessary to reach previous effects; (3) mood modification—the activity alters/enhances mood; (4) relapse––an inclination to return to earlier patterns of the activity after control or abstinence (5) withdrawal—unpleasant feelings arise when the activity is stopped or abruptly reduced; and (6) conflict—the activity produces tension in relationships, job/education, and other activities (Brown, 1993; M. Griffiths, 1996, 2005); to evaluate SNS use during the previous year.Higher scores indicate higher levels of problematic SNS use. The BSMAS has demonstrated appropriate psychometric properties in the Turkish sample (Cronbach’s *α* = 0.84) (Demirci, 2019). The literature recommends using the BSMAS as a screening tool in problematic SNS use with the sum of scores obtained from all components (Andreassen et al., 2016). However there is no cut-off score in the Turkish version, with one previous study recommending a BSMAS total score above 19 (out of 30) as an indicator of high risk of developing problematic SNS use (Bányai et al., 2017). Thus, we followed this approach in defining our sample’s SNS use characteristics. The BSMAS has demonstrated appropriate psychometric properties in our sample (Cronbach’s *α* = 0.86; 95% CI [0.84, 0.87]).

*Metacognitions Questionnaire for Children (MCQ-C; Bacow, Pincus, Ehrenreich, & Brody, 2009)*

The MCQ-C is a 24-item self-report measure which is an adaptation of the Metacognitions Questionnaire for Adolescents (MCQ-A) (Cartwright-Hatton et al., 2004), that assesses different metacognitions in children. The MCQ-C also differs from the MCQ-A by including only four out of five of the original factors. These are positive meta-worry (e.g. “If I worry about things now, I will have fewer problems in the future”), negative meta-worry (e.g. “If I worry a lot, I could make myself sick”, superstitious, punishment, and responsibility beliefs (e.g. “If I did not get a worry thought out of my head and then something bad happened, it would be my fault”), and cognitive monitoring (e.g. “I try hard to keep track of the thoughts that I have in my head”. The cognitive confidence factor was omitted in the MCQ-C adaptation study due to theoretical reasons. To improve the readability of the self-report measure with children, easier words are utilized instead of complex ones (e.g. “bad” instead of “negative”) in MCQ-C. Each factor consists of six items, and responses are based on the following 4-point Likert-style scoring: 1 (do not agree), 2 (slightly agree), 3 (somewhat agree), and 4 (strongly agree). The sum of scores in each factor is calculated with higher scores indicating higher levels of pathological metacognitions. The validity and reliability study of MCQ-C was established in a Turkish sample (Irak, 2012). The internal consistency of MCQ-C in this study was acceptable (Cronbach’s α = 0.62; 95% CI [0.58, 0.66]).

*Children’s Version of Reading the Mind in the Eye Test (RMET; (Baron-Cohen, Wheelwright, Spong, Scahill, & Lawson, 2001)*

The RMET is an adaptation of the adult RMET test which requires participants to put themselves in the mind of the individuals in photographs presented to them, and to attribute a mental state to these individuals (Baron‐Cohen et al., 1997). The test consists of 28 photographs that show only the eye region of the face in which the participants are asked to choose among four words that define the feeling or thinking of the person in the photograph. For example, item 6 has the options of “hate”, “unkind”, “worried”, and “bored” (the correct answer is “worried”). Test scores for the children version can be calculated for positive emotions (e.g. happy, joyful, eager, calm, grateful), negative emotions (e.g. sad, worried, upset, bored), and neutral emotions (e.g. normal, questioning, focused and unsure) (Cassels, 2015). The total number of correct responses in each category are calculated by the clinician and higher scores in the relevant category indicate better ability in ER. The validity and reliability study of the children’s version of RMET was ascertained in Turkish samples (Girli, 2014). The internal consistency of the children’s version of RMET in our sample was also adequate (Cronbach’s α = 0.63; 95% CI [0.58, 0.67]).

**Statistical Analysis**

Descriptive statistics methods were employed to calculate the mean, standard deviation, frequency, and total count of the sociodemographic and test variables. The normality of distribution was examined utilizing Kolmogorov-Smirnov test, kurtosis, and skewness. The normality assumptions were met. Reliability analysis with interclass correlation coefficients (model: two-way mixed, type: consistency) was used to compute the Cronbach's alphas and 95% confidence interval scores of each scale for the study sample. To assess the relationships between daily SNS use, BSMAS, MCQ-C, and RMET scores, Pearson product-moment correlations were performed. Multiple linear regression analysis (stepwise method used) was then run to inspect the predictive value of daily SNS use, RMET positive emotions, and MCQ-C factors for the BSMAS total score, after confirming that the assumptions for stepwise multiple regression analysis were met. Cohen's *f*2, which is appropriate for calculating the effect size within a regression model was computed, and according to Cohen's guidelines, *f* 2 ≥ .02, *f* 2 ≥ .15, and *f* 2 ≥ .35 represent small, medium, and large effect sizes, respectively (Cohen, 1988). The level of statistical significance (*p*) was adjusted to < .05, and all analyses were estimated with the Statistical Package for Social Sciences (SPSS) version 22.0 (IBM Corp., Armonk, NY).

**Ethics**

The study was carried out in accordance with the Declaration of Helsinki. The Institutional Review Board of the International University of Sarajevo (IUS-REC-01-3230/2019) approved the study and the official permissions were provided by school directorates. All participants were informed about the study and all provided informed consent. Parental consent was also sought for all participants.

**RESULTS**

**Sample Characteristics**

Sociodemographic characteristics of the participants are presented in Table 1. The mean age of the participants was 15.84 years (*SD* = 0.96). Analysis showed that 50.9% (*n* = 438) of the participants were males and 49.1% (*n* = 423) were females. In terms of the number who owned SNS account, 23.6% (*n* = 203) of the participants reported having one SNS account, 33.3% (*n* = 287) indicated having two SNS accounts, 28.6% (*n* = 246) had 3-4 SNS accounts, while 14.5% (*n* = 125) owned 5 or more SNS accounts. In terms of average hours of SNS use per day, 42.7% (*n* = 368) of the participants used SNS less than 2 hours per day, while 57.3% (*n* = 492) reported using SNS for more than 2 hours per day. There were 249 participants (28.92%) who scored 19 (suggested cut-off score for problematic SNS use; Bányai et al., 2017) or above on the BSMAS total score. Mean scores and standard deviations of the study variables are presented in Table 2.

**Correlations between Daily SNS Use, BSMAS, MCQ-C, and RMET Factors**

Bivariate correlation analyses are displayed in Table 2. Daily SNS use, positive meta-worry, negative meta-worry, and superstition, punishment and responsibility beliefs were positively correlated the BSMAS total score. Cognitive monitoring was positively correlated with mood modification, relapse and BSMAS total score. Positive ER was found to be correlated with salience, relapse and BSMAS total score. Negative ER was only correlated with withdrawal.

**Stepwise Multiple Linear Regression Analysis**

Results from stepwise multiple linear regression analysis are presented in Table 3. In the final model, daily SNS use, positive meta-worry, negative meta-worry, superstition, punishment and responsibility beliefs, and cognitive monitoring were significant predictors of the BSMAS total score (F(5, 851) = 111.84, p <.01), explaining 39.7% of the total variance. The effect size of the final regression model was large (*f* 2 = .66).

**DISCUSSION**

This study set out with the aim of assessing the relative contribution of metacognitions and ER in predicting problematic SNS use among adolescents. We observed that all factors of metacognitions predicted problematic SNS use, however, ER was not found to be a significant predictor.

The role of positive meta-worry as an independent predictor of problematic SNS use is a key finding and mirrors recent research in adolescent problematic Internet Gaming Disorder (e.g. Aydin et al., 2020). Positive meta-worry is linked to the activation of maladaptive forms of coping (rumination, worry, thought suppression) in the presence of distressing triggers (e.g. upsetting thoughts, emotions, sensations) that may ‘backfire’ leading to an escalation of negative affect (Wells, 2000, 2008). This, in turn, may increase the probability of engaging in SNS use as a means of cognitive-affective regulation. For example, worrying/ruminating about internal states (e.g. boredom, thoughts about self-worth) may bring to greater salience of SNS triggers, the lowering of tolerance thresholds, and the worsening of affective states which may aggravate withdrawal and facilitate relapse.

Negative meta-worry pertains to the evaluation and judgment of the lack of control over, and danger of, internal states and forms of maladaptive coping such as rumination, worry and thought suppression. The presence of negative meta-worry indicates that psychological distress has escalated to higher thresholds (e.g. that rumination and worry may have become perseverative) increasing the probability of engaging in problematic SNS use as a means of escaping such forms of perseverative thinking. This finding aligns itself to what has been observed in other studies, which is that negative metacognitive beliefs are a marker of more severe aspects of addictive behaviour (Spada et al., 2015; Hamonniere & Varescon, 2018).

A similar argument applies to superstition, punishment and responsibility beliefs and cognitive monitoring which were also found to be an independent predictor of problematic SNS use. The presence of these beliefs indicates that those who: (1) label internal experiences (e.g. urge to use SNS, low mood, boredom) as a form of punishment (e.g. “it is bad to think about certain things”) or uncontrollable/possessing superstitious powers on cognition (e.g. “if I could not be in control of what I think, I would fall apart”); and (2) spend more time monitoring their experiences, may engage in SNS as an attempt to achieve ‘metacognitive control’ (Wells, 2002). In other words, achieve the *neutralisation* of these internal experiences. The paradoxical effect of using SNS to achieve metacognitive control is that the strategy is likely to backfire, fuelling those same internal experiences one would want to control in the first place thus leading to the perseveration of SMS use. These observations align themselves to what has been found in the literature linking, in particular, beliefs about the need to control thoughts and the escalation of, and relapse into, a wide range of addictive behaviours (Spada et al., 2015; Hamonniere & Varescon, 2018).

Turning now to ER, an unexpected finding was that ER ability was not associated with problematic SNS use. This finding is intriguing and surprising given the fact that previous studies evaluating ER have reported opposite results in alcohol use disorder (Freeman et al., 2018), substance use disorder (Bayrakçı et al., 2015), internet gaming disorder (Aydın et al., 2020) and internet addiction (Chen et al., 2017; Spada & Marino, 2017). Recent research in adolescents (Aydın et al., 2020; Ünal-Aydın et al., 2020) has posited that ER is an essential component in the development of adaptive interpersonal communication and poor performance in ER should be a vulnerability factor in addictive behaviours, including problematic SNS use. Central to this perspective is the idea that imprecision in identifying others’ emotions may trigger vulnerability to addictive behaviours as a means of cognitive-affective self-regulation. In view of this, we think our rather contradictory result could be attributed to sample characteristics. It is recognised that adolescents who score higher on the BSMAS are more liable to experience difficulties related to SNS use, and a BSMAS total score above 19 (out of 30) suggests that individual is at-risk of developing problematic SNS use (Bányai et al., 2017). In our study, the mean BSMAS total score was below the problematic SNS use indicating that our sample had low levels of risk of developing problematic SNS use which may explain why ER scores were not correlated in the expected direction. In a similar vein, according to the results of one recent study which evaluates emotion regulation in pathological gambling, the researchers demonstrated that different components of emotion regulation (e.g. emotional awareness for positive/negative emotions, emotional impulsivity) might be related to specific subtypes of gambling disorder (e.g. emotionally vulnerable, antisocial-impulsive). For instance, improving both positive and negative emotion regulation might be appropriate for antisocial-impulsive subtype, whereas, regulating only negative emotional states might be more suitable treatment target for emotionally vulnerable subtype of gambling disorder (Rogier & Velotti, 2018). Since we evaluated the capability to identify emotions solely, perhaps another specific dimension of emotion recognition, that we did not evaluate in this study, may have significant associations with problematic SNS use.

Several limitations to this preliminary study need to be acknowledged. First, the sample was not randomly selected and due to the use of self-report questionnaires, the results may have been affected by answer accuracy and recall bias. The cross-sectional design also precludes us from conclusive statements about causality. Future studies should employ longitudinal designs that observe the variations in metacognitions and ER over time to help tease out casual predictors of problematic SNS use. Additionally, as mentioned already, the overall mean score of BSMAS in our sample was lower than the problematic SNS use threshold. Thus, the low count of the participants at risk of problematic SNS use may have caused a bias while interpreting the results. Furthermore, although we excluded participants with mental health disorders, it is possible that undiagnosed cases could have been present among our sample due to the lack of a structured clinical interview being employed to screen for participation. Finally, as only individuals in the late adolescence period were included in this study, it is possible that these results may not be generalisable to a broader range of adolescents within different age intervals.

Despite these limitations, the main strength of the present study is that it showcases, for the first time in the literature, the importance of metacognitions in predicting problematic SNS use among adolescents. Targeting metacognitions (especially positive and negative meta-worry) may be potentially of therapeutic benefit. There is a large literature base demonstrating the effectiveness of metacognitive therapy in treating psychological distress (see Wells, 2013) and growing evidence of its application to addictive behaviours (see Spada et al., 2015). These interventions may include the direct restructuring of metacognitions as well as techniques aimed at potentiating attentional flexibility (attention training technique) and interrupting rumination and worry (detached mindfulness and postponement) which may free up valuable resources for problem-solving and engagement with the environment. The studies related to the effectiveness of metacognitive therapy in treating addictive behaviours (see Spada et al., 2015; Caselli et al., 2018) are already accumulating.

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Table 1: Sociodemographic features of the sample.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Mean | S.D. | Count (%) |
| *Age* | 15.84 | 0.96 |  |
| *Gender* |  |  |  |
| Male |  |  | 438(50,9%) |
| Female |  |  | 423(49,1%) |
| *Education (years)* | 10.07 | 0.94 |  |
| *Total count of siblings* | 2.74 | 1.27 |  |
| *Economic status (converted to Euro)* |  |  |  |
| Less than €300 |  |  | 32(3,7%) |
| €350 - €750 |  |  | 427(49,6%) |
| More than €750 |  |  | 402(46,7%) |
| *Residential area* |  |  |  |
| City center |  |  | 785(91,2%) |
| Not city center |  |  | 76(8,8%) |
| *Presence of a past psychiatric condition* |  |  | 58(6,7%) |
| *Presence of a psychiatric condition in relatives* |  |  | 122(14,2%) |
| *Number of owned SNS accounts* |  |  |  |
| 1 |  |  | 203(23,6%) |
| 2 |  |  | 287(33,3%) |
| 3-4 |  |  | 246(28,6%) |
| 5 and more |  |  | 125(14,5%) |
| *Average SNS use (hour per day)* |  |  |  |
| Less than 2 hours |  |  | 368(42,7%) |
| More than 2 hours |  |  | 492(57.3%) |
| *Problematic SNS use* |  |  | 249(28.9%) |

Table 2: Inter-correlations between the study variables.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | *M* (*SD*) | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1. | BSMAS-Total | | 15.23 (6.39) | 1 |  |  |  |  |  |  |  |  |
| 2. | MCQ-C-PMW | | 12.80 (4.77) | .22\*\* | 1 |  |  |  |  |  |  |  |
| 3. | MCQ-C-NMW | | 15.96 (4.86) | .21\*\* | .05 | 1 |  |  |  |  |  |  |
| 4. | MCQ-C-SPR | | 15.61 (4.64) | .27\*\* | .20\*\* | .55\*\* | 1 |  |  |  |  |  |
| 5. | MCQ-C-CM | | 17.43 (4.34) | .08\* | .20\*\* | .35\*\* | .41\*\* | 1 |  |  |  |  |
| 6. | RMET-POS | | 5.00 (1.21) | .08\* | .03 | -.02 | -.02 | -.04 | 1 |  |  |  |
| 7. | RMET-NEG | | 7.74 (1.66) | .03 | -.03 | .03 | .08\* | -.01 | .22\*\* | 1 |  |  |
| 8. | RMET-NEU | | 7.80 (1.61) | .03 | -.04 | .03 | .07\* | .01 | .23\*\* | .58\*\* | 1 |  |
| 9. | Daily SNS use | | 2.84 (1.24) | .51\*\* | .12\*\* | .10\*\* | .16\*\* | .05 | .04 | .01 | -.01 | 1 |

Notes: BSMAS-Total: Bergen Social Media Addiction Scale - Total Score; MCQ-C-PMW: Metacognitions Questionnaire for Children - Positive Meta-Worry; MCQ-C-NMW: Metacognitions Questionnaire for Children - Negative Meta-Worry; MCQ-C-SPR: Metacognitions Questionnaire for Children - Superstition, Punishment and Responsibility Beliefs; MCQ-C-CM: Metacognitions Questionnaire for Children - Cognitive Monitoring; RMET-POS: Reading the Mind in the Eyes Test Positive; RMET-NEG: Reading the Mind in the Eyes Test Negative; RMET-NEU: Reading the Mind in the Eyes Test Neutral; Daily SNS use: Average SNS use (hours per day).

\*p<.05, \*\*p<.01.

Table 3: Stepwise multiple linear regression statistics with BSMAS-Total as the outcome variable and MCQ-C factors as the predictor variables.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Dependent Variable** | **Predictors** | ***β*** | **Standardised Beta** | ***t*** | ***p*** | ***R2*** |
| BSMAS-Total | Daily SNS use | 2.77 | .54 | 19.84 | .000 | .40 |
| MCQ-C-PMW | .18 | .13 | 4.82 | .000 |
| MCQ-C-NMW | .13 | .10 | 3.11 | .002 |
| MCQ-C-SPR | .17 | .12 | 3.66 | .000 |
| MCQ-C-CM | -.10 | -.07 | -2.35 | .019 |

Notes: BSMAS-Total: Bergen Social Media Addiction Scale - Total Score; MCQ-C-PMW: Metacognitions Questionnaire for Children - Positive Meta-Worry; MCQ-C-NMW: Metacognitions Questionnaire for Children - Negative Meta-Worry; MCQ-C-SPR: Metacognitions Questionnaire for Children - Superstition, Punishment and Responsibility Beliefs; MCQ-C-CM: Metacognitions Questionnaire for Children - Cognitive Monitoring; Daily SNS use: Average SNS use (hours per day).