



# Psychometric properties of the Barratt Impulsiveness Scale in patients with gambling disorders, hypersexuality, and methamphetamine dependence



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## HIGHLIGHTS

- Barratt Impulsiveness Scale factor structure is assessed in three clinical samples
- Modifications to the BIS resulted in a goodness of fit for a 3-factor model
- Minor variations in impulsivity exist between our three populations
- Approximately half of patients in each group exhibited high impulsivity
- Future studies with addictive populations should consider this modified BIS

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## ABSTRACT

Although the Barratt Impulsiveness Scale (BIS; Patton, Stanford, & Barratt, 1995) is a widely-used self-report measure of impulsivity, there have been numerous questions about the invariance of the factor structure across clinical populations (Haden & Shiva, 2008, 2009; Ireland & Archer, 2008). The goal of this article is to examine the factor structure of the BIS among a sample consisting of three populations exhibiting addictive behaviors and impulsivity: pathological gamblers, hypersexual patients, and individuals seeking treatment for methamphetamine dependence to determine if modification to the existing factors might improve the psychometric properties of the BIS. The current study found that the factor structure of the BIS does not replicate in this sample and instead produces a 12-item three-factor solution consisting of motor-impulsiveness (5 items), non-planning impulsiveness (3 items), and immediacy impulsiveness (4 items). The clinical utility of the BIS in this population is questionable. The authors suggest future studies to investigate comparisons with this modified version of the BIS and other impulsivity scales such as the UPPS-P Impulsive Behavior Scale in clinical populations when assessing disposition toward rash action.

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## 1. Introduction

Impulsivity has been defined as “a predisposition toward rapid, unplanned reactions to internal or external stimuli with diminished regard to the negative consequences of these reactions to the impulsive individual or others” (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001; Potenza, 2007). While multiple scales have been developed to assess self-reported impulsivity, the Barratt Impulsiveness Scale (BIS) is arguably the most widely used (Patton, Stanford, & Barratt, 1995). The extensive use of the BIS is reflected in the more than 500 citations of the 11th revision reported in the literature (Stanford et al., 2009). The BIS has been used in multiple neuropsychiatric populations and

numerous research studies (Spinella, 2007). The BIS has shown positive correlations with neuropsychological measures of impulsivity and is sensitive to executive deficits in prefrontal and orbitofrontal systems in multiple clinical samples (see Spinella, 2004). For example, problem gamblers tend to have more errors on the Go/No-go task and higher scores on the BIS, and BIS and Go/No-go scores can significantly discriminate problem gamblers and non-gamblers (Forbush et al., 2008). Scores on the BIS and neuropsychological tests have also been shown to be more predictive of Borderline Personality disorder and Bulimia Nervosa (Black et al., 2009; Kemps & Wilsdon, 2010). Interestingly, BIS scores were able to add unique predictive variance to psychological tests in the prediction of borderline personality disorders and problem gambling, whereas neuropsychological tests were unable to add predictive variance over and above BIS scores (Black et al., 2009; Forbush et al., 2008). Similar findings have been noted in other clinical disorders such as substance abuse and bipolar disorder where impulse control is

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compromised (Hanson, Luciana, & Sullwold, 2008; Swann, Dougherty, Pazzaglia, Pham, & Moeller, 2004). Correlations among neuroimaging and BIS scores have also supported relationships between behavioral dysregulation and cortical regions associated with inhibitory deficits such as the dorsolateral prefrontal cortex (Valdes et al., 2006).

Although the BIS total and subscale scores appear to successfully differentiate clinical populations from healthy controls (e.g., Forbush et al., 2008; Lee et al., 2009), replicating the factor structure of the BIS has been problematic, making specific interpretations of findings challenging to apply to research and clinical applications. Patton et al. (1995) found that the BIS-10 and BIS-11 both contained three factors in psychiatric inpatients and prison inmates: motor impulsivity, cognitive impulsivity and non-planning impulsivity. However, the BIS-11 was also found to have six primary factors (attention, motor impulsiveness, self-control, cognitive complexity, perseverance, and cognitive instability) underlying the three second-order factors (Patton et al., 1995). Although some studies have confirmed this factor structure, even in short form versions of the BIS (see Chahin, Cosi, Lorenzo-Seva, & Vigil-Colet, 2010; Miller, Joseph, & Tudway, 2004; Spinella, 2007), other studies have not supported the three-factor structure of the BIS-11. For example, Haden and Shiva (2008) found a two-factor model in a forensic inpatient sample, consisting of nonplanning impulsiveness and a combined factor of motor and non-attentional impulsiveness items. Additionally, Ireland and Archer (2008) found a three-factor solution among male and female adult prisoners, but the three factors did not replicate the Patton et al. (1995) structure and appeared to differ significantly between males and females. Specifically, the three-factor structure was supported for males, but not for females (Ireland & Archer, 2008). It is important to note that many of the studies replicating the Patton et al. (1995) three-factor solution studied community and non-clinical samples, including a recent investigation of the psychometric properties of the BIS which was limited to college students and healthy community controls (Stanford et al., 2009). However, the two most recently published assessments of the BIS structure in a community sample failed to find empirical support for a three-factor structure favoring a two-factor model as a better fit for the data (Reise, Moore, Sabb, Brown, & London, 2013) or a unidimensional factor (Steinberg, Sharp, Stanford, & Tharp, 2013). Regardless, the factor structure appears to be less robust in samples thought to exhibit high levels of impulsivity including those with addictive disorders, suggesting caution in using the three factors of the BIS-11 in these populations.

In order to address the utility of the factor structure in clinical samples with addictive tendencies, the present study utilized three populations known to exhibit impulsivity: pathological gamblers, hypersexual patients, and individuals seeking treatment for methamphetamine dependence. Although impulsivity has been noted independently among these patient samples (e.g., Billieux et al., 2012; Blanco et al., 2009; de Wit, 2008; Knezevic & Ledgerwood, 2012; Potenza & de Wit, 2010; Reid, Bramen, Anderson, & Cohen, in press; Reid, Carpenter, et al., 2012; Reid, McKittrick, et al., 2012; Reid, Garos, & Carpenter, 2011; Shin, Hong, & Jeon, 2012), this is the first study to evaluate the psychometric properties of the BIS in a combined sample of these three populations. Given the high impulsivity in the three groups being studied, we hypothesized that the three-factor model of the BIS-11 (involving non-planning, motor and inattention impulsivity) would not fit well and an alternate factor structure would better fit the data across the three diagnostic groups.

## 2. Method

### 2.1. Participants and procedure

Subjects used in this study ( $N = 353$ ) were obtained from an archival database of research participants recruited for three separate studies from 2008 through 2012 and approved by the Institutional Review Board at the University of California, Los Angeles. The subjects in these convenience samples met criteria for pathological gambling

( $n = 203$ ), methamphetamine dependence ( $n = 81$ ), and hypersexual behavior ( $n = 69$ ). Each population was assessed for their respective disorder based on diagnostic interviews using either the *Mini International Neuropsychiatric Interview* (MINI; Sheehan et al., 1998), the *Structured Clinical Interview for the DSM-IV-TR* (SCID; Spitzer, Williams, Gibbon, & First, 1995) and other structured interviews for gambling disorders and hypersexuality (see below).

#### 2.1.1. Methamphetamine participants

Methamphetamine dependence was assessed using the SCID and participants were excluded if they met criteria for a major psychiatric disorder not due to substance abuse (e.g., schizophrenia or bipolar illness) as assessed by the SCID; a recent (past 30 days) history of suicide attempts and/or current serious suicidal intention or plan; current dependence on cocaine, opiates, alcohol, or benzodiazepines, as defined by DSM-IV-TR criteria; and a history of alcohol dependence within the past 3 years. Participants were considered to be void of a gambling disorder if during the interview they indicated that they either did not gamble or gambled infrequently (e.g., <3 times a year). Only participant data containing Hypersexual Behavior Inventory (HBI) scores less than 53 were extracted for this study (HBI Mean = 36.9, SD = 11.2) and information regarding comorbid psychopathology was unavailable for this analysis.

#### 2.1.2. Pathological gamblers

Participants were recruited as part of ongoing research conducted by the UCLA Gambling Studies Program. Gambling disorders were assessed using a structured interview: the National Opinion Research Center DSM Screen for Gambling Problems (NODS; see below) and required NODS scores  $\geq 5$  (NODS Mean 8.6, SD = 1.2). Participants were also assessed for psychopathology and substance-related disorders using the MINI and a toxicology screen. Participants used for this analysis did not meet criteria for a substance-related disorder in the past 12 months and must have tested negative for cannabis, cocaine, opioids, methamphetamine, or alcohol. Only participant data containing Hypersexual Behavior Inventory scores  $\leq 53$  were extracted for this study (HBI Mean = 30.9, SD = 10.5) and information regarding comorbid psychopathology was unavailable for this analysis.

#### 2.1.3. Hypersexual participants

The hypersexual patients were recruited as part of a DSM-5 field trial assessing the reliability and validity of the proposed criteria for hypersexual disorder (HD). Participants were classified as hypersexual based on their responses to the HD structured interview and elevated scores ( $>53$ ) on the Hypersexual Behavior Inventory. Hypersexuals were assessed for substance-related disorders using the MINI and gambling disorders using the NODS. Data for this analysis was extracted from our research database using a syntax requiring hypersexuals to have a NODS score  $\leq 1$  (NODS Mean 0.25, SD = 0.43), and no substance-related disorder in the past 12 months including nicotine dependence (caffeine-related disorders were not assessed). Data on comorbid psychopathology for this sample are being submitted for review elsewhere.

A more extensive review of methods for each respective group has been described elsewhere for the methamphetamine dependent participants (Heinzerling et al., 2010), the pathological gamblers (Parhami et al., 2012; Reid, McKittrick, et al., 2012), and the hypersexual population (Reid, Carpenter, et al., 2012).

Participants ( $N = 353$ ) had a mean age of 39.2 ( $SD = 11.1$ ) years and were predominantly male (female = 26%). Ethnic representation consisted of Hispanic (20.1%), Asian (4.2%), African American (8.5%), and Caucasian (67.1%).

### 2.2. Measures

*Hypersexual Disorder Diagnostic Clinical Interview (HD-DCI)*. Based on the proposed DSM-5 classification criteria for hypersexual disorder

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