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# Report #15756623

"I have no control over how much time I play" Metacognitions about Online Gaming Scale: Evidence from a cross-cultural validation among Israeli adolescents 1. Introduction Internet Gaming Disorder (IGD) is a persistent and recurrent pattern of excessive and uncontrollable internet gaming, resulting in a cluster of cognitive and behavioral symptoms, impaired daily functioning, and significant psychological distress (American Psychiatric Association, 2013; 8 12 18 World Health Organization, 2019; Kirly, Potenza, and Demetrovics, 2022). Adolescents are particularly vulnerable to IGD (Yu, Mo, Zhang, Li, & Lau, 2022; Lampropoulou, Siomos, Floros, & Christodoulou, 2022; Rosendo-Rios, Trott, & Shukla, 2022). The prevalence of IGD among adolescents ranges between 7% and 15% (Pontes et al., 2021). Other studies suggest a global prevalence that ranges from 2.47% to 3.05% (Pan et al., 2020; Stevens et al., 2021). Research suggests that IGD is rife among both genders but that boys and young men, with a rate of 19%, are at greater risk than



girls and young women, whose rate of IGD is at 7.8% (Yu, Mo, Zhang, Li, & Lau, 2021). With gaming industry revenues expected to reach above \$200 billion globally by 2023 (Statista, 2021), IGD may become even more widespread within this vulnerable population, warranting immediate attention. In Israel, a recent study indicated that 30% of the adolescents surveyed self-perceived as having IGD (Efrati & Spada, 2022). This alarmingly high prevalence of IGD self-awareness among adolescents, accompanied by the high IGD rates, underscores the long-standing need to identify IGDs risk factors and provide reliable and valid assessment tools and early interventions in high-risk adolescents (Lampropoulou et al., 2022). 8 15 Responding to these needs, this study aimed to validate the Metacognitions about Online Gaming Scale (MOGS; Spada & Caselli, 2017) among adolescents for prospective studies. 1.1. Metacognitions and IGD Metacognition refers to thinking about ones own thinking . 2 3 It can be defined as any stable knowledge about ones own cognitive system and strategies that may affect the regulation of cognition, the awareness of the current state of cognition, and the appraisal of the meaning of cognitive-affective states (Wells & Matthews, 1996). 2 According to Wells and Matthews (1994; 1996) metacognitive model of



psychological distress, metacognitions (beliefs about ones cognitive-affective experiences and how they should be controlled) are involved in the activation and maintenance of maladaptive coping strategies that exacerbate negative affect. This, in turn, increases the likelihood of engaging in addictive behaviors as a form of escapism and as a last resort for achieving cognitive-affective self-regulation (Spada, Caselli, Nikcevic, & Wells, 2015). As metacognitions may vary across disorders (Casale et al., 2021), Spada and Caselli (2017) drew researchers attention away from generic metacognitions (i.e., generic beliefs about cognitive-affective experiences such as I need to control my mind at all times ) to specific metacognitions concerning IGD by developing the MOGS. Metacognitions about online gaming are theorized to guide cognitive appraisal, and coping styles and (dis)regulate behaviors during the pre- and post-engagement phases toward external triggers (e.g., exposure to online gaming). Two types of metacognitions have been identified in the literature: positive and negative. Positive metacognitions relate to the benefits of engaging in coping strategies for controlling cognitive-affective experiences (e.g., Online gaming helps me control my negative thoughts ) and are linked to activating such coping strategies. Negative



metacognitions are judgments about perceived control over adopted coping strategies and the resulting cognitive-affective states (e.g., I continue to play despite I think it would be better to stop ). These types of metacognitions may hamper attempts at self-regulation and contribute to an escalation of psychological distress. The ubiquitous role of positive and negative metacognitions in addictive behaviors has been widely evidenced across numerous studies over the last 20 years (e.g., Spada et al., 2015; Hamonniere & Varescon, 2018). As shown by subsequent studies, specific metacognitions about online gaming have stronger associations with IGD (e.g., 0.450.75; Akbari et al., 2021; Nazligl, & Ssen, 2021; Dang et al., 2022; Gandolfi, Soyturk, & Ferdig, 2021) compared to generic metacognitions (e.g., 0.120.33; Aydn et al., 2020; Zhang et al., 2020; Efrati et al., 2021).

### 1.2. Gaming motives

Adolescents motives for gaming, which can transform a healthy recreational activity into a pathological addiction, are significant predictors of IGD (Mills et al., 2018). Scholars agree that understanding the motives for gaming is central to understanding the phenomenon of gaming addiction (Akbari et al., 2021; Lafrenire, Verner-Filion, & Vallerand, 2012; King & Delfabbro, 2009; Moudiab & Spada, 2019; Marino et al.,



2020). Demetrovics et al. (2011) identified seven motives for gaming using exploratory factor analysis. These are forming social connections, escaping from reality, competing with others, coping with distress, developing skills, engaging with fantasy worlds, enjoying recreation, and building relations. Yee (2006) added social motives, immersion, and achievement. Achievement concerns motives related to power, domination, rivalry, provocation and the like. Social motives relate to forming friendships, helping others, self-disclosure, getting support, and teamwork. Immersion concerns engaging with fantasy worlds and role-playing to escape the real world and its problems (Yee, 2006). These gaming motives appear to be critical determinants of IGD (Wang, & Cheng, 2022). Therefore, the first aim of this study, to examine metacognitions about online gaming, should be explored as a potential connection to gaming motives.

### 1.3 Emotion regulation strategies

Another connection, between metacognitions about online gaming and emotion regulation strategies in adolescents may exist. Scholars concerned with healthy psychological development have increasingly recognized the importance of developing socially appropriate and adaptive skills to manage or regulate emotions (Matthews, Webb, & Sheppes, 2021; Cole, Michel, &



Teti, 1994; Morris, Silk, Steinberg, Myers, & Robinson, 2007; Southam-Gerow & Kendall, 2002). Emotion regulation requires intrinsic and extrinsic processes that move a person toward goal accomplishment (Thompson, 1994). These can be conscious and require effort or unconscious and automatic or effortless (Cole et al., 1994; Gross & Thompson, 2007; Thompson, 1994). Two principal emotion regulation strategies exist. The first is cognitive reappraisal, which concerns the redefinition of situations giving rise to emotional responses such that the emotional impact is changed. The second is expressive suppression which is an inhibition of ongoing emotion-expressive behavior (Gullone & Taffe, 2012). Emotion regulation has a therapeutic role in treating harmful behaviors such as IGD (Wu et al., 2020), substance use (Cavicchioli et al., 2019), and gambling addiction (Rogier & Velotti, 2018). Evidence also suggests that poor emotion regulation, excessive use of suppression, and less frequent reappraisal may be significant predictors of IGD. Recently, Yen et al. (2018) found that a group diagnosed with IGD had significantly lower cognitive reappraisal strategies and greater expressive suppression strategies than the control group and that cognitive reappraisal negatively predicted IGD



and expressive suppression positively predicted IGD. Moreover, Caplan's cognitive-behavioural model of problematic internet use (Caplan, 2010; 1 Haagasma et al., 2013) has been employed to demonstrate that preference for online social interaction (POSI) can exacerbate the negative consequences of unhealthy gaming both directly and through mood regulation (Haagasma et al., 2013).

In addition, Marino et al. (2020) found, in a study on 543 Italian gamers, that POSI correlated with positive and negative metacognitions about online gaming and IGD. Therefore, the second aim of this study is to examine adolescents exhibiting difficulties with cognitive emotion regulation (reappraisal and suppression) and POSI and determine the association, if any, with metacognitions about online gaming and IGD.

#### 1.4 Attachment orientations

Attachment orientations are formed in infancy in response to interactions with primary caregivers (see Mikulincer & Shaver, 2016). Infants develop secure bonds with attachment figures (i.e., attachment security) when the latter provide support and satisfy the infants needs (e.g., for comfort and security). Infants whose needs are satisfied develop a view of themselves as loveable and grow to see others as dependable. Individuals with a secure attachment style are more sociable and develop well-adjusted relationships



with family, friends, and romantic partners. Where parental support is inadequate, infants may develop insecure attachment styles that are divided into anxious and avoidant styles (Brennan, Clark, & Shaver, 1998; Collins & Allard, 2004). When caregivers fail to satisfy an infants needs, and support and care is wanting or erratic, children may develop a fear of abandonment and rejection. Anxiously attached individuals are characterized by an unfulfilled need for affection incommensurate with the amount of affection they actually receive (Birnbaum, Reis, Mikulincer, Gillath, & Orpaz, 2006). Cold and distant caregiving can cause infants to develop an avoidant attachment style and to view others as untrustworthy and undependable. Individuals with this attachment style tend to emotionally distance themselves from intimate relationships (Smith, Murphy, & Coats, 1999). The links between attachment orientations and IGD have been shown to be weak or to have no direct association in some studies (e.g., King & Delfabbro, 2017; Throuvala, Janikian, Griffiths, Rennoldson, & Kuss, 2019; Teng, Griffiths, Nie, Xiang, & Guo, 2020). However, other studies suggest that perceived insecure attachments (e.g., lower trust, lower levels of communication, and higher levels of alienation),





including parental attachment, are associated with IGD (Estevez, Jauregui, & Lopez-Gonzalez, 2019; Schneider, King, & Delfabbro, 2017; Wang, Ho, Chan, & Tse, 2015; Zhu, Zhang, Yu, & Bao, 2015). Consequently, it seems that attachment insecurity, linked to various social dysfunctions, high levels of psychological distress, and emotion dysregulation, creates a predisposition for metacognitions about online gaming and IGD. Therefore, the third aim of this study is to examine whether attachment insecurities should be explored as having a possible correlation to the MOGS and IGD.

4 5 1.5 The current study Given the limited research that focuses on adolescents and the MOGS, especially 6-month prospective studies, the current research has two aims: 1) to evaluate the psychometric properties of the MOGS, including its factor structure, reliability, and predictive validity among Israeli adolescents utilizing a 6-month prospective study; and 2) to examine the MOGS as a theoretical model that mediates the effect of attachment patterns on IGD, the POSIs, and the motives for online gaming. Specifically, the study examines two questions: First, is the factorial structure of the Hebrew MOGS comprised of two factors? Second, do metacognitions mediate the effect of attachment patterns on IGD, the POSIs, and



the motives for online gaming? 2. Method 2.1 Participants

The study population comprised 1,056 Israeli Jewish adolescents from the general community (610 males and 446 females), with ages ranging from 13 to 18 ( $M = 15.77$ ,  $S D = 1.43$ ). All participants were enrolled in the eighth ( $n = 133$ ; 12.7%), ninth ( $n = 161$ ; 15.4%), 10th ( $n = 225$ ; 21.5%), 11th ( $n = 270$ ; 25.8%), and 12th ( $n = 259$ ; 24.7%) grades. Most (96.8%) were native Israelis.

Socioeconomically, the students described their levels as being very bad (0.3%), bad (2.2%), good (58%), and very good (39.5%). In terms of religious affiliation, the sample consisted of 507 (48%) self-reported religious individuals, of which 223 (21.1%) considered themselves traditional, 252 (23.9%) secular, and 74 (7%) ultra-Orthodox. Participants had the opportunity to mark multiple genres and game types, and they indicated the following preferences: Massively Multiplayer Online Role-playing Game (MMORPG;  $n=543$ ; 51%), First-Person Shooter (FPS;  $n= 358$ ; 34%), Role-Playing Game (RPG;  $n= 241$ ; 23%); Multiplayer Online Battle Arena (MOBA ;  $n=308$ ; 29%). 2.2 Measures 2.2. 8 1 Sociodemographic variables

Adolescents reported their age (1318), biological sex (male, female), religiosity (traditional, secular, religious, ultra-Orthodox), immigration status (Israeli, immigrant), and



socioeconomic status (SES; divided into the categories of very good, good, bad, and very bad). 2.2. 1 6 2 Preference for Online Social Interactions The preference for online social interactions (POSI) subscale was translated into Hebrew for this study via a back translation procedure (from English to Hebrew and back) of the Generalized Problematic Internet Use Scale 2 (GPIUS2; 6 Caplan, 2010); the GPIUS2 was used to assess the POSIs. 1 6 The subscale comprises three items (e.g., q.1 q.3 Online social interaction is more comfortable for me than face-to-face interaction 1 6 ). Participants were asked to rate the extent to which they agreed with each item on an 8-point scale (ranging from 1= q.1 q.3 definitely disagree 1 6 to 8 = definitely agree). 1 3 13 The Cronbachs alpha for the scale in the present study was 0.86 (T1) and . 1 89 (T2). Items were averaged to obtain a total score, with higher scores representing higher levels of POSI. 2.2. 3 IGD The severity of IGD and its detrimental effects over 12 months were assessed using a version of the nine-item short form of the Internet Gaming Disorder Scale (Pontes & Griffiths, 2015) based on the nine IGD items defined in the American Psychiatric Associations Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (2013). Items were translated into Hebrew by Efrati et al. (2021). 1 Responses are



rated on a 5-point scale (ranging from 1 = never to 5 = very often). 1 3

13 The Cronbachs alpha for the scale in the present study was 0.86 (T1) and . 1 89 (T2). Items were averaged to obtain a total score, with higher scores representing a higher degree of IGD severity. 2.2. 4 4 The Metacognitions about Online Gaming Scale This study used the MOGS (Spada & Caselli, 2017) to assess positive and negative metacognitions about online gaming. Like POSI, the MOGS was translated by a back-to-back translation procedure (from English to Hebrew and back).

3 The scale has two factors, each of which is assessed by six items; 0.2 positive metacognitions about online gaming 3 (P-MOG) refers to the usefulness of online gaming as a cognitive-affective self-regulatory strategy (e.g., 0.2 Online gaming helps me to control my negative thoughts 3 ), and 0.2 negative metacognitions about online gaming 3 (N-MOG) refers to the uncontrollability and dangers of online gaming and online gaming-related thoughts (e.g., 0.2 I have no control over how much time I play 3 ). 1 3 7

Participants were asked to rate the extent of their agreement with each statement on a 4-point scale (ranging from 1 = do not agree to 4 = agree very much). 3 Items were added to obtain a score for both positive and negative metacognitions. 1 3

The Cronbachs alpha for the scale in the present study was 0.85 (T1) and . 1 85 (T2) for positive metacognitions,



and .88 (T1) and .91 (T2) for negative metacognitions. Items were averaged to obtain a total score, with higher scores representing higher levels of metacognitions. 2.2. 5 The Motives for Online Gaming Questionnaire The Motives for Online Gaming Questionnaire (Demetrovics et al., 2011) was used to assess a range of motives for online gaming. Items were translated from English to Hebrew by three independent psychologists and back-translated into English by a bilingual expert in the field. 1 3 14 Participants were asked to rate the frequency of each of the 27 items over the last 12 months on a 5-point scale (ranging from 1 = never to 5 = q.1 q.2 q.4 almost always/always 1 3 14 ). 1 The scale comprised seven motivational dimensions: 1) social (four items; e.g., q.1 because gaming gives me company 1 ); Cronbachs alpha was .82 (T1) and .84 (T2); 2) escape (four items; 1 e.g., q.1 because gaming helps me escape reality 1 ); Cronbachs alpha was .88 (T1) and .88 (T2); 3) competition (4 items; e.g., because it is good to feel that I am better than others ; Cronbachs alpha was . 1 82 (T1) and .82 (T2); 4) skill development (4 items; e.g., q.1 because it improves my coordination skills 1 ); Cronbachs alpha was 0.81 (T1) and .83 (T2); 5) coping (4 items; 1 e.g., q.1 because gaming helps me get into a better mood 1 ); Cronbachs alpha was 0.88 (T1) and .89 (T2); 6) fantasy (4 items; 1 e.g., q.1 because I



can do things that I am unable to do or not allowed to do in real life

1 ; Cronbachs alpha was 0.84 (T1) and .86 (T2); and

7) recreation (3 items; e.g., because it is entertaining ;

Cronbachs alpha was 0.81 (T1) and . 1 80 (T2). Items were

averaged to obtain seven separate scores for each

motivational dimension, with higher scores representing higher

levels of each motive. 2.2.6 The Emotion Regulation

Questionnaire for Children and Adolescents Developed by

Gullone and Taffe (2012), the Emotion Regulation

Questionnaire for Children and Adolescents (ERQCA) was based

on the ERQ (Gross & John, 2003). The questionnaire

contains 10-item scales for assessing the emotion regulation

strategies of cognitive reappraisal (CR) and expressive

suppression (ES); CR consists of six items, and ES consists of four.

11 Items are rated on a 5-point Likert response scale

(1 = strongly disagree, 5 = strongly agree), with higher sco

res indicating greater use of the corresponding ER strategy. Examples

of such statements include When I want to feel happier, I

think about something different (Item 1) and I control my

feelings by not showing them (Item 6). We used the Hebrew

version (Efrati & Amichai-Hamburger, 2020). Cronbachs alpha

was .79 (T1) and .81 (T2) for reappraisal and .74 (T1)

and .75 (T2) for suppression. 2.2.7 Attachment Style



Classification Questionnaire This questionnaire (Finzi et al., 1996; Finzi et al., 2000) is an adaptation for children of the Hebrew version (Mikulincer et al., 1990) of Hazan and Shavers (1987) questionnaire for the classification of attachment styles in adults. The questionnaire contains 15 items divided into three factors, which were based on Ainsworths (1970) three attachment patterns: secure (e.g., I usually believe that others who are close to me will not leave me ), anxious/ambivalent (e.g., Im sometimes afraid that no one really loves me ), and avoidant (e.g., I find it uncomfortable and get annoyed when someone tries to get too close to me ). The participants were asked to read each item and to rate the extent to which the item described themselves on a 5-point scale, with scores ranging from 1 (not at all) to 5 (very much). Cronbachs alpha was .82 (T1) and .82 (T2) for attachment anxiety and .72 (T1) and .74 (T2) for attachment avoidance.

2.3 Procedure The study was presented to participants as a research project on metacognitions about online gaming in Jewish adolescents from various regions of Israel (eastern, central, southern, or northern parts of Israel). 2 The participants constituted a convenience sample recruited from various sources such as postings on bulletin boards and online forums. 2 12 Questionnaires



were uploaded to Qualtrics, an online questionnaire platform, and distributed by several research assistants. **2** Parents of adolescents who agreed to participate in the study were contacted via email or phone and were asked to review the questionnaires and sign an informed parental consent form, which was sent back to the research assistants by email. Upon agreement, a link to the online survey was sent to the participants, who were assured anonymity. Participants were then asked to complete the survey privately in a quiet room in their homes. Following receipt of a signed informed consent form, questionnaires were presented in random order. All questionnaires were in Hebrew. Finally, an online debriefing took place, and participants were thanked for their participation. Participants were sampled twice in a baseline assessment and at a 6-month follow-up measurement. **17** The Institutional Review Board approved the procedure. **3. Data analysis** In the first section of the results, we set out to validate the Hebrew version of the Metacognitions about Online Gaming Scale (MOGS; Spada & Caselli, 2017). To do so, we employed Exploratory Graph Analysis (EGA; Golino et al., 2020) using EGAnet R package a network psychometrics method that uses undirected network models for the assessment of





psychometric properties of questionnaires. EGA was used to verify the number of or factors using graphical lasso (Friedman et al., 2008) and the items that are associated with each factor. Network loadings, which are roughly equivalent to factor loadings, are reported using `net.loads()`, with suggested general effect size guidelines for network loadings of 0.15 for small, 0.25 for moderate, and 0.35 for large (Christensen & Golino, 2021). Next, to examine the stability of the EGA and therefore of the underlying construct of the Hebrew-MOGS, we followed the analysis with Bootstrap Exploratory Graph Analysis with 5,000 resampling cycles. We also assessed the stability of each of the 12 items using the `itemStability()` function with a minimum cut-point of 75% stability. We corroborated the results of the EGA with a Confirmatory Factor Analysis (CFA) with maximum likelihood estimation with robust standard errors and a mean- and variance- adjusted test statistic (MLMVS; i.e. the Satterthwaite approach) using `lavaan` Structural Equation Modeling (SEM) R package. **7 10 Model fit** was estimated by Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). CFI and TLI > .90 and RMSEA and SRMR < .07 are acceptable. We



finalized the first section by a test-retest reliability of the Hebrew-MOGS over a period of 6 months by intraclass correlation coefficient (ICC 0.50 as acceptable; Koo & Li, 2016) using the irr R package, and with convergence validity that was tested by bivariate correlations between MOGS and IGD, preference for online social interactions, motives for online gaming (social, escape, competition, coping, skill development, fantasy, recreation), and emotion regulation strategies (suppression, reappraisal). All measures were taken from T1. The second part of the results began with a descriptive examination of the Hebrew-MOGS facets (i.e. negative and positive metacognitions about online gaming) followed by an Mahalanobis-Minimum Covariance Determinant (MMCD) test for detecting multivariate outliers in the main study measures (i.e. metacognitions, attachment patterns [anxiety, avoidance], IGD, preference for online social interactions, and motives for online gaming). The analyses detected 159 multivariate outliers. Accordingly, we employed robust analyses to avoid the possible bias of analyzing data with multiple outliers. Specifically, we examined whether negative and positive metacognitions about online gaming mediate the effect of attachment pattern that are crystalized in early years of life on IGD, preference



for online social interactions, and motives for online gaming. To ensure directionality, attachment patterns and metacognitions were taken from T1 (given that attachment patterns were found develop in early years and remain moderately stable over time), and IGD, preference for online social interactions, and motives for online gaming from T2 (i.e. 6-month follow-up). To do so, we estimated hierarchical robust regression models with an MM-estimator in which we (i) predicted whether metacognitions are predicted by attachment patterns, and (ii) whether metacognitions predict IGD, preference for online social interactions, and motives for online gaming while controlling for attachment patterns.

16 In these models, we also controlled for adolescents gender, age, religiosity, and socioeconomic status. Models were estimated with the `rlm()` function of the MASS R package; Causal Mediation Analyses were then used to appraise the significance of the indirect paths from attachment patterns via metacognitions to IGD, preference for online social interactions, and motives for online gaming. Significance was estimated using bias-corrected and accelerated (BCa) confidence intervals with 1,000 Monte Carlo draws. In the final step, we conducted sensitivity analyses for each significant indirect path to assess its sensitivity for possible



unobserved confounding variables. 5. Discussion Metacognitions about online gaming have been highlighted as a critical factor that could contribute to problematic behavior throughout adolescence (Akbari et al., 2021). However, knowledge of metacognitions about online gaming among adolescents is still limited. 4 5 9 In the current study, we focused on critical factors that might account for the psychometric properties of the MOGS, including its factor structure, reliability, and predictive validity. To do so, we conducted a large-scale prospective study involving 1,056 Israeli Jewish adolescents from the general population. We were able to examine the contribution of the MOGS as a mediator of the effects of attachment patterns on IGD, POSIs, and motives for online gaming. Overall, we corroborated the results of the EGA with a CFA of the MOGS, suggesting that the Hebrew MOGS can optimally measure metacognitions about online gaming within a two-factor latent construct: negative metacognitions and positive metacognitions. These results align with the study in Spada and Casellis (2017) work on the development of the MOGS. Cronbachs alpha coefficients for all factors and the total score were good at the 6-month follow-up (ranging from 0.85 to 0.91) and in line with the original self-report measure



development (Spada & Caselli, 2017). In keeping with convergence validity predictions, adolescents reported positive and significant correlations between metacognitions and all related measures as part of the psychometric properties of the MOGS. Moreover, as we expected, we found weak correlations with emotion regulation strategies, moderate correlations with preferences for online social interactions and motives for online gaming, and strong correlations with IGD. This finding is in line with previous research that shows strong correlations with IGD; specifically, negative metacognitions (Marino et al., 2020; Akbari et al., 2021) reflect adolescents beliefs regarding their lack of control over gaming. These beliefs, possibly activated during or after playing, may lead to continued gaming to reduce negative affect with the paradoxical effect of increasing it (Marino & Spada, 2017). We hypothesized that metacognitions mediate the effect of attachment patterns on IGD, POSIs, and motives for online gaming. Unsurprisingly, and in keeping with the hypothesis, boys had significantly higher negative and positive metacognitions about online gaming than girls, older and more religious adolescents had fewer positive metacognitions about online gaming, and adolescents with higher SES had more negative metacognitions



about online gaming than adolescents with lower SES. This finding is in line with research findings that boys show higher levels of metacognitions (Dang et al., 2022). Results were also in line with recent research that young age (Efrati et al., 2021) and lower religiosity (Efrati & Spada, 2022) indicate more IGD (which may explain the fewer positive metacognitions). In contrast to our findings about SES, a recent study did not find correlations between SES and metacognitions (Marino et al., 2019). One possibility could be the use of generic metacognition (MCQ) tools. Another reason is the difference between problematic Facebook use which is less common in adolescents than online gaming. Moreover, adolescents with higher SES were found to be more at risk for addictive behavior on the Internet and gaming (Petruzelka et al., 2020; Toker & Baturay, 2016), possibly due to more awareness (parents education or school prevention programs) of problematic behavior regarding online gaming, which may lead to more negative metacognitions about online gaming. Aside from the correlation between metacognitions about online gaming and other measures, we examined this correlation in this study after controlling for attachment patterns. Results indicated that the higher an adolescents negative and/or positive



metacognitions about online gaming, the more severe their IGD, and the greater their POSIs and motives for online gaming. These findings correspond with previous studies on adolescents and gamers indicating correlation between metacognitions about online gaming and IGD (Dang et al., 2022; Akbari et al., 2021), POSIs, and motives for online gaming (Marino et al., 2020). Specifically, the current study also focused on demographic aspects. It revealed that older adolescents had higher motivation for the social benefits of gaming, which may be related to their affinity for technology as digital natives (Andreassen et al., 2016) and the developmental tasks of this older age period (personal goals vs life optimization; Freund & Baltes, 1998). In addition, we found that boys had a higher motivation for competition and recreation than girls. Demetrovics et al. (2011) found this result in a Hungarian sample of 3,818 participants; in contrast, our study found that females had a higher motivation for recreation than males. One explanation is age difference: ages 14 to 17 scored the lowest for recreation (Demetrovics et al., 2011). In addition, religious adolescents had a lower incidence of IGD and lower motivation for social, escape, coping fantasy, and recreation



than secular adolescents. A previous study on Israeli adolescents indicates a lower prevalence of IGD for religious adolescents than secular adolescents (Efrati & Spada, 2022), but we could not find research indicating differences by religion in the motivation of Internet gaming. Future research is needed in this area. Finally, regarding attachment patterns, an anxious attachment style is typical of adolescents who seek closeness, support, affection, and love but lack the conviction that they will be able to meet their goals and fear rejection. Thus, higher motivation to escape and less to compete may serve as a substitute for those adolescents who harbor attachment anxiety. For different reasons, adolescents who indicate attachment avoidance may be seeking compensation for a lack of warmth, closeness, and intimacy in their lives. Research has shown that pornography use compensates for avoiding attachment and loneliness (Efrati & Amichai-Hamburger, 2019). Therefore, it is unsurprising that attachment avoidance was associated with a higher rate of IGD, a POSIs, and motivations to escape, cope, develop skills, and create an online fantasy world. Consistent with previous research (Casale, Caplan, & Fioravanti, 2016; 7 Casale, Music, & Spada, 2021; Marino et al., 2019), metacognitions were





found to mediate the relationship between potential risk factors and problematic technological behavior in general. Our findings indicate that positive and negative metacognitions significantly mediated the effect of attachment anxiety and avoidance for IGD, POSI, and motives for online gaming. As a result of their childhood experiences, anxious adolescents are oriented toward danger monitoring, tend to focus on perceived signs of abandonment and threat, and are prone to rumination (Malik, Wells, & Wittkowski, 2015). Anxiety in adolescents is likely to result in a belief that perseverative thinking is valuable and negative beliefs about thought uncontrollability and danger (Caselli et al., 2017). Conversely, adolescents characterised by attachment avoidance tend towards thought suppression, repressing natural threats, and denying their need for closeness. Avoidant-style adolescents may believe in the danger and uncontrollability of thoughts and emotions and attempt to mitigate this danger by controlling their thoughts (Caselli et al., 2017; Moss, Erskine, Albery, Allen, & Georgiou, 2015). Maladaptive metacognitions resulting from anxious attachment appear to be associated with higher levels of IGD, POSI, and motives for online gaming. Although our main premises were supported, the study has



several limitations. The study is correlational, and so precludes conclusions regarding causal processes. Although we employed a prospective assessment of metacognitions and, therefore, can appraise the directionality of the associations, caution is warranted when implementing the current findings into interventions. In addition, the research population was comprised of Israeli Jewish adolescents. Future studies should examine other diverse ethnic and cultural adolescent populations to ascertain the replicability and generalization of the findings. Despite the limitations of this study, we view its findings as an important step towards understanding the dynamics of metacognitions in the development of IGD in adolescents. Based on our findings, therapy has the potential to deliver more focused help to adolescents with a disposition toward IGD. It is crucial to increase therapists awareness of the benefits of considering the role of metacognitions when dealing with IGD symptoms and adding a cognitive approach to individual therapy for adolescents experiencing IGD.



# Sources

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