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Combined reality therapy and mindfulness meditation decrease intertemporal decisional impulsivity in young adults with Internet gaming disorder



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ABSTRACT

Decisional impulsivity represents an important phenotype and a therapeutic target in Internet gaming disorder (IGD). Reality therapy and mindfulness meditation were two approaches to reduce impulsivity. This study aimed to evaluate the efficacy of a group behavioral intervention combining reality therapy and mindfulness meditation in reducing decisional impulsivity and IGD severity. Twenty-five IGD and 21 healthy comparison (HC) young adults participated in baseline tests on the delay discounting and balloon analog risk tasks to measure intertemporal and risky decision-making respectively. Among them, 18 IGD subjects participated in the intervention and were tested again at the end of intervention, and 19 HC subjects without intervention were also tested twice within a similar time period. Results indicate that: (1) at baseline, IGD subjects showed greater intertemporal and risky decisional impulsivity than HC subjects; (2) After intervention, IGD subjects were decreased in delay discounting rate and IGD severity, but did not perform differently on decisional impulsivity in risky choices, as compared with baseline. These findings suggest that decisional impulsivity is a multifaceted behavioral construct and may serve as a possible therapeutic target for IGD. In addition, these results highlight the need for further research into the roles of different forms of decisional impulsivity in the shaping, maintenance, and remission of IGD.

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1. Introduction

It is estimated that there are more than 390 million Internet gamers in China, with young adults making up the majority of this population (China Internet Network Information Center, 2016). The

number of individuals with Internet gaming disorder (IGD) has increased rapidly over the last decade, and the issue is particularly serious in young adults because they have easy access to Internet gaming and often spend an excessive amount of time on such activities (Chou, Condron, & Belland, 2005). American Psychiatric Association (2013) has included IGD as a non-substance disorder in the appendix of the 5th edition of the Diagnostic and Statistical Manual of Mental disorder (DSM-5), because it shares key symptoms (e.g., impulsive use, loss of control, withdrawal) with other kinds of addictive disorders. Nearly all addictions, including IGD, are characterized by increased impulsivity (Li & Sinha, 2008), and an individual's impulsivity level is associated with poorer

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intervention outcome and higher relapse rate (Brewer, Worhunsky, Carroll, Rounsaville, & Potenza, 2008; Goudriaan, Oosterlaan, De Beurs, & Van Den Brink, 2008). For this reason, impulsivity has been proposed as a potential target for intervention for IGD (Dong & Potenza, 2014; Irvine et al., 2013).

Impulsivity is a multidimensional construct that can be divided into impulsive disinhibition and decisional impulsivity (Bechara, 2005; Reynolds, Ortengren, Richards, & de Wit, 2006). Although impulsive disinhibition appears to be characteristic of individuals with substance and alcohol use disorders (Bednarski et al., 2012; Hu, Ide, Zhang, Sinha, & Li, 2015; Li, Yan, Sinha, & Lee, 2008), it has been argued that individuals with IGD are not impaired in the inhibition of impulsive behavior, at least at the behavioral level (Sun et al., 2009; Yao, Wang, et al., 2015). One potential reason for this discrepancy between IGD and other addictive disorders is that Internet gamers need to accurately control their gaming avatars to launch attacks and dodge enemies, activities that provide extensive practice in cognitive motor control (Bavelier et al., 2011; Yao, Wang, et al., 2015). Internet action gaming may benefit a wide range of executive functions, including inhibitory control (Anguera et al., 2013; Castel, Pratt, & Drummond, 2005), thus, ameliorating impulsive disinhibition commonly seen in individuals with addictive disorders.

In contrast to impulsive disinhibition, individuals with IGD do show greater decisional impulsivity. For example, individuals with IGD dwell on Internet gaming regardless of negative consequences (Petry et al., 2014; Yao et al., 2014; Yao, Wang, et al., 2015). Decisional impulsivity can be further sub-divided into intertemporal and risky decision-making (Reynolds et al., 2006; Verdejo-García, Lawrence, & Clark, 2008). Individuals with IGD favor smaller immediate over larger delayed rewards in the delay discounting task (DDT), reflecting greater decisional impulsivity in the intertemporal domain, as compared with healthy control (HC) individuals (Irvine et al., 2013; Saville, Gisbert, Kopp, & Telesco, 2010). In addition, previous studies have also shown elevated decisional impulsivity under risk in IGD compared with HC individuals on various risky decision-making paradigms, such as the balloon analogue risk (BART) and game of dice tasks (Lin, Zhou, Dong, & Du, 2015; Pawlikowski & Brand, 2011; Qi et al., 2015; Yao et al., 2014; Yao, Chen, et al., 2015; Yao, Wang, et al., 2015). Together, decisional impulsivity may serve as an etiological marker and a potential intervention target of IGD. However, no studies have developed an intervention to decrease decisional impulsivity or evaluate its efficacy in alleviating IGD severity.

One possible approach to reduce decisional impulsivity is reality therapy, which is based on the WDEP model (W = wants, D = direction and doing, E = evaluation, P = planning and commitment) (Kim, 2008; Wubbolding, 2013; Wubbolding et al., 2004). In this approach, firstly, participants receiving reality therapy are required to identify the goal of their behavior (e.g., to pursue relaxation after a day of stressful study). Secondly, they are asked what they are actually doing (e.g., playing games). Thirdly, they are guided to evaluate whether their behaviors advance or impede progress toward the initial goal (e.g., playing games may help relieving the immediate stress, but excessive gaming may interfere with study and health, ultimately leading to more stress). Finally, they are encouraged to seek more appropriate and healthier alternatives to replace the current behavior to achieve the goal, and to make plans to change undesirable behavior (e.g., doing sports rather than playing games when feeling stressed) (Wubbolding, 2013). Thus, reality therapy directly targets goal-directed choices and self-control by helping individuals reflect on their behaviors, evaluate their choices, and plan to choose more effective options. In addition, this approach has shown promising efficacy in the alleviation Internet addiction symptoms (Kim, 2007, 2008). Taken

together, it appears to be an appropriate approach to target decisional impulsivity in IGD.

Another possible approach to reduce decisional impulsivity is mindfulness meditation, because existing evidence showed its potential to enhance self-control, attention regulation, and working memory (Jha, Krompinger, & Baime, 2007; Ortner, Kilner, & Zelazo, 2007; Tang, Tang, & Posner, 2013; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010), all of which play critical roles in optimal decision-making (Bickel, Yi, Landes, Hill, & Baxter, 2011; Hare, Hakimi, & Rangel, 2014; Yao, Wang, et al., 2015). Additionally, mindfulness meditation helps individuals to focus attention on their interoceptive and emotional awareness without judgment (Alfonso, Caracul, Delgado-Pastor, & Verdejo-García, 2011; Hölzel et al., 2011), and has been shown beneficial effects on the treatment of various psychiatric disorders, including addiction (Bowen et al., 2006; Tang et al., 2013; Zhang et al., 2016b, 2016a).

The present study aimed to develop a group behavioral intervention combining reality therapy and mindfulness meditation to target heightened decisional impulsivity for IGD, and to evaluate its efficacy on two components of decisional impulsivity and IGD severity in individuals with IGD. We chose group intervention because it facilitates social support and interpersonal interaction (Du, Jiang, & Vance, 2010), which are typically impaired in individuals with IGD (American Psychiatric Association, 2013). Based on previous studies, we hypothesized that: (1) at baseline, the IGD group, compared with the HC group, would be impaired on both intertemporal and risky decision-making, as measured by the DDT and BART, respectively (Irvine et al., 2013; Qi et al., 2015; Saville et al., 2010); (2) following the intervention, individuals with IGD would improve decision-making performance in both tasks and decrease IGD severity, as compared with baseline; and (3) improvements on decisional impulsivity would be significantly associated with reductions in IGD severity at the individual level.

2. Methods

2.1. Participants

A total of 25 IGD and 21 HC young adults (18–26 years old) were recruited by means of online advertisements and word of mouth. Participants were interviewed using DSM-5 criteria of IGD (American Psychiatric Association, 2013), and those who (1) met 5 or more criteria (Ko et al., 2014), (2) spent at least 14 h per week on Internet gaming, and (3) reported Internet games as their primary Internet activities were diagnosed as individuals with IGD (Zhang et al., 2016b, 2016a). HC subjects never played Internet games. All participants were free from Axis I psychiatric disorders as assessed by the Mini-International Neuropsychiatric Interview (MINI; Sheehan et al., 1998).

All of the 25 IGD and 21 HC subjects participated in the baseline test. Eighteen IGD subjects completed a 6-week group behavioral intervention combining reality therapy and mindfulness meditation and repeated the test one week after the end of the intervention. Nineteen HC subjects without intervention were also tested twice within a period of seven weeks. Of the remaining 7 IGD and 2 HC subjects, 5 IGD and 2 HC subjects did not attend the group intervention or follow-up test sessions because of time conflicts, whereas the other 2 IGD subjects dropped out during the group intervention and did not participate in the second test either.

This study complied with the Declaration of Helsinki. All participants provided written informed consent and were financially compensated for their time, following a protocol approved by the Institutional Review Board of the School of Psychology, Beijing Normal University.

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