The moderating effect of self-esteem, depression and anxiety between satisfaction with body appearance and problematic internet use

ABSTRACT

Background and objectives: Given that dissatisfaction with bodily appearance can sometimes lead to the avoidance of personal contacts and the increase of internet use, the present study examines this relationship. The direct role of dissatisfaction with bodily appearance along with the possible mediation effects of depression, anxiety and self-esteem were tested. **Methods:** A total of 694 participants completed an online questionnaire (58.5% male, mean age 21.5 years), containing measures on problematic internet use, depression and anxiety symptoms, self-esteem and satisfaction with body image. Path analyses were used to test direct and indirect effects. **Results:** Satisfaction with body appearance had a significant negative direct effect on problematic internet use among both sexes. Additionally, satisfaction with body appearance had a positive effect on self-esteem and negative on anxiety. However, neither self-esteem nor anxiety had a direct significant effect on problematic internet use. However, the effect of dissatisfaction with body appearance also mediated via the self-esteem–depression path toward problematic internet use. **Conclusions:** Dissatisfaction with physical appearance seems to have a significant role in individuals' immersing themselves in internet use.

Keywords: internet addiction, body appearance, self-esteem, anxiety, depression

INTRODUCTION

Problematic internet use and 'internet addiction' have been areas for serious empirical research since the first academically published papers in 1996 (1, 2). Since then, well over 150 studies have been published that have explored this phenomenon from research examining prevalence rates and etiology, through to intervention and treatment studies (3-5). Despite these many studies, there is still no consensus as to the most appropriate name or the most comprehensive operationalization of the problem. However, numerous empirical studies have shown that very excessive internet use can lead to many consequences associated with more traditional addictions such as salience, tolerance, cravings, withdrawal symptoms, conflicts (with work, education, relationships, etc.), and relapse (6).

It should also be noted that there is a distinct difference between addictions *on* the internet and addictions *to* the internet. As Griffiths and Widyanto (7) noted, being an internet gambling addict or an internet gaming addict are not internet addicts but gambling or gaming addicts using the medium of the internet to fuel their addiction. However, there are many activities (such as excessive use of chat rooms or social networking) that could be regarded as genuine internet addictions as these are activities that cannot occur anywhere else but on the internet (8). Furthermore, despite being ill-defined, problematic internet use is expected to appear in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* as a phenomenon needing further research (9).

One of the most important research areas to better understand the development of this problematic behavior is the examination of personality traits associated with excessive internet use. The association between problematic internet use (including 'internet addiction') and specific dimensions of personality and specific psychopathological symptoms have been intensely examined (10-14). However, almost all of the published studies to date have only ever analyzed uni-dimensional associations. In the area of problematic internet use, the use of simple models appears to be the 'state of the art'. However, the knowledge base that has now accumulated in the area provides the possibility for analyzing the different relevant dimensions in a common, more complex model.

Studies have clearly indicated positive associations between internet addiction and *depressive symptoms* (15-18) as well as *anxiety* (19-22) in both general population and clinical samples (23-26). Additionally, longitudinal studies have suggested an interrelationship between these factors. Furthermore, internet addiction and specific addictions on the internet (e.g., gambling, gaming, social networking, etc.) appear to increase the later prevalence of depressive symptoms (27-30). It has also been shown that the presence of depression and social phobia predicts the prevalence of internet addiction over a two-year period (31).

Empirical studies have also shown an association between problematic internet use and low *self-esteem* both in cross-sectional (10, 32-35) and longitudinal studies (36). The complex model developed by Kim and Davis (37) confirmed the role of low self-esteem in problematic internet use. However, it was also suggested that the association of problematic internet use and low self-esteem is mediated by depression and anxiety. The relationships between low self-

esteem and depressive symptoms (38-40), and between low self-esteem and anxiety disorders (41, 42) are well documented.

The role of the *satisfaction with physical appearance* was also investigated. However, only a few studies have identified concern about *body image* as a predictor of problematic internet use in men (43, 44). The low number of studies on the topic is even more surprising given that one of the main attractions of internet is the lack of physical presence that provides a communication medium for hiding actual and perceived physical disabilities (45, 46). Nevertheless, the negative impact of dissatisfaction with physical appearance on self-esteem has been reported in several studies (47-49). Other studies have identified associations between dissatisfaction with physical appearance in both depression (50-52), and anxiety (53-55).

On the basis of these aforementioned studies, the present study suggests a more complex model that provides the possibility to study all these relationships within a common framework (rather than the more simplistic association analyses reported in previous studies). The proposed model not only integrates factors studied in previous studies (i.e., depression, anxiety, self-esteem) but also includes body image satisfaction. Consequently, this means that internet users who are dissatisfied with their appearance experience more anxiety and depression symptoms as well as showing more problematic internet use. Therefore, it was hypothesized that dissatisfaction with bodily appearance would be associated with depression, anxiety symptoms and self-esteem (see Figure 1). It was also hypothesized that satisfaction with body image has both direct and indirect (through the mediating effect of depression and anxiety) effects on problematic internet use. It was also hypothesized that the proposed mediation model would be invariant across both sexes.

- - - Figure 1 - - -

METHOD

Participants and procedure

A call was placed on a Hungarian website visited by many internet users from a diverse background. This website was chosen because at the time of data collection it was one of the few websites that provided various information and services to visitors and therefore attracted a heterogenic user group. A total of 694 Hungarian participants (58.5% male) completed an online questionnaire (34 participants were excluded due to inconsistencies or a high proportion of missing data). The mean age was 21.5 years (sd=5.2) with all participants aged between 14 and 34 years. More than one-fifth of the participants (21.5%) had higher education degree, while 46.2% were high school graduates. Just over half the participants (54.2%) used internet for 8 to 35 hours per week for non-working purposes. Just under one-quarter (23.5%) spent less than eight hours a week using the internet for leisure purposes whereas one-fifth (20.5%) spent over 35 hours a week.

Measures

Problematic internet use was measured using the three-factor Problematic Internet Use Questionnaire (PIUQ) (56). The PIUQ consists of three 6-item factors (obsession, neglect and control disorder) that directly assess negative impacts of internet use in a person's life (e.g.,

negative impacts on work, relationships with partner/friends, sleep, etc.). Participants use a 5-point scale to estimate how much the given statement is true for them. The PIUQ assesses generalized internet use rather than specific internet applications (e.g., gaming, social networking, etc.). The three subscales are obsession, neglect, and control disorder. Excellent psychometric properties of the PIUQ have been confirmed (57).

Self-esteem was assessed using the Hungarian version of Rosenberg's Self-Esteem Scale (RSES-HU) (58). This scale contains five positively and five negatively worded items and is answered on a 4-point Likert-scale. This construct of global self-esteem measured by the RSES-HU has recently been confirmed in Hungarian population (59).

Anxiety was assessed using the State-Trait Anxiety Inventory (STAI) (60, 61). This 20-item tool uses a 4-point Likert-scale. Psychometric characteristics of STAI have been confirmed in several cultures, including Hungary (60, 62).

Depression was assessed using the Center for Epidemiological Studies Depression Scale (CES-D) (63). This is a 20-item self-report measure where higher scores indicate greater depression (range 0-60). The CES-D has been shown to have good reliability and validity across multiple populations (64), including Hungary (62).

Satisfaction with body appearance was assessed using an 8-item questionnaire designed by the authors. The items relating to body appearance were answered on a 5-point Likert scale contain statements concerning satisfaction and dissatisfaction with physical appearance. The items showed high internal consistency (Cronbach's alpha = 0.809). At the time of data collection, there was no validated instrument available in Hungarian to measure body image satisfaction. Furthermore, in order to adjust to the circumstances of data collection, the aim was to apply a short instrument, and therefore an author-devised 8-item questionnaire based on the

scientific literature was created (65-67). All questions measured the level of satisfaction with body and appearance. Example statements from the instrument include: "Most of the time people like my appearance". "I feel uncomfortable in swimwear" and "When I look in the mirror, I make a negative remark about myself".

Statistical analysis

Descriptive analyses were used to assess the mean and standard deviation of the scales, and confidence interval (CI: 95%) of means are also presented. For reliability, Cronbach's alpha was calculated as indices of internal consistency, which was considered satisfactory if the values were at least .70 (68). Independent t-tests were used to assess gender differences, and the magnitude of the differences was evaluated with effect sizes (Cohen d). Path analyses within structural equation modeling (SEM) were used to test the proposed mediation model. Due to deviation from normal distribution, in all SEM analysis maximum likelihood estimation robust to non-normality (MLR) was used (69). Testing the applicability of models both for males and females, a multi-group analysis was preferred to the two single-group models. This method provides the most efficient parameter estimates (70), and test of invariance (e.g., factor loadings, intercepts, path coefficients) of the proposed models across both sexes.

To evaluate the overall model fit, the χ^2 goodness-of fit statistic, the comparative fit index (CFI), the Tucker-Lewis Fit Index or nonnormed fit index (TLI or NNFI), root mean square error approximation (RMSEA), and the standardized root mean square residuals (SRMR) were used. CFI and TLI are related to the total variance accounted by the model, and values higher than 0.90 are desired (71). RMSEA is related to the variance of residuals, and values smaller than 0.08 are desired (72). Value of the SRMR below 0.08 is considered a good fit (73). Descriptive analyses

were performed with the SPSS19.0 statistical software package (74), and all SEM analyses were performed with MPlus 6.0 (69).

RESULTS

Descriptive statistics

Descriptive analyses were performed and gender differences were tested (see Table 1). With the exception of the PIUQ Obsession scale and total score of PIUQ, statistically significant differences were found between men and women. Males reported (i) higher self-esteem scores, (ii) more satisfaction with their appearance, and (iii) more neglect problems on the PIUQ. Females reported (i) higher scores on STAI and CES-D, and (ii) more control problem on the PIUQ. The effect sizes (Cohen d) were small for satisfaction with appearance, and for control disorder scale of the PIUQ (0.36 and 0.27, respectively), but negligible for all the other scales (below 0.20). Internal consistencies were higher than 0.75 in the case of all scales (Table 2).

- - - Tables 1 and 2 - - -

Mediation analysis

The proposed mediation model was tested by the means of SEM methods. Since sex difference in self-esteem, depression and anxiety are well established, multi-group analysis was carried out controlling for both education and age. In order to assess invariance of the mediation

model, two models were fitted to the data. Here, (i) M1 assumes that factor loadings of the latent variable of problematic internet use are invariant, and (ii) M2 assumes both factor loadings and structural paths are invariant across both sexes. According to results obtained, relative goodness-of-fit indices met their corresponding critical value for both M1 (χ^2=61.507 [χ^2_{Males}=31.190 $\chi^2_{Females}$=30.317] df=28; CFI=0.980 TLI=0.952 RMSEA=0.060 SRMR=0.024) and M2 (χ^2=71.232 [χ^2_{Males}=34.990 $\chi^2_{Females}$=36.242] df=37; CFI=0.979 TLI=0.963 RMSEA=0.053 SRMR=0.038). Because the degree of fit did not decrease significantly (Satorra-Bentler scaled χ^2 difference test = 1.124 Δdf=9 p>0.05) when all the path coefficients were constrained to be equal in both sexes (see Figure 2), the invariance of the mediation model was supported. This means that the structural paths among the components were invariant across both sexes.

According to the results (see Figure 2), satisfaction with body appearance had a significant direct effect on problematic internet use between both sexes. Satisfaction with body appearance had a direct significant effect on both self-esteem and on anxiety. However, no direct effect on depression was detected. Direct path from self-esteem to problematic internet use lacked significance. However, self-esteem had an indirect effect on problematic internet use primarily via depression, because between anxiety and PIUQ, the path coefficients proved to be non-significant (p> 0.05).

- - - Figure 2 - - -

In relation to the indirect effects, only the satisfaction with 'body appearance → self-esteem → depression → problematic internet use' pathway appeared to be significant (standardized indirect effect was -0.086, p<0.001 for males, and -0.085 p<0.001 for females).

The magnitude of the mediation was estimated with proportion of the mediated effect in the total effect. The mediation proportion of this pathway was 29% for both males and females. Therefore, higher satisfaction with body was associated with higher self-esteem, which is associated with lower depression, and which is linked to lower problematic internet use. All other pathways from satisfaction with body appearance were non-significant ($p>0.05$). The full model explained 33.5% of the total variance of problematic internet use among males, and 31.5% among females.

DISCUSSION

The present study suggests that satisfaction with body image is both directly and indirectly associated negatively with problematic internet use. Furthermore this model was found to be invariant across genders, unlike the study of Hetzel-Riggin and Pritchard (43) who only found an association between overweight preoccupation and problematic internet use in males. However, Rodgers and colleagues (44) obtained similar results, although body image avoidance was not linked to the symptoms of problematic internet use.

The present study confirms findings from other studies concerning the relationship between low self-esteem and depression symptoms in problematic internet use or online gaming addiction (75). At the same time, satisfaction with physical appearance is present in our model as a new dimension. It appears that dissatisfaction with physical appearance might have a significant role in individuals immersing themselves into virtual reality media where they can disguise and/or hide their real physical characteristics and have the possibility to take on an

alternative desired virtual appearance. However, we cannot exclude the possibilities that the desired virtual appearance can also strengthen the dissatisfaction with the current appearance irrespective of the users' objective physical characteristics. The significance of negative body image is also supported by comorbidity of internet addiction and eating disorders (23, 25, 76). Given that the relationship between dissatisfaction with bodily appearance and abnormal eating habits is generally known (77-79), linking these fields in testing similar causal models might be a task for future empirical research.

Caution must be exercise when interpreting the results of this study as it employed a cross-sectional study design utilizing self-selected and self-report data. It would be useful to extend this study with a longitudinal component in the future. Another limitation of the study was that it utilized online data collection that may have provided a barrier for controlling results. However, this method might have several advantages in obtaining honest and truthful responses in areas of a sensitive nature (80). It should also be noted that the instrument used to measure problematic internet use only examined generalized (i.e., total) online activity and did not differentiate between different online applications (e.g., gaming, social networking, etc.). It may be the cse that some types of internet use (e.g., gaming) are more problematic than others (e.g., using search engines). Additionally, given that the association between problematic internet use and low self-esteem is mediated by depression and anxiety, the addition body image into the model presented might perhaps be a confounding variable as some studies have identified associations with physical appearance in both depression and anxiety.

Participants varied from 14 to 34 years of age and therefore it is possible that younger participants (e.g., those aged 14 to 16 years may have had a different self-image compared to those over the age of 30 years). More specifically, there may be differences between

teenagers/young adults and older adults in self-knowledge, esteem, body satisfaction and authenticity. It should also be noted that the demographic information of participants was limited to age, gender, and education. Other factors such as ethnicity, economic stability, access to the internet, and physical disability could have had an influence on the findings but these were not examined. It would also be informative to repeat the study with an internationally recognized instrument that has been validated in Hungarian to assess subjective appearance as well as to add variables that measure the occurrence of eating disorders among the most excessive internet users.

IMPLICATIONS

Based on the results of this study, it is concluded that investigating the subjective perceptions concerning appearance, especially in adolescents, and the targeting these misperceptions in the interventions could be of much benefit in the treatment of individuals with problematic internet use and internet addiction. Promoting awareness of emotions concerning physical appearance might also be a part of prevention activities in adolescence.

Note: A copy of the full questionnaire used in this study can be obtained from the corresponding author.

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List of figure legends:

Figure 1. The theoretical model

Note: Direct relationship is hypothesized between dissatisfaction with bodily appearance and depression, anxiety symptoms, and self-esteem. It is also hypothesized that satisfaction with body image has both direct and indirect effects on problematic internet use.

Figure 2. The mediation model and standardized path coefficients. Results of multi-group analysis with invariant factor loadings and path coefficients (M2) across both sexes (males/females), and the explained variance of the endogen variables. Dash arrows: non-significant path coefficients. Double arrow: covariance between the errors of anxiety and depression measures.

Table 1. Means, standard deviations (SD) and confidence intervals (CI) for both genders and for the total sample and effects size (Cohen d) (N=694)

	Total sample	Males	Females	t-test	Cohen d
	Mean (SD) [95% CI]	Mean (SD) [95% CI]	Mean (SD) [95% CI]		
PIUQ Total score	32.77 (10.40) [31.96-33.58]	32.46 (10.13) [31.43-33.50]	33.21 (10.78) [31.91-34.51]	$0.89^{n.s.}$	0.07
PIUQ Obsession	9.30 (4.12) [8.98-9.62]	9.18 (4.03) [8.77-9.59]	9.47 (4.33) [8.95-9.99]	$0.90^{n.s.}$	0.07
PIUQ Neglect	12.69 (4.43) [12.35-13.03]	13.01 (4.56) [12.55-13.47]	12.24 (4.20) [11.74-12.74]	2.21*	0.18
PIUQ Control disorder	10.91 (4.07) [10.60-11.22]	10.46 (3.89) [10.07-10.85]	11.54 (4.24) [11.03-12.05]	3.39**	0.27
Rosenberg Self-esteem Scale	28.95 (5.45) [28.52-29.38]	29.34 (5.70) [28.75-29.93]	28.42 (5.04) [27.81-29.03]	4.38**	0.18
State-Trait Anxiety Inventory	43.35 (11.43) [42.45-44.25]	42.47 (11.29) [41.30-43.64]	44.54 (11.53) [43.14-45.94]	2.23*	0.18
CES-D	35.63 (10.98) [34.76-36.50]	34.82 (10.54) [33.72-35.92]	36.73 (11.49) [35.33-38.13]	2.22*	0.17
Satisfaction with appearance	26.26 (6.42) [25.75-26.77]	27.23 (6.07) [26.60-27.86]	24.93 (6.65) [24.12-25.74]	2.13*	0.36

Note: PIUQ: Problematic Internet Use Questionnaire, CES-D: Center for Epidemiologic Studies Depression Scale

*p<0.05; **p<0.01; $^{n.s.}$ non-significant

Table 2. Zero-order correlations and Cronbach's alphas (N=694)

	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Cronbach's α
(1) PIUQ Total	0.83	0.85	0.80	-0.35	0.43	0.44	-0.35	0.885
(2) PIUQ Obsession		0.55	0.50	-0.29	0.36	0.36	-0.27	0.870
(3) PIUQ Neglect			0.49	-0.30	0.34	0.36	-0.26	0.761
(4) PIUQ Control disorder				-0.31	0.37	0.36	-0.33	0.763
(5) Rosenberg Self-esteem Scale					-0.70	-0.60	0.50	0.872
(6) State-Trait Anxiety Inventory						0.80	-0.48	0.911
(7) CES-D							-0.34	0.911
(8) Satisfaction with body appearance								0.809

Note: All correlation coefficients are significant at least $p<0.0017$ according to Bonferroni correction. PIUQ: Problematic Internet Use Questionnaire, CES-D: Center for Epidemiologic Studies Depression Scale.