

Bipolar spectrum disorders in a clinical sample of patients with Internet addiction: Hidden comorbidity or differential diagnosis?

KLAUS WÖLFLING¹, MANFRED E. BEUTEL², MICHAEL DREIER¹ and KAI W. MÜLLER^{1*}

¹Outpatient Clinic for Behavioural Addiction, Department of Psychosomatic Medicine and Psychotherapy, University Medical Centre, Johannes Gutenberg University Mainz, Mainz, Germany

²Department of Psychosomatic Medicine and Psychotherapy, University Medical Centre, Johannes Gutenberg University Mainz, Mainz, Germany

(Received: January 26, 2015; revised manuscript received: April 27, 2015; accepted: April 27, 2015)

Background and aims: Behavioral addictions and bipolar disorders have a certain probability of co-occurrence. While the presence of a manic episode has been defined as an exclusion criterion for gambling disorder, no such exclusion has been formulated for Internet addiction. *Methods:* A clinical sample of 368 treatment seekers presenting with excessive to addictive Internet use was screened for bipolar spectrum disorders using the Mood Disorder Questionnaire. Psychopathology was assessed by the Symptom Checklist 90R and a clinical interview was administered to screen for comorbid disorders. *Results:* Comorbid bipolar disorders were more frequent in patients meeting criteria for Internet addiction (30.9%) than among the excessive users (5.6%). This subgroup showed heightened psychopathological symptoms, including substance use disorders, affective disorders and personality disorders. Further differences were found regarding frequency of Internet use regarding social networking sites and online-pornography. *Discussion:* Patients with Internet addiction have a heightened probability for meeting criteria of bipolar disorders. It is not possible to draw conclusions regarding the direction of this association but it is recommended to implement screening for bipolar disorders in patients presenting with Internet addiction. *Conclusion:* Similar to gambling disorder, it might prove necessary to subsume bipolar disorders as an exclusion criterion for the future criteria of Internet addiction.

Keywords: bipolar spectrum disorders, diagnostic criteria, clinical prevalence, comorbidity, Internet Addiction, Internet Gaming Disorder

INTRODUCTION

Internet Addiction (IA) has been characterized by increasing amounts spent online, preoccupation with online activities, withdrawal when the behavior is restricted, and continued use despite negative repercussions (American Psychiatric Association, 2013). Since neurobiological and clinical studies (Ko et al., 2013) have indicated that IA is sharing many parallels with gambling disorder, a mental disease that recently has been defined as a non-substance-related addiction, a growing number of professionals have claimed to perceive IA as a further non-substance related addiction (Frascella, Potenza, Brown & Childress, 2010). Consequently, the preliminary diagnostic criteria for Internet Gaming Disorder, a specific subtype of IA that has recently been included into section III of the DSM-5, encompass criteria similar to those from gambling disorder (American Psychiatric Association, 2013).

Despite of progress in research of IA, there are still uncertainties regarding its classification and diagnostics. It is well documented that IA is associated with heightened rates of psychopathological symptoms and comorbid disorders (Tonioni et al., 2012). However, the question of differential diagnosis for IA is a less examined yet important issue. Considering high rates of comorbidity in IA, the importance of diagnostic guidelines becomes evident. There are numerous studies on comorbid disorders in IA and it has been demonstrated that IA is associated with a variety of negative health consequences and different comorbid disorders,

especially affective and anxiety disorders and ADHD (Carli et al., 2012; Kelley & Gruber, 2013; Ko, Yen, Yen, Chen & Chen, 2012; Müller, Beutel & Wölfling, 2014). Only a small number of studies investigated relationships between IA and bipolar spectrum disorders (BSD). In an early investigation, Shapira, Goldsmith, Keck, Khosla and McElroy (2000) found that 55% of patients suffering from IA met criteria for Bipolar I disorder. Likewise, Bernardi and Pallanti (2009) found that two of 15 patients being treated for IA suffered from hypomania.

With this research we intend to contribute to the development of sound diagnostic guidelines for IA. In a previous study, Ko, Ye, Chen, Chen and Yen (2005) proposed to define manic episodes as an exclusion criterion for IA. However, although the APA (American Psychiatric Association, 2013) has released a proposal concerning diagnostic criteria for Internet Gaming Disorder, no exclusion criteria were defined nor guidelines for differential diagnosis.

Given that for gambling disorder, gambling behavior during a manic episode has been defined as an exclusion criterion and taking into account that there are parallels

* Corresponding author: Kai W. Müller, Dipl.-Psych.; Outpatient Clinic for Behavioural Addiction, Department of Psychosomatic Medicine and Psychotherapy, University Medical Centre, Johannes Gutenberg University Mainz, Untere Zahlbacher Straße 8, 55131 Mainz, Germany; Phone: +49 (0)6131-174039; E-mail: muellka@uni-mainz.de

between gambling disorder and IA, systematic investigations regarding frequency of BSD in IA are needed to better define diagnostic boundaries. In this explorative study we intend to investigate occurrence of BSD within patients with excessive Internet use and IA. Based on a pilot study (Müller & Wölfling, 2012) and since comorbid disorders are occurring frequently in IA-patients, we hypothesize that BSD will be more common among the treatment seekers meeting criteria for IA compared to subjects not being classified with IA. Additionally, we want to analyze differences between IA-patients with vs. without comorbid BSD regarding socio-demographics, psychopathology and Internet usage behavior.

MATERIALS AND METHODS

Selection of participants

402 consecutive treatment seekers entering an outpatient clinic for behavioral addictions in Germany were screened for BSD between 2010 and 2014. Twenty-eight subjects (6.9%) had to be excluded because of missing data resulting in a final sample of $n = 385$. Every treatment seeker answered questionnaires and underwent a diagnostic interview by a therapist to address criteria for other mental disorders.

Measures

IA-diagnosis was based on the Scale for the Assessment of Internet and Computer Game Addiction (AICA-S; Müller, Glaesmer, Brähler, Wölfling & Beutel, 2014; Wölfling, Müller & Beutel, 2010), a self-report measure consisting of 14 items derived from substance-related addictions. AICA-S has been demonstrated to show good psychometric properties ($\alpha = .91$). A cutoff of 7 points has been shown to be related to the best diagnostic accuracy (sensitivity = 80.5%; specificity = 82.4%; Müller, Beutel et al., 2014).

Additionally, Internet usage behavior regarding eight Internet activities (online games, social networking sites, online shopping, online pornography, online gambling, mailing or messaging, chatting, research platforms) were assessed.

BSD was assessed using the Mood Disorder Questionnaire (MDQ, Hirschfeld et al., 2000). This self-report measure contains 13 items related to the DSM-IV criteria. A cutoff of 7 points (in combination with more than one criterion being fulfilled at the same time and psychosocial problems arising from it) has been proposed by the authors. Its clinical validity has been demonstrated (Hirschfeld et al., 2000).

The SCL-90R (Derogatis, 1977) was used to measure psychopathological symptoms. It assesses psychosocial distress with 90 items (on a 5-point likert scale) on nine subscales with good psychometric properties (Brophy, Norvell & Kiluk, 1988).

Statistical analyses

SPSS 21.0 was used for all the analyses. Associations between dimensional variables were performed using corre-

lational analyses. Group differences were analysed using t -tests with Cohens d as an indicator for the effect size. Differences between dichotomous or nominal variables were analysed with chi-square tests. Logistic regression analyses were performed to identify predictors for BSD.

Ethics

Each participant was informed about the background of the study and was asked to provide written informed consent. Participation was voluntary. The procedure was in accordance with the declaration of Helsinki and approved by the local ethics committee.

RESULTS

Relationships between Internet addiction and symptoms of bipolar spectrum disorders

First we analysed relationships between IA and BSD according to the MDQ. While the correlation between the MDQ-score and time spent online on a day of the weekend failed to show significance ($r = .070$, ns), the correlation between the score of AICA-S and MDQ reached significance ($r = .299$, $p = .01$).

We then compared treatment seekers meeting diagnostic criteria for IA according to the AICA-S (score > 7 points; IA-subjects, $n = 236$, 63.1%) with those subjects not exceeding this cutoff (non-IA-subjects, $n = 138$, 36.9%) regarding BSD. It turned out that patients from the IA-group had significantly higher means in the MDQ ($t(372) = 6.70$, $p = .001$) and that a larger amount of the IA-subjects ($n = 75$; 30.9%) were scoring above the MDQ-cutoff than the non-IA-subjects ($n = 8$; 5.6%; $\chi^2 = 33.74$; $p = .001$; $\phi = .296$).

The further analyses focus on those subjects meeting criteria for IA ($n = 243$). A comparison of IA-subjects with (bipolar-IA-group; $n = 75$) and without (IA-group; $n = 168$) BSD is provided.

Differences in sociodemographics and Internet usage behaviour

The comparisons of sociodemographic variables between the two groups displayed significant differences regarding living situation, education and employment (see Table 1).

Regarding Internet addictive behaviour, the bipolar-IA-group ($M = 15.4$, $SD = 5.05$) displayed higher scores in AICA-S ($t(120.9) = 3.70$, $p = .001$) than the IA-group ($M = 12.8$, $SD = 4.31$). No significant differences were found regarding time spent online between the Bipolar-IA-group ($M = 6.8$ hours, $SD = 5.88$) and the IA-group ($M = 6.9$, $SD = 3.73$).

The Bipolar-IA-group was more often engaged in online-pornography ($M = 1.4$, $SD = 1.14$ vs. $M = 0.9$, $SD = 1.06$ $t(222) = 2.57$, $p = .011$) and social networking sites ($M = 1.8$, $SD = 1.14$ vs. $M = 1.3$, $SD = 1.00$ $t(223) = 3.20$, $p = .002$). A regression analysis with the eight Internet activities predicting BSD in IA displayed that high frequent usage of social networking sites ($\text{Exp}(B) = 3.31$, $p = .006$) was predictive for BSD in IA (Nagelkerke $R^2 = .093$).

Table 1. Sociodemographic characteristics of patients with Internet addiction with and without bipolar symptoms

	Bipolar IA-group (n = 75)	IA-group (n = 168)	Significance
gender (male)	97.3% (71)	93.3% (162)	ns
age (M, SD)	26.1 (9.91)	24.2 (8.41)	ns
age (range)	13–60	12–64	
marital status (% , n)			ns
single	70.7% (53)	76.8% (129)	
married	16.0% (12)	8.9% (15)	
separated, divorced, widowed	2.7% (2)	2.4% (4)	
housing situation (% , n)			$\chi^2 = 13.35; p = .004$
with parents	30.7% (23)	49.4% (83)	
own household	41.3% (31)	26.8% (45)	
shared living	12.0% (8)	9.5% (16)	
other	5.3% (4)	0.6% (1)	
education (% , n)			$\chi^2 = 11.53; p = .026$
<10 th grade	18.7% (14)	11.3% (19)	
>10 th grade	64.0% (43)	53.0% (89)	
still attending school	13.3% (10)	21.4% (36)	
other	1.3% (1)	0.0% (0)	
employment status (% , n)			$\chi^2 = 12.97; p = .003$
full-time/part-time	25.3% (19)	17.3% (29)	
school/university/traineeship	36.0% (27)	56.0% (94)	
unemployed	28.0% (21)	13.1% (22)	
other	2.7% (2)	1.2% (2)	

Notes: M = mean, SD = standard deviation; χ^2 = chi-square value, p = level of significance; percentages do not sum to 100% because of missing data; Bipolar IA-group = patients positively screened for Internet addiction and bipolar disorder; IA-group = patients positively screened for Internet addiction without bipolar symptoms

Table 2. Mean scores of the subscales and the Global Severity Index of the SCL-90R

GSI and subscales of SCL-90R	Bipolar-IA-group (n = 69) (M, SD)	IA-group (n = 159) (M, SD)	t (df), p, d
Global Severity Index	1.0 (0.63)	0.7 (0.50)	t(108) = 4.49, p = .001; d = .68
Somatization	0.7 (0.62)	0.4 (0.48)	t(105) = 3.39, p = .001; d = .53
Obsessive-compulsive	1.5 (0.79)	1.0 (0.69)	t(215) = 5.55, p = .001; d = .76
Social insecurity	1.1 (0.78)	0.9 (0.76)	t(215) = 2.58, p = .011; d = .37
Depression	1.4 (0.90)	1.0 (0.95)	t(215) = 3.74, p = .001; d = .53
Anxiety	0.9 (0.78)	0.5 (0.56)	t(99) = 4.09, p = .001; d = .65
Aggressiveness	1.0 (0.78)	0.6 (0.59)	t(99) = 3.99, p = .001; d = .63
Phobic anxiety	0.4 (0.53)	0.4 (0.60)	Ns
Paranoid ideation	0.9 (0.79)	0.7 (0.67)	t(214) = 2.88, p = .004; d = .42
Psychoticism	0.8 (0.68)	0.4 (0.46)	t(99) = 4.36, p = .001; d = .68

Notes: GS = Global Severity Index of Symptom-Checklist 90R (SCL-90R); missing cases: n = 16; M = mean, SD = standard deviation; t = t-value; df = degrees of freedom; p = p-value, d = Cohen's d; Bipolar IA-group = patients positively screened for Internet addiction and bipolar disorder; IA-group = patients positively screened for Internet addiction without bipolar symptoms

Comparison of psychopathological symptoms and comorbidity

Patients reporting BSD display heightened psychosocial strain in eight of the nine SCL-sub-scales (cf. Table 2).

A regression analysis with the SCL-90R-sub-scales on BSD indicated that obsessive-compulsive symptoms

(Exp(B) = 2.82, p = .001) turned out as a significant predictor for BSD (Nagelkerke R² = .168).

A comparison of further psychiatric disorders assigned to IA-patients with vs. without BSD illustrated that substance-use disorders were significantly more frequent among the bipolar-IA-group (12.0%, n = 9) than among IA-patients (3.0%, n = 5), as well as unipolar depressive disorders

(30.7%, $n = 23$ vs. 17.9%, $n = 30$) and conduct and personality disorders (13.3%, $n = 10$ vs. 4.8%, $n = 8$).

DISCUSSION

In this paper we screened for the frequency of BSD within a sample of treatment seekers because of IA. We found that a positive BSD-screening was more probable within those subjects meeting criteria for IA than among subjects without IA. Within the IA-patients, a large amount of nearly one third met criteria for BSD.

Only few differences were found regarding sociodemographics with patients with comorbid BSD being less likely to live with their parents and more likely to be unemployed. According to the SCL-90R, IA patients with BSD displayed elevated scores in psychopathology with obsessive-compulsive symptoms predicting BSD significantly. IA-patients with BSD significantly more often met criteria for substance-use disorders, unipolar depressive disorders and conduct and personality disorders.

Interestingly, we found few but significant differences regarding Internet usage behavior. While there were no differences regarding time spent online, patients with BSD engaged more frequently in social networking sites and online-pornography.

There are several explanations for the high prevalence of BSD within our clients: First, BSD and IA show high rates of comorbidity. Second, BSD-patients tend to express excessive Internet use as a part of the BSD and third, prevalence of BSD is overestimated in this study.

While increased rates of BSD in behavioral addictions have been reported before (Kawa et al., 2005; Sapir, Zohar, Bersudsky, Belmaker & Osher, 2013), associations with IA have been documented to a lesser extent – mostly in studies encompassing small samples (Shapira et al., 2000). According to a recent meta-analysis (Carli et al., 2012), depression and anxiety disorders are common in IA. However, the missing empirical evidence regarding BSD in IA might also be accounted for by the lack of studies investigating such relationships. Lots of clinical studies assessing comorbidity in IA concentrate on unipolar depression (Morrison & Gore, 2010) and it has been criticized that the presence of depressive symptoms like loss of interests and avolition distracts from further screening for manic symptoms (Lish, Dime-Meanan, Whybrow, Price & Hirschfeld, 1994). Thus, it may be not the presence but the detection rate of BSD in IA-patients that is low. Further research combining screening instruments and clinical interviews are required.

A second explanation is that BSD should be considered as differential diagnoses in patients expressing excessive Internet use. The excessive use may be explained by a manic episode in these subjects and thus BSD should be regarded as the primary diagnosis. However, this hypothesis' validity is questionable since IA-symptoms had to be present over the period of twelve months in this study to meet criteria for IA. Since manic episodes are usually limited to a short time period, excessive Internet use arising from the manic episode should have been remitted afterwards as well.

It is also possible that the amount of patients suffering from BSD is overestimated in this study, especially since the MDQ displays high specificity but low sensitivity (Mill-

er, Klugman, Berv, Rosenquist & Ghaemi, 2004). It is recommended to replicate our findings by conducting clinical interviews focusing on BSD in IA-patients.

Whether IA and BSD are associated as comorbid disorders or if excessive Internet use is a mere consequence of BSD remains unanswered unless further evidence is available. Based on our results, we recommend considering BSD as an exclusion criterion for IA.

This study has some limitations that need to be addressed. Most significantly, the relations between IA and BSD were assessed by self-report questionnaires and not by a clinical interview, limiting the clinical validity of the data. Additionally, the analyses are based on a selective sample of treatment seekers. Thus, it is unsure if these results can be generalized to patients from other clinical settings. Despite those limitations, we conclude that a significant proportion of patients with IA are displaying signs of BSD that are associated with heightened psychosocial distress. Regardless of the direction of these relationships it is reasonable to assume that these patients might be in need for specific treatment and that goes beyond therapeutic modification of the addictive behavior.

CONCLUSIONS

In a clinical setting, IA is accompanied by high rates of symptoms of bipolar spectrum disorders. While the direction of these relationships must remain unanswered without further examinations, the data presented here point to bipolar disorders as a potential differential diagnosis for IA. To conclude, our results stand in line with proposals of other authors (van Rooij & Prause, 2014) to critically validate the criteria of IA and work on a further elaboration of them.

Funding sources: No financial support was received for this study.

Authors' contribution: KW: study concept and design, MEB: study supervision, MD: statistical analyses, KWM: study concept and design, analysis and interpretation of data.

Conflict of interest: The authors declare that there is no conflict of interest.

REFERENCES

- American Psychiatric Association. (2013). *The Diagnostic and Statistical Manual of Mental Disorders: DSM 5*. bookpointUS.
- Bernardi, S. & Pallanti, S (2009). Internet addiction: A descriptive study focusing on comorbidities and dissociative symptoms. *Comprehensive Psychiatry*, 50(6), 510–516.
- Brophy, C. J., Norvell, N. K. & Kiluk, D. J. (1988). An examination of factor structure and convergent validity of the SCL-90-R in an outpatient clinic population. *Journal of Personality Assessment*, 52, 334–340.
- Carli, V., Durkee, T., Wasserman, D., Hadlaczky, G., Despalins, R., Kramarz, E., Wasserman, C., Sarchiapone, M., Hoven, C. W., Brunner, R. & Kaess, M. (2012). The association between

- pathological Internet use and comorbid psychopathology: A systematic review. *Psychopathology*, 46(1), 1–13.
- Derogatis, L. R. (1977). *SCL-90. Administration, scoring and procedures manual-I for the R (revised) version and other instruments of the Psychopathology Rating Scales Series*. Chicago: Johns Hopkins University School of Medicine.
- Frascella, J., Potenza, M. N., Brown, L. L. & Childress, A. R. (2010). Shared brain vulnerabilities open the way for nonsubstance addictions: Carving addiction at a new joint? *Annals of the New York Academy of Sciences*, 1187, 294–315.
- Hirschfeld, R. M. A., Williams, J. B. W., Spitzer, R. L., Calabrese, J. R., Flynn, L., Keck, P. E., Lewis, L., McElroy, S. L., Post, R. M., Rappaport, D. J., Russell, J. M., Sachs, G. S. & Zajecka, J. (2000). Development and validation of a screening instrument for bipolar spectrum disorder: The Mood Disorder Questionnaire. *American Journal of Psychiatry*, 157, 1873–1875.
- Kawa, I., Carter, J. D., Joyce, P. R., Doughty, C. J., Frampton, C. M., Wells, E., Walsh, A. E. S. & Olds, R. J. (2005). Gender differences in bipolar disorder: Age of onset, course, comorbidity, and symptom presentation. *Bipolar Disorders*, 7(2), 119–125.
- Ko, C. H., Yen, J. Y., Chen, C. C., Chen, S. H. & Yen, C. F. (2005). Proposed diagnostic criteria of Internet addiction for adolescents. *Journal of Nervous and Mental Disease*, 193(11), 728–733.
- Ko, C. H., Liu, G. C., Yen, J. Y., Chen, C. Y., Yen, C. F. & Chen, C. S. (2013). Brain correlates of craving for online gaming under cue exposure in subjects with Internet gaming addiction and in remitted subjects. *Addiction Biology*, 18(3), 559–569.
- Ko, C. H., Yen, J. Y., Yen, C. F., Chen, C. S. & Chen, C. C. (2012). The association between Internet addiction and psychiatric disorder: A review of the literature. *European Psychiatry*, 27(1), 1–8.
- Kelley, K. J. & Gruber, E. M. (2013). Problematic Internet use and physical health. *Journal of Behavioral Addictions*, 2(2), 108–112.
- Lish, J. D., Dime-Meenan, S., Whybrow, P. C., Price, R. A. & Hirschfeld, R. M. (1994). The National Depressive and Manic-Depressive Association (National DMDA) survey of bipolar members. *Journal of Affective Disorders*, 31(4), 281–394.
- Miller, C. J., Klugman, J., Berv, D. A., Rosenquist, K. J. & Ghaemi S. N. (2004). Sensitivity and specificity of the Mood Disorder Questionnaire for detecting bipolar disorder. *Journal of Affective Disorders*, 81(2), 167–171.
- Morrison, C. M. & Gore, H. (2010). The relationship between excessive Internet use and depression: A questionnaire-based study of 1,319 young people and adults. *Psychopathology*, 43(2), 121–126.
- Müller, K. W., Beutel, M. E. & Wölfling, K. (2014). A contribution to the clinical characterization of Internet Addiction in a sample of treatment seekers: Validity of assessment, severity of psychopathology and type of co-morbidity. *Comprehensive Psychiatry*, 55(4), 770–777.
- Müller, K. W. & Wölfling, K. (2012). Clinical data on co-morbid bipolar symptoms in patients with Internet addiction. *Bipolar Disorders*, 14, 8 [Meeting Abstract].
- Müller, K. W., Glaesmer, H., Brähler, E., Wölfling, K. & Beutel, M. E. (2014). Internet addiction in the general population. Results from a German population-based survey. *Behavior & Information Technology*, 33(7), 757–766.
- Sapir, R., Zohar, A. H., Bersudsky, Y., Belmaker, R. H. & Osher, Y. (2013). Behavioral addictions in euthymic patients with bipolar I disorder: A comparison to controls. *International Journal of Bipolar Disorders*, 1(27), 1–6.
- Shapira, N. A., Goldsmith, T. D., Keck, P. E., Khosla, U. M. & McElroy, S. L. (2000). Psychiatric features of individuals with problematic Internet use. *Journal of Affective Disorders*, 57(1–3), 267–272.
- Tonioni, F., D’Alessandris, L., Lai, C., Martinelli, D., Corvino, S., Vasale, M., Fanella, F., Aceto, P. & Bria, P. (2012). Internet addiction: Hours spent online, behaviors and psychological symptoms. *General Hospital Psychiatry*, 34(1), 80–87.
- Van Rooij, A. J. & Prause, N. (2014). A critical review of “Internet addiction” criteria with suggestions for the future. *Journal of Behavioral Addictions*, 3(4), 203–213.
- Wölfling, K., Müller, K. & Beutel, M. (2010). Diagnostische Testverfahren: Skala zum Onlinesuchtverhalten bei Erwachsenen (OSVe-S) [Diagnostic inventories: Scale for the Assessment of Internet and Computer Game Addiction (AICA-S)]. In D. Mücken, A. Teske, F. Rehbein & B. Wildt (Eds), *Prävention, Diagnostik und Therapie von Computerspielabhängigkeit* [Prevention, diagnostics, and therapy of computer game addiction] (pp. 212–215). Lengerich, Germany: Pabst Science Publishers.