

METACOGNITIONS AND EMOTION REGULATION AS PREDICTORS OF PROBLEMATIC INTERNET USE IN ADOLESCENTS

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Abstract

Objective: Problematic Internet Use (PIU), broadly conceptualized as an inability to control one's use of the Internet leading to negative consequences in daily life, is fast becoming a matter of significant concern in our society, particularly in adolescents. In the present study we aimed to assess a model in which metacognitions and emotion regulation independently predicted PIU.

Method: A total of 380 adolescent students from a secondary school in Italy voluntarily participated in the study. Students completed a set of online self-report scales assessing PIU, metacognitions, and emotion regulation.

Results: Metacognitions, with the exception of cognitive self-consciousness, were positively correlated with PIU. Moreover, emotion regulation negatively correlated with PIU. The model tested indicated that both metacognitions and emotion regulation had direct effects (positive and negative respectively) on PIU and that the relationship between metacognitions and emotion regulation was not significant.

Conclusions: Both metacognitions and emotion regulation appear to be relevant to PIU among adolescents. We discuss the implications of these findings.

Keywords: adolescence, emotion regulation, metacognitions, problematic Internet use

Declaration of interest: none

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Introduction

Adolescents' use of the Internet is fast becoming a matter of significant concern in our society (Flisher 2010, Spada 2014). At present, it is estimated that prevalence rates of PIU in European adolescents range from 1.0 to 13.5% (Durkee et al. 2012, Kaltiala-Heino et al. 2004, Pallanti et al. 2006, Siomos et al. 2008). One of the major challenges, in this context, is the development of a more detailed understanding of how Internet use may become problematic, and what could facilitate the early detection of individuals at risk of developing PIU.

A possible explanation as to how Internet use may become problematic lies in it taking the form of a maladaptive self-regulatory strategy (La Rose et al. 2003, Spada et al. 2008) rather than simply being used for problem solving, entertainment and challenge (Caplan and High 2007, Wan and Chiou 2006). In support of this view, several studies have shown relationships between individual differences in automatic and controlled aspects of self-regulation and PIU (for a review see Billieux and Van der Linden 2012). If we assume that PIU may arise from difficulties in self-regulation it follows that the emotion regulation paradigm may be of relevance in furthering our understanding of such difficulties (Philippot and Feldman 2013). This model broadly emphasizes the role of awareness, understanding, and acceptance of emotions in achieving emotion regulation

(Gratz and Roemer 2004). Research has shown that deficits in emotion regulation are present in alcohol problems (Fox et al. 2008), cocaine-dependence (Fox et al. 2007) and gambling (Williams et al. 2012), with evidence emerging that such deficits are also linked to PIU (Caplan 2002, 2010; Casale et al. 2016; Yu et al. 2013). Similarly, Hormes et al. (2014) have observed that problematic users of social networking sites, compared to non-problematic ones, are more likely to experience difficulties in emotion regulation.

Recent conceptualizations of addictive behaviours have also emphasized the role of metacognition in the genesis and perpetuation of emotion dysregulation (Spada et al. 2009, 2013; Spada and Wells 2005, 2009). Metacognition refers to the aspects of cognitive processing responsible for the monitoring, evaluation, interpretation and regulation of the content of cognition (Wells 2000). It is purported that since metacognition fulfills an executive function with regard to cognitive processing, it also plays a contributory role in emotion regulation/dysregulation (Wells 2000). According to the metacognitive model of psychopathology (Wells and Matthews 1994) metacognitions (or metacognitive beliefs) are central to the development and persistence of emotion dysregulation. Metacognitions refer to beliefs about the meaning of internal events (e.g. "I should be in control of my internal states at all times" and "Having thought X means I am weak-willed") and

ways of controlling them (“If I worry I will be prepared” and “Ruminating will help me find a solution”). It is thought that such beliefs are central to the initiation and perseveration of unhelpful coping strategies (extended thinking, thought suppression, threat monitoring, avoidance, and maladaptive behaviours) which, in turn, lead to emotion dysregulation.

Metacognitions have been examined using the Metacognitions Questionnaire (Cartwright-Hatton and Wells 1997, Wells and Cartwright-Hatton 2004) which assesses metacognitions through five factors: (i) positive beliefs about worry (beliefs that perseverative thinking is useful); (ii) negative beliefs about thoughts (beliefs that thoughts are uncontrollable and dangerous); (iii) cognitive confidence (beliefs in one’s own attention and memory); (iv) beliefs about the need to control thoughts; and (v) cognitive self-consciousness (beliefs about the tendency to self-focus attention and monitor thoughts).

Support for the link between dimensions of the Metacognitions Questionnaire and psychopathology has come from a wide range of studies utilizing both cross-sectional, longitudinal and experimental designs (for a review see: Wells 2013). Within addictive behaviours metacognitions have been found to predict problem drinking (Spada et al. 2009, Spada and Wells 2005, Spada et al. 2007) gambling (Lindberg et al. 2011, Mansueto et al. 2016), and nicotine dependence (Nikčević and Spada 2008, Spada et al. 2007). They have also been observed to predict PIU (Spada et al. 2008) with the authors of this study postulating that generic maladaptive metacognitions predict PIU because they lead to an escalation in negative emotions (through the activation of maladaptive coping strategies such as rumination and worry), which in turn increase the likelihood of utilizing the Internet as a means of cognitive-affective self-regulation. This line of argument is also supported by recent research which has confirmed the role of metacognitions in predicting problematic Facebook use (Marino et al. 2016).

The present study aimed to replicate, in part, Spada and colleagues’ (2008) study by examining whether metacognitions would predict PIU in adolescents. None of the previous studies undertaken in the area have examined the link between metacognitions and in PIU in adolescents. We thus hypothesized that both metacognitions and emotion regulation would be correlated (respectively positively and negatively) with PIU. We also aimed to assess a model in which metacognitions and emotion regulation would independently predict PIU.

Method

Participants

A convenience sample of 380 adolescent students from a secondary school in Italy voluntarily participated in the study. The participants were 30.8% male and 68.4% female, ranging in age from 13 to 20 years (mean=15.82, SD=1.67). The two gender groups did not differ on mean age ($t_{(374)} = .90, p = .83$).

Procedure

Permission was sought from the Head of School. Signed consent was obtained from both underage students’ parents, whereas students of age gave their own written consent. All parents and students accepted to take part in the research study. Participants were asked to log into an institutional website developed for

research at the Department of Developmental and Social Psychology (University of Padova, Italy) and to answer an on-line questionnaire, using an anonymous personal code. All responses to the self-report instruments (outlined below) were collected during a regular school-day in classrooms and in the presence of the class teacher. Formal approval for this research was given by the Ethics Committee of Psychological Research at the University of Padova, Italy.

Self-Report Instruments

Problematic Internet Use. PIU was assessed with the Short Problematic Internet Use Test (SPIUT), validated for Italian adolescents (Siciliano et al. 2015). The SPIUT comprises of six items rated on a five-point scale (1=“never” to 5=“very often”). Items covers several criteria for PIU described by Meerkerk and colleagues (2009): loss of control (e.g. “Do you find that you are staying online longer than you intended?”); preoccupation/salience (e.g. “Have you neglected homework because you are spending more time online?”); conflict (e.g. “Have you been reprimanded by your parents or your friends about how much time you spend online?”); and withdrawal symptoms and coping (e.g. “Do you feel nervous when you are offline and is that feeling relieved when you do go back online?”). Answers to each item were averaged to form a single score and higher scores on the scale indicate higher levels of PIU. The Cronbach’s alpha for the SPIUT was .72 in the present study.

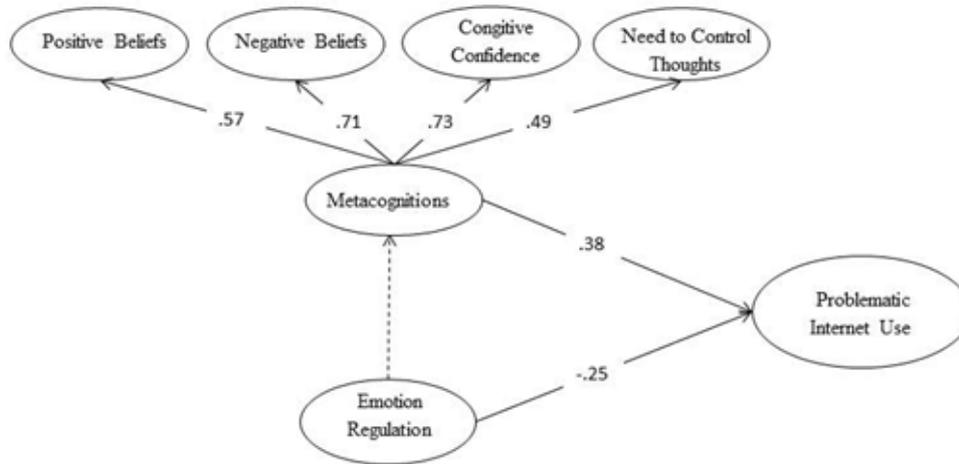
Metacognitions. Metacognitions were assessed using the Italian version of the Metacognitions Questionnaire 30 (Quattropani et al. 2014, Wells and Cartwright-Hatton 2004). The MCQ-30 consists of five factors assessed by six items each: positive beliefs about worry (e.g. “Worrying helps me cope”); negative beliefs about thoughts concerning uncontrollability and danger (e.g. “When I start worrying I cannot stop”); cognitive confidence (e.g. “My memory can mislead me at times”); beliefs about the need to control thoughts (e.g. “Not being able to control my thoughts is a sign of weakness”); and cognitive self-consciousness (e.g. “I pay close attention to the way my mind works”). Items are rated on a 4-point scale (1= “definitely disagree” to 4= “definitely agree”). Answers to each item were averaged to form a single score and higher scores indicate higher levels of maladaptive metacognitions. The Cronbach’s alpha for the MCQ-30 was .88 in the present study.

Emotion regulation. Emotion regulation was assessed with the three-items subscale measuring “emotion regulation” drawn from the validated Social and Emotion Health Survey (SEHS) for secondary school students (Furlong et al. 2013). Participants were asked to rate on a four-point scale (1=“not at all like me” to 5=“very much like me”) how true they feel that the statements relate to them personally (i.e. “I accept responsibility for my actions”, “When I make a mistake I admit it”, “I can deal with being told no”). Answers to each item were averaged to form a single score and higher scores indicate higher levels of emotion regulation. The Cronbach’s alpha for the SEHS subscale was .68 in the present study.

Analyses

The pattern of relationships specified by our theoretical model (presented in **figure 1**) was examined through structural equation modeling (SEM) and

Figure 1. Tested model of the inter-relationships between the study variables



Note. All coefficients are significant at and below the 0.001 level.

Maximum Likelihood method was used to test the model, using the Lavaan package (Rosseel 2012) of the software R (R Development Core Team 2013). In the model tested, PIU was the dependent variable, and metacognitions and emotion regulation were the independent variables.

Results

Correlations

Table 1 shows the bivariate correlations among the variables of interest included in the model. Metacognitions, with the exception of cognitive self-consciousness, were positively correlated with PIU. Moreover, emotion regulation negatively correlated with PIU. Finally, since gender and age appeared not to be significantly linked to PIU, we did not include them in the tested model.

SEM Analyses

To evaluate the fit of a model, the following criteria are commonly considered: Comparative-Fit Index

(CFI; acceptable fit $\geq .90$); the goodness-of-fit index (GFI; acceptable fit $\geq .90$); Root Mean Square Error of Approximation (RMSEA; acceptable fit $\leq .08$); and Standardized Mean Square Error of Approximation (SRMR; good models $\leq .08$) (e.g., Browne and Cudeck 1993, Hu and Bentler 1999).

The model was tested including in the SEM all the variables of interest: metacognitions as a latent independent variable identified by four latent variables, made of observed scores, significantly linked to PIU in the correlation analysis; and emotion regulation as a latent independent variable comprising of observed scores. PIU was also a latent dependent variable comprising of observed scores. Results of the SEM for the model (figure 1) indicated an adequate fit to the data: $\chi^2_{(62)} = 138.28, p < .001$; CFI = .916, GFI = .946, RMSEA = .056 [90% CI: .044, .070], SRMR = .054. Moreover, the squared multiple correlations for the endogenous variables indicate that the model accounts for 20% of the variance of the outcome (PIU).

Consistent with our hypothesis metacognitions had a direct positive effect on PIU ($\beta_{\text{STANDARDIZED}} = .38$), and emotion regulation had a direct negative effect on PIU ($\beta_{\text{STANDARDIZED}} = -.25$). Moreover, the relationship between metacognitions and emotion regulation appeared to not

Table 1. Correlation matrix for the study variables

	M(SD)	1	2	3	4	5	6	7	8		
1. PIU ^a	2.43 (.73)	1									
2. Positive Beliefs ^b	2.09 (.71)	.19**	1								
3. Negative Beliefs ^b	2.19 (.71)	.20**	.42**	1							
4. Cognitive Confidence ^b	2.02 (.72)	.19**	.28**	.33**	1						
5. Need to Control Thoughts ^b	2.73 (.70)	.21**	.39**	.52**	.37**	1					
6. Cognitive Self-consciousness ^b	2.82 (.57)	-.20	.24**	.06	.01	.29**	1				
7. Metacognitions ^c	2.56 (.52)	.27**	.71**	.77**	.68**	.78**	.20**	1			
8. Emotion Regulation	2.89 (.66)	-.17**	.05	-.05	-.04	.07	.32**	-.001	1		
9. Age	15.82 (1.67)	-.02	.09	.12*	-.001	.09	.04	.10	.01	1	
10. Gender	-	.07	-.04	.15*	.04	-.11*	-.10*	.01	-.05	-.05	1

Notes: * $p < 0.05$; ** $p < 0.001$; N=377. ^a=Problematic Internet Use; ^b=Metacognitions; ^c=Mean score of four metacognitions (Positive Beliefs, Negative Beliefs, Cognitive Confidence, Need to Control Thoughts).

be significant; that is the two variables independently predicted PIU.

Discussion

The goal of the present study was to examine the effect of metacognitions and emotion regulation on PIU in adolescents. Results indicated that metacognitions, with the exception of cognitive self-consciousness, were positively correlated with PIU. Moreover, emotion regulation negatively correlated with PIU. Structural equation modelling showed that metacognitions had a direct positive effect on PIU, and emotion regulation had a direct negative effect on PIU, with the relationship between metacognitions and emotion regulation not significant; that is the two variables independently predicted PIU.

These findings confirm, in an adolescent sample, Spada and colleagues' (2008) original observations in an adult sample about the role of metacognitions in predicting PIU. It is plausible to argue (in line with the original study) that the presence of metacognitions may lead to the activation of maladaptive coping strategies, such as rumination and worry, which in turn may increase the likelihood of utilizing the Internet as a means of cognitive-affective self-regulation. In other words, using the Internet (for example by seeking information to reduce preoccupations and psychological discomfort) may become a strategy to control 'unwanted' emotional states (Spada et al. 2008). The findings also confirm, as observed in previous studies (Hormes et al. 2014, Yu et al. 2013), the independent contribution of emotion regulation to PIU. They also align themselves to a recent study which showed the combined contribution of emotion regulation and PIU-specific metacognitions to PIU in young adults (Casale et al. 2016). However, an unexpected result of this study is the non-significant link between emotion regulation and metacognitions, usually found in adult samples (Casale et al. 2016). A possible explanation for this result may lie in findings by Bakracevic et al. (2010) who observed that perceived self-regulation skills decreased from childhood to adolescence and, then, increased again in adulthood while metacognitive ability appeared to increase across the group age. The authors argued that this might be as a result of developmental characteristics of adolescents who tend to under-estimate their competences. Thus, further studies should investigate further the link between self-emotion-regulation skills and metacognitions, especially among non-clinical samples of adolescents.

The present results are preliminary and some limitations should be highlighted. First, the sample was not randomly selected and the use of data from a self-report measures is typically influenced, to some degree, by recall bias and answer accuracy. Second, the cross-sectional design employed does not allow definitive statements about causality.

Despite these limitations, results of this study have potentially important implications for developing prevention and intervention programmes for adolescents. First, social and emotional learning (SEL) programmes have been recognized as highly effective in improving emotional skills, attitudes, and behaviours among school-aged children (for a meta-analysis, see Durlak et al. 2011). Second, there is now a large and fast expanding literature 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). Therefore, developing interventions taking into account both metacognitions and emotion regulation that lead to PIU might be of value.

In conclusion, the results from the current study provide an important addition to the literature on PIU, suggesting that both the emotion regulation model and the metacognitive model might be used to develop a theory-driven conceptualization of PIU and associated treatment.

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