Composite impulsivity-related domains in college students

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A B S T R A C T
Impulsivity is a complex, multidimensional construct with prior theoretically and empirically derived characterizations of impulsivity-related behaviors varying considerably among studies. We assessed college students (N = 440) longitudinally with five impulsivity-related self-reported assessments and two computerized behavioral measures. Using a combination of exploratory and confirmatory factor analysis (CFA), we derived then validated several composite impulsivity-related domains (CIRDs). These factors replicated, in large part, findings from a previous study conducted by our group in an independent sample that used a similar analytical approach. The four CIRDs derived in current study are: Impulsive action, Approach/Appetite Motivation, Impulsivity/Compulsivity and Experience and thrill seeking/Fearlessness. Subsequent psychometric analyses found these CIRDs to be relatively stable over the two-year period. Moreover, multiple regression analysis found that CIRD profiles associated with clinical and behavioral characteristics including anxiety, depression, attention deficit hyperactivity disorder and substance use symptomology. Overall, our data suggest that empirically-derived CIRDs have potential for organizing previous impulsivity-related constructs into a more naturalistic framework where distinct constructs are often expressed together in the same individuals. This framework might facilitate future research of neuropsychiatric disorder risk and etiology.

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1. Introduction

Impulsivity is a complex, multidimensional characteristic that has been characterized as “a predisposition towards rapid, unplanned reactions to internal or external stimuli with diminished regard to the negative consequences of these reactions to the impulsive individuals or others” (Fineberg et al., 2014). However, how best to parse impulsivity-related features is unclear (Fineberg et al., 2014). Appropriate segregation of different theoretical constructs is important to the neurobiological study of impulsivity, as different domains might vary in relationship to brain circuits, neurotransmitter systems and/or genetic mechanisms and contribution to specific psychopathologies. Two empirically supported impulsivity dimensions are impulsive-choice and impulsive-action (Brevers et al., 2012, Dalley et al., 2011). However, numerous other impulsivity-related constructs, including characteristics of novelty and sensation-seeking (Zuckerman and Neeb, 1979), reward-drive (Carver and White, 1994; Luman et al., 2012; Torrubia et al., 2001), thrill-seeking (Campbell et al., 2010), behavioral inhibition/activation (Carver and White, 1994) also relate importantly to personality and psychopathology. Also, a prior study (Cyders and Smith, 2008) has conducted structural equation modeling using UPPS scale (Berg et al., 2015) to assess longitudinal risky and gambling behaviors. The purpose of the current study was to derive...
comparisons of factor structure across studies are not possible because they used different measures. However, it is noteworthy that although scores on measures within similar theoretical domains (e.g., Go/NoGo and Stop Signal tasks) are not always highly correlated (Caswell et al., 2015), studies that used the same measures tend to find similar factor structure. For instance, two prior studies from our group (Ginley et al., 2014; Meda et al., 2009) found that sensitivity to punishment measured on the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ) (Torrubia et al., 2001) and compulsivity as measured by the Padua Inventory (PI) (Sternberger and Burns, 1990) covaried. Such similarities suggest that a study with sufficient coverage of impulsivity-related measures might produce a viable framework of super-ordinate impulsivity domains. Therefore, the purpose of the current study was to derive composite impulsivity-related domains (CIRDs) from multiple impulsivity-related measures and validate the previously derived factor structure (Meda et al., 2009). Using methods including EFA, confirmatory factor analysis (CFA), intra-class correlation, and different linear association analyses appropriate to the various data types, we tested the structure, internal consistency, test-retest reliability, and association of derived CIRDs with symptoms scores of various psychopathologies in young adults. We hypothesized that (i) EFA-derived CIRDs would share a structure similar to described in our previous study (Meda et al., 2009), (ii) CFA in an independent dataset would validate the CIRD factor structures, (iii) CIRD measures would exhibit reliability over time, and (iv) CIRD measures would be associated with symptom scores of various disorders previously linked in various ways to impulsivity in prior research (First, 2013; Fossati et al., 2004, Grano et al., 2007; Jupp and Dalley, 2014a; Lejuez et al., 2010, Moeller et al., 2001, Piero, 2010).

2. Material and methods

The study sample consisted of young adult freshmen students (N = 440) who participated in NIAAA-funded Brain and Alcohol Research with College Students (BARCS) study (Dager et al., 2013, Khadka et al., 2014). Demographic and characteristics information of study sample are reported in Table 1. We collected data from college students of two different institutions (Central Connecticut State University and Trinity College) in order to capture racial/ethnic sample representative of college students in the Greater Hartford Region. All participants provided written informed consent approved by Hartford Hospital, Yale University, Trinity College, and Central Connecticut State University.

2.1. Impulsivity measures

Participants were assessed with five self-report questionnaires and two computer-based laboratory tasks. The impulsivity-related measures assessed were based upon our previous study (Meda et al., 2009). The various impulsivity-related measures chosen emerged from different theoretical construct and sometimes overlapped. Self-report measures included (i) Sensation-Seeking Scale (SSS) (Zuckerman and Neub, 1979), (ii) Behavioral Activation System/Behavioral Inhibition System Scale (BIS/BAS) (Carver and White, 1994), (iii) Barratt Impulsiveness Scale (BIS-11) (Patton et al., 1995), (iv) Sensitivity to Punishment and Sensitivity to Reward Questionnaire (Torrubia et al., 2001), and (v) Padua Inventory (PI) (Sternberger and Burns, 1990).

Computer-based behavioral tasks included the (i) Balloon Analog Risk Task (BART) (Hunt et al., 2005), and (ii) Experiential Discounting Task (EDT) (Reynolds and Schiffrabauer, 2004). Details on impulsivity-measures and questionnaires are reported in supplemental section.
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