Complex nature of impulsivity measurements: A comparison of self-report questionnaires and behavioral laboratory task

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Abstract
Impulsivity is a multi-dimensional psychological construct and is a central element in the diagnosis of many mental disorders: substance abuse disorder, ADHD, several personality disorders, and impulse control disorders. This essay intends to review self-report scales (BISS-11 and EIQ) and a behavioral laboratory task (The Stop Signal Task) and access their strengths and limitations. Research has shown a lack of correlation between the self-report and the behavioral laboratory task measures; indicating that each tap into different aspects of impulsivity. It is suggested that the future research may focus on developing a unidimensional trait definition of impulsivity and possibly design a new tool that complements its analysis. In summary, this essay acts as a guide to understanding the different assessment measures of impulsivity, and caution should be used when using a certain measurement tool, which may tap into a limited aspect of impulsivity.

Keywords: Impulsivity, Measures, BISS-11 and EIQ, The Stop Signal Task

Review
Impulsivity is a multi-dimensional psychological construct; encompassing components of cognition and behavior (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001). Impulsivity can be defined as behavior that is executed without adequate thinking, i.e., spontaneous actions that are carried out without giving much thought to their consequences (Evenden, 1999; Samuel & Sahakian, 2007). The Diagnostic and Statistical Manual of Mental Disorders (5th ed.) (American Psychiatric Association, 2013) has dedicated a separate chapter for disruptive, impulse control and conduct disorders. Research has suggested it to be an underlying construct in various other psychological disorders (Gullo, et al., 2017; Horn, Dolan, Elliot, Deakin, & Woodruff, 2003; Lee-Winn, Townsend, Reinblatt, & Mendelson, 2016; Dick et al., 2010; Shirley & Sirocco, 2014). The multifaceted nature of impulsivity makes it challenging to develop a single tool of measurement, while still providing a valid and reliable assessment. Therefore, it is critical to measure impulsivity accurately to be able to make a valid diagnosis of the primary psychopathology.

Currently, impulsivity is measured using self-report questionnaires and behavioral laboratory tasks (Cyders & Coskunpinar, 2011). This essay intends to evaluate and critique two commonly used, self-report impulsivity questionnaires Barratt Impulsiveness Scale (BIS-11) (Patton, Stanford, & Barratt, 1995); and The Eysenck Impulsiveness questionnaire (Eysenck, Eysenck, & Barrett, 1985) and one behavioral laboratory task (Stop Signal task). Thereby, comparing two main categories of impulsivity measurement tools.

Barratt Impulsiveness Scale (BIS-11) (Patton, Stanford, & Barratt, 1995) is one of the most commonly used self-report measure of impulsivity and has been in use for almost 58 years (as of 2017) (Stanford et al., 2009). It is based on a 30 item scale and is rated on a four-point Likert scale for example, “rarely/never,” “occasionally,” “often” and “almost always/aways." The BIS-
11 is compiled to gauge three impulsivity sub-traits: Motor impulsiveness (lack of adequate forethought and perseverance), for example, “I do things without thinking” (Stanford et al., 2009). Non-planning impulsiveness (lack of self-control), for example, "I act on impulse" (Stanford et al., 2009). Finally, Attentional impulsiveness (cognitive instability), for example, "I am restless at lectures or talks" (Stanford et al., 2009). Stanford et al., (2009), in their 50-year review of the BIS-11, indicated a high-level of internal consistency (α = .83) and test-retest reliability of .83. The BIS-11 has been widely tested and validated in number of psychopathologies such as: substance use disorder (Ersche, Turton, Pradhan, Bullmore, & Robbins, 2010), pathological gambling (Furntes, Hermano, Artes, & Gorenstein, 2006), attention deficit and hyperactivity disorder and bipolar disorder (Nandagopal, et al., 2011). Dom, Hulstijn, and Sabbe, (2006), further showed that BIS-11 was more efficient than Zuckerman Sensation Seeking Scale (SSS) (Zuckerman, Kolin, Price, & Zoob, 1964) concerning the sensitivity to substance abuse disorder. They showed that only BIS-11 segregated the early-onset alcoholics score efficiently to the late-onset alcoholics scores.

Another commonly used self-report tool is The Eysenck Impulsiveness questionnaire (EIQ) (Eysenck, Eysenck, & Barrett, 1985). The EIQ measures impulsiveness in terms of three-factor dimensions: Impulsiveness, Venturesomeness, and Empathy. Impulsiveness was defined as ‘behaving without thinking and without realizing the risk involved in the behavior (Eysenck et al., 1985). Venturesomeness was defined as ‘being conscious of the risk of the behavior but acting anyway’ (Eysenck et al., 1985). Finally, Empathy was defined as the capability to relate to other people in an emotional capacity(Eysenck et al., 1985). The scale consists of 54 true/false items. These items are further segregated into the following: The Impulsiveness subscale covers 19 items (e. g. Do you often do things on the spur of the moment? ). The Venturesomeness subscale contains 16 items (e. g. Do you enjoy taking risk?). Finally, the Empathy subscale consists of 19 items (Do you get very upset when you see someone cry?). High internal reliabilities scores for both Impulsiveness and Venturesomeness have been reported at .80, and an inter-scale correlation was reported at .36 (Eysenck, Eysenck, & Barrett, 1985). The EIQ has been shown to effectively use in the study of pathological gambling, where impulsivity is an underlying construct (Hodgins & Holub, 2015).

Impulsivity measures using behavioural lab tasks usually measure two separate components of impulsivity: impulsive choice (maladaptive decision making) and impulsive action (ability to inhibit inappropriate or unwanted behaviors) (Weafer, Baggot, & Wit, 2013; Dick et al., 2010). The Stop Signal Task (SST) (Lappin & Eriksen, 1966) is a widely used behavioural laboratory assessment task, used to measure the “impulsive action” or “response inhibition” (Verbruggen & Logan, 2009a). The participant has to quickly and accurately respond to the initial “go” stimulus; which on intervals is followed by the “stop” signal (such as a sound) whereby the participant should avoid a response by not pressing any button (Verbruggen & Logan, 2008). The reaction time (SSRT) is calculated based on the difference between the “go” and the “stop” stimuli (Verbruggen & Logan, 2009b). Moeller, Barratt, Dougherty, Schmitz, and Swann (2001) showed that the SST has a high level of content validity because the task accurately measures willingness/ability to withhold a response. Regarding reliability, Wostmann, et al. (2013) inferred that reliability ranged from $r = 0.61$ to $r = 0.65$, making the SST of moderately high reliability. Therefore, the SST has strong construct validity. In comparison to the self-report measures, SST has shown sensitivity to external manipulation such as state influences like abstinence from smoking in participants (n = 56) with ADHD symptoms (self-report) (Ashare &
Hawk, 2012). Research has also shown that different versions of SST have a sound validity when used with children (Nichols & Waschbusch, 2004).

Numerous studies have investigated the effectiveness and the relationship between the self-report measure scores and behavioral laboratory measures of impulsivity (Cyders & Coskunpinar, 2011; Furntes, Hermano, Artes, & Gorenstein, 2006; Samuel & Sahakian, 2007). Furthermore, studies have shown a lack of significant correlation between the self-report measures (BIS-11 and EIQ) and the impulsiveness measure of the behavioural laboratory tasks (Reynolds, Ortengren, Richards, & de Wit, 2006). This lack of a significant correlation stems from the fundamental difference between the self-report measures and the behavioural laboratory task measures. Self-report measures were developed to gain an insight into the more stable nature of the personality traits (Cyders & Coskunpinar, 2012; Stanford et al., 2009). On the other hand, the behavioural laboratory tasks provide a "momentarily" measure of behavioural response at a given time point (Cyders & Coskunpinar, 2012). Although self-report measures are known to have strong face validity, this strength can backfire, as participants can be prone to "social desirability bias," thereby affecting the reliability of the overall results (Cyders & Coskunpinar, 2011). In contrast, the behavioural lab tasks are thought to effectively measure underlying traits, tendencies, and processes as a measure of impulsivity. As they do not suffer from issues such as face validity and social desirability bias. Moreover, they can be more effective in the study of ADHD in children (Alderson, Rapport, & MJ., 2007) and substance abuse (Dick et al., 2010), as researchers have more control over the confounding variables in a laboratory environment. However, a major drawback of behavioural laboratory tests is the low ecological validity (criterion-validity) as the applicability to real life environment can be questioned (Cyders & Coskunpinar, 2011). Ferraz, et al., 2009 explored impulsivity as a function in borderline personality disorder and compared the self-report questionnaires with the behavioural laboratory task measures. They found no correlation between trait and behavioural response impulsivity. The study re-enforced the multi-dimensional nature of impulsivity and difficulty in assessing it as a unitary construct.

However, research has also given weight to the use of a combination of behavioural tasks and self-report measures, as they do capture broader dimensions of impulsivity. For example, Hermano, Artes, and Gorenstein (2006) investigated impulsivity in 214 pathological gamblers and 82 healthy controls, using both neuropsychological tests (go/no-go task) and self-report scales (BIS-11). They reported that both measures of impulsivity used together, differentiated better between the gamblers and the control group, than if each test was used separately.

In conclusion, the studies have highlighted the lack of correlation between different measures of impulsivity (Cyders & Coskunpinar, 2012; Samuel & Sahakian, 2007). Future research should focus on using a combination of the self-report measures and behavioural laboratory tasks; to get a more comprehensive assessment of impulsivity in a psychological disorder (Weafer, Baggot, & Wit, 2013). There is an urgent need to have a more unitary definition of impulsivity that would focus on the core traits underlying impulsive behaviour rather than a spectrum of traits. In regards to the measurement tool, a new unitary tool of analysis would complement the unitary definition of impulsivity (Smith, Fischer, & Fister, 2003). That would further standardize the clinical diagnosis of psychopathologies that have impulsivity central to their diagnosis and treatment. In summary, this essay acts as a guide to understanding the different assessment measures of impulsivity, and supports the argument that caution should be used when using a certain measurement tool, which may tap into a limited aspect of impulsivity.
References


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