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Original Article

Boredom proneness and its correlation with Internet addiction and Internet activities in adolescents with attention-deficit/hyperactivity disorder

Wen-Jiun Chou ^a, Yu-Ping Chang ^b, Cheng-Fang Yen ^{c,d,*}

^a Department of Child and Adolescent Psychiatry, Chang Gung Memorial Hospital, Kaohsiung Medical Center and College of Medicine, Chang Gung University, Kaohsiung, Taiwan

^b School of Nursing, The State University of New York, University at Buffalo, NY, USA

^c Department of Psychiatry, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan

^d Department of Psychiatry, School of Medicine, and Graduate Institute of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan

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Internet gaming

Abstract This study examined the associations of boredom proneness with Internet addiction and activities as well as the moderators for such associations in adolescents with attention-deficit/hyperactivity disorder (ADHD). In total, 300 adolescents with ADHD participated in this study. Their Internet addiction, the scores for lack of external and internal stimulation on the Boredom Proneness Scale-short form (BPS-SF), ADHD, parental characteristics, and the types of Internet activities were examined. The associations of boredom proneness with Internet addiction and Internet activities and the moderators of the associations were examined using logistic regression analyses. Higher scores for lack of external stimulation on the BPS-SF were significantly associated with a higher risk of Internet addiction. Maternal occupational socioeconomic status moderated the association of lack of external stimulation with Internet addiction. Higher scores for lack of external stimulation were significantly associated with a high tendency to engage in online gaming, whereas higher scores for lack of internal stimulation were significantly associated with a low tendency to engage in online studies. Lack of external stimulation on the BPS-SF should be considered a target in prevention and intervention programs for Internet addiction among adolescents with ADHD.

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* Corresponding author. Department of Psychiatry, Kaohsiung Medical University Hospital, No. 100, Tzyou 1st Rd, Kaohsiung, 807, Taiwan. E-mail address: chfaye@cc.kmu.edu.tw (C.-F. Yen).

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Introduction

Internet addiction has substantial adverse effects on physical and mental health and interpersonal relationships; it also diminishes the academic performance of adolescents [1]. Attention-deficit/hyperactivity disorder (ADHD) is the most common psychiatric disorder among adolescents with Internet addiction [2]. The risk of Internet addiction was significantly associated with the severity of ADHD symptoms among adolescents in community [3]. A prospective community study also indicated that ADHD predicts the occurrence of Internet addiction in adolescents during a 2-year follow-up period [4]. The results of previous studies support the observation that Internet addiction warrants early prevention in adolescents with ADHD.

Boredom proneness is one of the possible etiologies responsible for the high risk of Internet addiction among individuals with ADHD [5]. Mikulas and Vodanovich [6] defined boredom as “a state of relatively low arousal and dissatisfaction, which is attributed to an inadequately stimulating environment.” Perkins and Hill [7] expounded boredom as “cognitive changes in the direction of less differentiated and more homogeneous construing give rise to a state of subjective monotony which induces, or perhaps even represents, the state.” Boredom has been found to be significantly associated with problems of negative affect, behavior, interpersonal relationships, and occupations [8]. In addition, boredom has been identified as one of common causes of addictive substance use [9]. Boredom is one of the common triggers of intensive Internet use [10], and it is significantly associated with Internet addiction [11] and Internet-related functional impairment [12] in university students. High boredom proneness is also one of the risk factors for online gambling in young adults [13].

High boredom proneness has been considered one of the core symptoms in individuals with ADHD, which usually results in impaired academic function and difficulties in interpersonal relationships [14]. Adults with high boredom proneness performed poorly on measures of sustained attention and exhibited increased symptoms of ADHD [15]. Given that Internet use can provide rapid responses, immediate rewards, and multiple windows with different activities, which may reduce the feeling of boredom, the hypothesis that high boredom proneness is significantly associated with the risk of Internet addiction among adolescents with ADHD is reasonable [5]. However, several issues regarding the association between boredom proneness and Internet addiction in adolescents with ADHD warrant further study. First, a previous study reported that leisure boredom increases the probability of Internet addiction in adolescents [16]. However, the relationship between general boredom proneness and Internet addiction in adolescents with a clinical diagnosis of ADHD has not been examined. Second, boredom proneness consists of various factors. For example, the Boredom Proneness Scale-short form (BPS-SF) [17] is the commonly used instrument for measuring general boredom proneness. The BPS-SF consists of two overall factors, namely lacks of internal stimulation and external stimulation [10]. The relationships between various components of boredom proneness and Internet addiction have not been examined. Third, adolescents may use the Internet for many types of

online activities. Various Internet activities have different characteristics and provide different types of pleasure. Whether boredom proneness has various relationships with different types of Internet activities requires further study. Fourth, sex [18], age [19], parental socioeconomic status (SES) [19], and severity of ADHD symptoms [18] are significantly associated with Internet addiction in individuals with ADHD. Meanwhile, sex and age moderated the relationships of residential background and social activities with Internet addiction in adolescents [20]. Regarding boredom proneness, a previous study on psychiatric inpatient population found that boredom proneness was not associated with age or gender [21], whereas another study on community population found that boredom is more prevalent among men, youths, the unmarried, and those of lower income [22]. However, whether these factors moderate the association between boredom proneness and Internet addiction and activities in adolescents with ADHD requires further study.

This study examined the associations between boredom proneness and Internet addiction and activities as well as the moderating effects of demographic, parental, and ADHD characteristics on these associations in adolescents with ADHD. We have three hypotheses. First, the scores for the lack of internal stimulation and external stimulation on the BPS-SF measuring boredom proneness are significantly associated with the risk of Internet addiction in adolescents with ADHD. Second, boredom proneness has various relationships with different types of Internet activities. Third, due to the scarcity of previous studies, we hypothesized that the demographic, parental, and ADHD characteristics moderate the association between boredom proneness and Internet addiction and activities in adolescents with ADHD.

Methods

Participants

The participants for this study were recruited from the child and adolescent psychiatric outpatient clinics of two medical centers in Kaohsiung, Taiwan. Adolescents aged between 11 and 18 years, who had received a diagnosis of ADHD according to the diagnostic criteria in the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) [23], were consecutively invited to participate in this study between August 2013 and July 2015. ADHD was diagnosed on the basis of multiple data sources including (i) an interview with a child psychiatrist; (ii) clinical observation of the participant's behavior; and (iii) a history provided by the parents and the short version of the Swanson, Nolan, and Pelham, Version IV Scale-Chinese version (SNAP-IV) [24]. Adolescents with intellectual disabilities, schizophrenia, bipolar disorder, autistic disorder, difficulties in communication, or any cognitive deficits that adversely affected their ability to understand the study purpose or complete the questionnaires were excluded. A total of 333 adolescents with the diagnosis of ADHD were enrolled for this study. Among them, 300 (90.0%) agreed to participate in this study and were interviewed by research assistants using a research questionnaire. Of the 33 adolescents who refused to join this study, 19 and 14 refused on the basis of their parents' and their own opinions, respectively. The

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