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Abnormal illness behavior and Internet addiction severity: The role of disease conviction, irritability, and alexithymia

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Background and aims: While the association between health anxiety and maladaptive Internet use is a well-established finding, no studies have been performed to examine the possible effect of abnormal illness behavior (AIB). AIB is a maladaptive manner of experiencing, evaluating, or acting in response to health and illness that is disproportionate to evident pathology. The aim of this study was to investigate the association between AIB and Internet addiction (IA) severity in a sample of Italian University students. The possible effect of alexithymia, anxiety, and depression was also taken into account. *Methods:* Participants were 115 men and 163 women (mean age = 23.62 ± 4.38 years); AIB was measured via the Illness Behavior Questionnaire (IBQ), and IA severity by the Internet Addiction Test (IAT). *Results:* The most powerful IBQ factor predicting IA severity scores was disease conviction. Irritability was the only emotional IBQ factor associated with IA severity. Nevertheless, disease conviction and alexithymia remained the only significant predictors of IAT scores when hierarchical regression analysis was executed. *Discussion and conclusions:* Our results support previous findings showing that those characterized by health anxiety are more prone to an excessive and maladaptive use of Internet. Moreover, this study showed that irritability was the only emotional aspect of AIB predicting IA severity. This finding is consistent with the cognitive model of hypochondria, which states that cognitive factors (dysfunctional beliefs and assumptions) play a major role in the explanation of this psychopathological condition.

Keywords: health anxiety, abnormal illness behavior, Internet addiction, disease conviction, alexithymia

INTRODUCTION

The development of the Internet has been associated with an exponential growth of health information websites (Eysenbach, Sa, & Diepgen, 1999). Searching the Internet for medical information is usually an adaptive behavior aimed at gaining reassurance about one's own or someone else's health. Nevertheless, browsing health websites is sometimes associated with an escalation in health anxiety (White & Horvitz, 2009), a phenomenon termed cyberchondria (Taylor & Asmundson, 2004).

There are different studies showing that those subjects characterized by health anxiety are more prone to an excessive and maladaptive use of Internet. Individuals with health anxiety experienced more negative consequences from online search of medical information, becoming more frightened by the gravity of online medical information and less reassured from browsing health-related websites (Baumgartner & Hartmann, 2011). It has been shown that individuals with high levels of health anxiety were more distressed by browsing medical websites, and they had a greater problematic Internet than those subjects with low levels of health anxiety (Fergus & Dolan, 2014; Muse, McManus, Leung, Meghreblian, & Williams, 2012).

Recently, it has been shown that health anxiety was associated with different aspects of Internet addiction (IA), such as unsuccessful attempts to decrease Internet use and negative effects on social, work, and/or academic lives (Singh & Brown, 2014).

While the association between health anxiety and maladaptive Internet use is a well-established finding, no studies have been performed to examine the possible effect of abnormal illness behavior (AIB) on maladaptive use of the net.

AIB is defined as the "an inappropriate or maladaptive mode of perceiving, evaluating and acting in relation to one's own state of health, despite … explanation of the nature of the illness and the appropriate course of management to be followed" (Pilowsky, 1978, p. 133). AIB occurs when illness behavior is not in balance with the medical

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assessment of the objective pathology, indicating that the individual is inappropriately assuming the sick role (Pilowsky, 1997). AIB is a broad construct, implying personality characteristics that are traditionally associated with health anxiety (such as hypochondriasis, disease conviction, presence of affective inhibition/ disturbance, tendency to deny life stresses, and irritability; Pilowsky & Spence, 1975), cyberchondria specifically refers to an escalation in health anxiety when browsing medical websites (Taylor & Asmundson, 2004; White & Horvitz, 2009). Cyberchondria is further associated with different psychopathological conditions and personality traits, such as symptoms of depression, anxiety, and stress; health anxiety; obsessive-compulsive symptoms; and anxiety sensitivity and intolerance of uncertainty (Starcevic & Berle, 2013). Thus, a better understanding of this topic may give significant insight both for theoretical and clinical purposes. According to this background, the present exploratory study was performed to evaluate the association between AIB and IA severity.

The primary aim was to explore the association between AIB and IA severity. Specifically, we were interested in investigating which aspects of AIB were the best predictor of IA severity. A further aim of this study was to verify whether anxiety, depression, and alexithymia could affect the association between AIB and IA severity.

METHODS

Participants and procedure

A total of 278 volunteer students (115 men and 163 women; mean age = 23.62 ± 4.38 years) recruited from the University of Messina (Italy) participated in the study. Participants responded to advertisements posted around the campus and on the University website. The administration of measures took place in small groups up to 30 subjects to ensure confidentiality, each group coming for a single session. On completion of the self-report battery, the subjects were interviewed by three psychiatrists, who administered the clinical scales.

To establish "high" and "low" AIB groups, bottom ($n = 94$) and top ($n = 87$) quartiles of participants' Illness Behavior Questionnaire (IBQ) scores were identified using cut-off scores of <2 and >3, respectively.

Measures

Illness Behavior Questionnaire (IBQ). The IBQ (Pilowsky & Spence, 1975) is a 62-item scale assessing different aspects of AIB on seven dimensions. *General Hypochondriasis* measures the extent to which a person has a phobic concern about his/her own health. *Disease Conviction* refers to the belief of the presence of a physical illness despite reassurance by doctors. *Psychological versus Somatic Focusing* scale reflects the degree to which perceived physical symptoms are attributed to underlying psychological concerns. *Affective Inhibition* refers to the difficulty in expressing feelings to others. *Affective Disturbance* measures the presence of feeling of anxiety and depression. *Denial* assesses the tendency to deny life stresses and to attribute every problem to physical illness. *Irritability* refers to the presence of anger and interpersonal friction. The Italian validated version of the IBQ used in this study showed high levels of reliability and validity revealing internal consistency coefficients ranging from 0.67 to 0.87 (Fava, Bernardi, Pilowsky, & Spence, 1982).

Internet Addiction Test (IAT). The IAT consists of 20 items scored on a 5-point Likert scale that deals with different aspects of Internet usage (Young, 1998). The Italian translation of the IAT revealed respectable basic psychometric parameters of reliability, discriminant, and convergent validity (Craparo, 2011; Ferraro, Caci, D'Amico, & Di Blasi, 2007).

Hamilton Depression Scale (Ham-D). The Ham-D (Hamilton, 1960) is a 17-item semi-structured interview that evaluates depressive symptoms. Pancheri, Picardi, Pasquini, Gaetano, and Biondi (2002) confirmed the validity of the Italian version of the scale. Internal consistency of the scale in this study was acceptable ($\alpha = .79$).

Hamilton Anxiety Scale (Ham-A). The Ham-A (Hamilton, 1959) is a semi-structured interview that consists of 14 items, each defined by a series of anxiety symptoms. Previous research documented high reliability and diagnostic concordance for the Italian version of this scale (Albert, Maina, Forner, & Bogetto, 2004; Maina, Albert, Gandolfo, Vitalucci, & Bogetto, 2005).

Toronto Alexithymia Scale (TAS-20). The TAS-20 consists of 20 items rated on a 5-point Likert scale assessing the different aspects of alexithymia. Previous studies (Bressi et al., 1996; Taylor, Bagby, & Parker, 1997) have shown that the Italian version of the TAS-20 has good internal consistency (Cronbach's α of .75 and .82 in normal and clinical groups, respectively) and test–retest reliability over a 3-week interval ($r = .77$).

Statistical analysis

Analysis of variance (ANOVA) and χ^2 test were used to compare the groups across the demographic and clinical variables. A one-sample Kolmogorov–Smirnov test was conducted beforehand to detect excessively skewed data. A *multivariate analysis of variances* (MANOVAs) using Pillai's criterion was executed to compare the groups across the different IAT factors, controlling for the effect of age. Pearson correlation coefficients were used to test for the association between IBQ total score and IAT subscales. A linear regression analysis was carried out with IBQ subscales used as predictors of IAT scores. Hierarchical regression analyses were conducted to verify whether negative emotions and alexithymia affected the association between IBQ scores and IA severity. The statistical analysis was performed with Statistical Package for the Social Sciences 16.0 software (SPSS Inc., Chicago, IL).

Ethics

The study was conducted in accordance with the Declaration of Helsinki and has been approved by the Ethics Committee of the University of Messina. All the subjects provided written informed consent after a full explanation of the protocol design.

RESULTS

The demographic and clinical characteristics for the "high" ($n = 94$) and "low" ($n = 87$) illness behavior groups and the total sample are shown in Table 1. Application of χ^2 tests revealed no group differences in parents' income and religion, whereas the two groups differed in the frequency of females, with the high AIB group comprising a greater proportion of females when compared with the low AIB group. An effect of age was also found: an ANOVA showed that mean age of the high AIB group was lower than the low AIB group. MANOVA using Pillai's criterion yielded a multivariate significant effect [$F(6, 173) = 173.00$; $p = .004$]. Univariate comparisons also yielded significant differences for total score, and five scales, with the high AIB group reporting higher levels of compromised quality of life, both social and individual, compensatory usage of the Internet, compromised time control, and excitatory usage of the Internet. Also, Pearson correlation revealed that IAT total scores were associated with all the different IAT subscales: *compromised social quality of life* ($r = .385$; $p < .0001$), *compromised individual quality of life* ($r = .344$; $p < .0001$), *compensatory usage of the Internet* ($r = .218$; $p < .0001$), *compromised academic/working careers* ($r = .248$; $p < .0001$), *compromised time control* ($r = .378$; $p < .0001$), *excitatory usage of the Internet* ($r = .282$; $p < .0001$), and *IAT total score* ($r = .395$; $p < .0001$). Three different ANOVAs showed that the high AIB group reported higher mean scores in measures of alexithymia, anxiety, and depression.

Results from the regression analysis indicate that the predictor model provides statistically significant prediction of IAT scores [$F(7, 264) = 8.223$; $p < .0001$], accounting for 17.9% of the total variance (Table 2). The only significant predictors of IAT scores were disease conviction ($p = .002$) and irritability ($p = .033$).

Before execution of the hierarchical regression analyses, multicollinearity was assessed with the variance inflation factor (VIF). VIF scores ranged between 1.12 and 3.05 and the largest condition index was below 10, suggesting a lack of significant multicollinearity (predictors were moderately correlated). To verify whether negative emotions and alexithymia affected the association between IBQ scores and IA severity, alexithymia, anxiety, and depression were added on the first step and the IBQ scores scales on the second step so as to see whether the IBQ scales predicted IA scores over

Table 1. Participants' sociodemographic features by AIB groups

Factor	Low AIB group ($n = 94$)	High AIB group ($n = 87$)	Statistics	Total ($n = 278$)
Age in years, mean (*SD*)	25 (4.70)	22.79 (3.92)	$F = 11.395$***	23.62 (4.38)
Females, *n* (%)	41 (43.6)	59 (67.8)	$\chi^2 = 10.701$**	163 (58.4)
Parents' income, *n* (%)				
<12,000	19 (20.2)	24 (27.5)	$\chi^2 = 7.297$	64 (22.9)
12,000–18,000	16 (17)	20 (22.9)		57 (20.4)
19,000–25,000	25 (26.6)	11 (12.6)		50 (17.9)
26,000–31,000	9 (0.9)	7 (0.8)		29 (10.4)
31,000–37,000	6 (0.6)	9 (1)		20 (7.2)
>37,000	12 (12.7)	10 (1.1)	33 (11.8)	
Religion, *n* (%)				
Catholic	70 (74.4)	74 (85.1)	$\chi^2 = 6.680$	224 (80.3)
Protestant	1 (0.1)	0 (0)		3 (1.1)
Jewish	6 (0.6)	2 (0.2)		1 (0.4)
Other	12 (12.7)	4 (0.45)		10 (3.6)
None	6 (0.6)	6 (0.68)		21 (7.5)
Internet users, *n* (%)				
Minimal	78 (82.9)	50 (57.4)	$\chi^2 = 13.399$***	196 (70.3)
Moderate	13 (13.8)	26 (29.8)		64 (22.9)
Excessive	4 (0.4)	11 (12.6)		19 (6.8)
IAT score, mean (*SD*)	34.71 (12.18)	42.51 (15.02)	$F = 10.958$***	23.62 (4.38)
Compromised social quality of life	10.45 (3.54)	12.83 (4.76)	$F = 11.637$***	11.63 (4.31)
Compromised individual quality of life	8.21 (2.96)	9.91 (3.96)	$F = 9.776$**	8.94 (3.40)
Compensatory usage of the Internet	3.57 (1.31)	4.17 (1.63)	$F = 6.456$*	3.85 (1.49)
Compromised academic/working careers	3.12 (1.68)	3.51 (1.91)	$F = 0.956$	3.33 (1.75)
Compromised time control	7.16 (2.34)	8.31 (3.32)	$F = 6.199$*	7.62 (2.77)
Excitatory usage of the Internet	2.72 (1.28)	3.21 (1.39)	$F = 7.725$**	2.96 (1.30)
IBQ score, mean (*SD*)	0.52 (0.51)	4.93 (1.24)	$F = 153.742$****	2.63 (1.95)
TAS-20 score, mean (*SD*)	44.02 (10.47)	50.26 (9.59)	$F = 7.376$**	47.80 (10.93)
Ham-A	3.15 (0.81)	4.24 (0.84)	$F = -32.386$****	3.61 (0.91)
Ham-D	3.11 (0.86)	4.08 (0.99)	$F = 28.015$****	3.48 (1.01)

Note. IAT: Internet Addiction Test; IBQ: Illness Behavior Questionnaire; TAS: Toronto Alexithymia Scale; Ham-A: Hamilton Anxiety Scale; Ham-D: Hamilton Depression Scale.
*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

Table 2. Hierarchical multiple regression analyses predicting Internet addiction from abnormal illness behavior controlling for alexithymia, anxiety, and depression

	Model 1				Model 2			
	β	*p*	*r*	sr	β	*p*	*r*	sr
Alexithymia	.17	.016	.30	.15	.16	.030	.14	.13
Anxiety	.06	.551	.29	.04	−.05	.585	.29	−.31
Depression	.19	.062	.33	.12	.07	.511	.33	.04
IBQ – General Hypochondriasis					.09	.171	.29	.08
IBQ – Disease Conviction					.23	.001	.36	.21
IBQ – Psychological versus Somatic Focusing					.05	.454	.22	.05
IBQ – Affective Inhibition					−.03	.596	.05	−.03
IBQ – Affective Disturbance					.00	.999	.31	.00
IBQ – Denial					.07	.246	.03	.07
IBQ – Irritability					.131	.068	.32	.12
Model R^2	.132				.219			
R^2 Change	.132				.088			
F	(3, 249) = 12.577*				(10, 242) = 6.795			

Note. r: correlation coefficient; sr: semi-partial correlation coefficient.
*$p < .0001$.

and above the alexithymia and negative emotions variables identified in the first step. Following our predictions, as seen in Table 2, the IBQ scales significantly predicted variance in IA severity scores (Model 2), beyond that predicted by alexithymia and the negative emotions (Model 1). Adding the IBQ scales in the second step significantly increased by 8.8% the explained variance in IA scores (Model 2), with disease conviction (sr = .21) contributing significant unique variance to the prediction of IA severity scores; irritability ceased to be a significant predictor of IAT scores ($p = .068$).

DISCUSSION AND CONCLUSIONS

The results of this study showed that AIB was associated with different aspects of IA severity. This result supports previous findings on health anxiety and cyberchondria showing that those subjects characterized by health anxiety are more prone to an excessive and maladaptive use of Internet (Baumgartner & Hartmann, 2011; Fergus & Dolan, 2014; Muse et al., 2012; Singh & Brown, 2014).

This study adds to the existing literature by showing that the most important health anxiety characteristic predicting IA severity scores is disease conviction, which refers to the belief in the presence of a physical illness despite reassurance by doctors. This result fits well with the cognitive model of hypochondriasis, which states that cognitive factors (dysfunctional beliefs and assumptions) play a prominent role in the explanation of this psychopathological condition (Warwick & Salkovskis, 1990). As suggested by Young (2007), the cognitive-behavioral treatment of IA focuses on re-learning how to engage with the Internet, helping patients to learn to monitor their thoughts and identify those dysfunctional automatic thoughts triggering addictive feelings and actions. Accordingly, it may be interesting to investigate which aspects of medical websites are specifically associated with disease conviction (e.g., perceived credibility of online source), since this may give significant insights for cognitive-behavioral treatment of cyberchondria.

Regression analysis also showed that irritability was the only emotional aspect of AIB predicting IA severity; this scale refers to the presence of anger and interpersonal friction. It might be hypothesized that anger could be heightened by the frustration of not being reassured by contradictory information usually coming from different medical websites (Kunst, Groot, Latthe, Latthe, & Khan, 2002). It seems interesting to stress that the irritability scale ceased to be a significant predictor of IA severity when controlling for the effect of anxiety, depression, and alexithymia in the hierarchical regression model. Research has yet shown that anger and alexithymia are two associated constructs (Berenbaum & Irvin, 1996); it may be interesting to investigate whether alexithymia also mediates the relationship between the irritability IBQ scale and IA scores. Nevertheless, these results are consistent with research evidencing that alexithymia may play an important role in the development of IA (Craparo, 2011; Dalbudak et al., 2013; De Berardis et al., 2009; Schimmenti et al., 2015; Scimeca et al., 2014; Yates, Gregor, & Haviland, 2012).

Undoubtedly, this study has several limitations. First, the use of self-report measures limits the generalizability of these results. The research sample consisted of university students belonging to an urban area of southern Italy; results would have been more valid if the sample was more heterogeneous on cultural and socioeconomic characteristics. Also, the concept of IA is very broad. It would be interesting to investigate which specific aspects of Internet addiction might be related to AIB. It is also important to consider that even if VIF values remain below the threshold, the dependent variables are conceptually very close to each other. Thus, it is possible that because of common variance, the true predictive effect of individual variables may be underestimated or lost.

Finally, this study had a correlational design; hence, it was not possible to exclude other variables, such as the possible effect of general proneness to anxiety on offline health behavior and online Internet addiction. Despite the limitations, the results of this study highlighted the association between AIB and IA, mainly mediated by the presence

of irritability. Based on these finding, it can be suggested that a better identification and understanding of those emotional components, such as irritability, and cognitive dysfunctional schemata which underlie health anxiety may improve the treatment of Internet addictive behaviors associated with AIB.

Future research on larger and heterogeneous samples should further explore the key constructs of interest, the directionality of the associations, and how well they generalize, possibly taking into account the most predominant online activity (e.g., information search, online communications, and online games).

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Authors' contribution: GS, RAZ, and MRAM designed the study, wrote the protocol, and supervised the method procedures, the various drafts, and the final version of the manuscript. AB and GP managed the literature searches and wrote the first drafts of the manuscript. MC, CC, and DQ managed the literature searches, organized recruitment, and collected data. GS and AB undertook the statistical analysis. All authors contributed to and have approved the final manuscript.

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