



# The use of multimethod impulsivity assessment in the prediction of ADHD, conduct problems, and callous-unemotional symptoms



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## ABSTRACT

The purpose of the current study was to examine the relationship between multiple forms of behavioral and trait impulsivity and the externalizing symptoms of Attention-Deficit Hyperactivity Disorder (ADHD), conduct problems (CP), and callous-unemotional (CU) traits. Participants were 182 elementary school age children (142 boys and 40 girls) ranging in age from 5.6 to 12.5 years, recruited through a university-based ADHD clinic. Data showed that symptoms of ADHD were characterized by playing fewer trials on the Reward Dominance task, UPPS Urgency, and UPPS lack of perseverance. Symptoms of conduct problems were characterized by playing fewer trials on the Reward Dominance task and UPPS urgency. In contrast, callous-unemotional traits were characterized by only UPPS urgency and not by performance on either of the behavioral tasks. These results indicate some convergence in terms of trait impulsivity across externalizing syndromes, as well as divergence in terms of behavioral impulsivity and perseverance on tasks. The implications of these findings are discussed with particular emphasis on the importance of different facets of impulsivity characterizing different childhood externalizing syndromes.

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## 1. Introduction

Impulsivity is central to multiple externalizing conditions of childhood. Attention-Deficit Hyperactivity Disorder (ADHD) has hyperactivity and impulsivity as one of its hallmark traits (American Psychiatric Association, 2013; Mathias et al., 2007; Nigg, 2000). Likewise, Conduct Disorder and associated conduct problems are characterized by impulsive behaviors that violate the rights of others. Furthermore, Limited Prosocial Emotions has been recently included into the DSM-5 as a specifier for Conduct Disorder and is designed to capture elements of the adult form of psychopathy (American Psychiatric Association, 2013), which is another condition that is marked by high impulsivity (Hare, 1980; Salekin, 2015). This childhood specifier was born from an emergent literature that designates these childhood-presenting psychopathy characteristics as “callous-unemotional” traits, and these traits refer to callousness and deficit or shallow emotional responses (e.g., not caring about performance or misbehavior, low empathy for others; Frick, Ray, Thornton, & Kahn, 2014). callous-unemotional traits and impulsive conduct problems are considered to be related yet separable constructs with moderate correlations between these two dimensions (Frick, O'Brien, Wootton, & McBurnett, 1994).

One way to explore the divergence between disorder etiology and pathology is to examine each syndrome in terms of potential underlying constructs (Loeber, Burke, & Pardini, 2009). Although all externalizing behaviors of childhood include “impulsivity” in their description, it is possible that ADHD, conduct problems, and callous-unemotional traits do not share a single “brand” of impulsivity. Recognizing the multifaceted nature of this construct, Whiteside and Lynam (2001) developed the UPPS Impulsive Behavior Scale (UPPS) via factor analyses of multiple measures of impulsivity. The resulting scale measures four distinct pathways to impulsivity: urgency, lack of premeditation, lack of perseverance, and sensation seeking. Urgency refers to the tendency to act impulsively when experiencing negative affect. Lack of premeditation refers to a failure to reflect on the consequences of behavior before acting. Lack of perseverance refers to an inability to follow through on difficult or boring tasks. Sensation seeking refers to a tendency to seek exciting activities and new experiences.

Miller, Derefinko, Lynam, Milich, and Fillmore (2011) used the UPPS for classification among ADHD subtypes and comorbid Oppositional Defiant Disorder symptoms in a sample of ADHD and comparison children ( $N = 88$ ). Analyses indicated that urgency, lack of premeditation, and lack of perseverance uniquely distinguished ADHD/ODD from a non-ADHD comparison group. A second study also found that individuals with childhood ADHD were higher on urgency, lack of premeditation, and lack of perseverance in adulthood (Pedersen et al., 2016). Miller et al. (2011) also found urgency and lack of premeditation distinguished

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ADHD/Oppositional Defiant Disorder from ADHD, and urgency and lack of perseverance trended toward distinguishing ADHD from comparison children. Using a sample of adolescents, [Urban, Suter, Pihet, Straccia, and Stéphan \(2015\)](#) found that Conduct Disorder, independent of substance use, demonstrated relations with urgency, further supporting the use of this construct when distinguishing externalizing behaviors in youth. Although these past studies are an important start, no research has examined relations between callous-unemotional traits and the four facets of the UPPS. While three studies have explored relations between callous-unemotional traits and sensation seeking ([Barry et al., 2000; Frick et al., 1994; Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999](#)), these studies utilized different measures of sensation seeking with mixed findings. Given the limited data, it remains unclear if specific aspects of trait impulsivity are associated with callous-unemotional traits.

### 1.1. Trait vs. behavioral impulsivity

Trait impulsivity, like that assessed on UPPS, and behavioral impulsivity, as assessed by laboratory measures, are separable due to potential variance in both method and constructs; therefore, researchers have argued for the need to study these measures together to address convergence/divergence ([Cyders & Coskunpinar, 2011; Loeber et al., 2001](#)). Specifically, past work has queried whether behavioral measures of impulsivity constructs assess the same variance as self-reported measures. Initial work has found rather small relations between behavioral and trait impulsivity, suggesting that either method variance is an issue in assessment, or that behavioral measures of impulsivity do not assess the same constructs as they are designed to ([Cyders & Coskunpinar, 2011](#)).

Two laboratory tasks have emerged in the childhood literature as potential measures of behavioral impulsivity. While many variations of these tasks exist, we refer to two specific examples from this literature: the Hungry Donkey and Reward Dominance computerized tasks. The Hungry Donkey ([Bechara, Damasio, Damasio, & Anderson, 1994](#)) was developed as a childhood adaptation of the Iowa Gambling Task, where four options are offered to the participant. Through trial and error, the participant learns that these options are differentially rewarding; some have large rewards and punishments, some have smaller rewards and punishments, and each has a net overall gain or loss. This task is proposed to address the underlying mechanism of *impulsive decision-making*, as determined by choosing the most disadvantageous options—those with the greatest overall net loss. This task has previously been associated with the presentation of childhood and adolescent ADHD ([Garon, Moore, & Waschbusch, 2006; Miller, Sheridan, Cardoso, & Hinshaw, 2013; Toplak, Jain, & Tannock, 2005](#)) and history of Conduct Disorder ([Kim, Lee, & Kim, 2006](#)). Some work has demonstrated that Conduct Disorder is associated with increased risky decision-making ([Hobson, Stephen, & Rubia, 2011](#)). Other studies have not found differences between those with Conduct Disorder and controls ([Schutter et al., 2011](#)) making it unclear if the Hungry Donkey measures a type of impulsivity consistent with ADHD and/or conduct problems. Furthermore, there is only one study that examined the relationship between psychopathic traits and risky behavior, finding that children with psychopathic traits are more likely than their non-psychopathic counterparts to choose risky decks ([Blair, Colledge, & Mitchell, 2001](#)).

The Reward Dominance task emerged as an assessment of behavioral disinhibition ([O'Brien & Frick, 1996; Lynam, 1997](#)). The goal of this task is for participants to earn as many points as possible. In the beginning, the participant earns a lot of points for playing, but over time they start losing more points than they are earning. The goal of this task is to quit playing the game before a participant starts losing more points than they are earning. The longer a participant plays signifies that an individual is reward dominant in that they continue to play even though doing so results in a high rate of point losses. Two studies support the notion that Conduct Disorder is associated with Reward Dominance (e.g.,

[Daugherty & Quay, 1991](#)). Regarding callous-unemotional traits, some research shows that children with psychopathic traits are more Reward Dominant than those without ([Barry et al., 2000; Fisher & Blair, 1998; O'Brien & Frick, 1996](#)), although there are some exceptions ([Lynam, 1997](#)). The relative absence of other work in this area makes it unclear whether Reward Dominance is a form of impulsivity that is broadly related to childhood externalizing syndromes or is exclusive to psychopathic/callous-unemotional traits.

### 1.2. Current study

Although prior work by [Miller et al. \(2011\)](#) has explored the relations between facets of the UPPS measure of impulsivity and ADHD subtypes, and multiple independent studies have explored individual behavioral tasks and childhood externalizing disorders, to date, there is no study that examines relations between multiple forms of impulsivity, including behavioral impulsivity, and symptoms of multiple externalizing disorders. In the current study, we examined the relations between various facets of trait and behavioral impulsivity and symptoms of each of these prominent externalizing syndromes.

Based upon previous work with an ADHD sample ([Barry et al., 2000; Daugherty & Quay, 1991; Hobson et al., 2011; Miller et al., 2011; Miller et al., 2013](#)), it was hypothesized that: (1) ADHD would be characterized by high UPPS urgency, high UPPS lack of perseverance, high UPPS lack of premeditation, and high risky decision-making on the Hungry Donkey task; (2) conduct problem symptoms would be characterized by high UPPS urgency, UPPS lack of premeditation, risky decision-making on the Hungry Donkey, and high Reward Dominance; (3) callous-unemotional traits would be characterized by high UPPS urgency, high UPPS lack of premeditation, high UPPS sensation seeking, and high Reward Dominance.

## 2. Methods

### 2.1. Participants

Participants were 182 children (142 boys and 40 girls) ranging in age from 5.6 to 12.5 years ( $M = 8.8, SD = 1.64$ ), recruited through a university-based ADHD clinic. A broad range of participants were recruited including both those with and without diagnoses of ADHD, Oppositional Defiant Disorder, and Conduct Disorder, to ensure that the full range of externalizing symptom scores were represented in the sample. For descriptive purposes, 152 of the 182 participants met criteria for ADHD-related issues (age range 5.6 to 12.3,  $M = 8.72, SD = 1.61$ ; 122 males, 30 females), and 30 children did not meet criteria for ADHD-related issues (age range 5.9 to 12.5,  $M = 9.23, SD = 1.73$ ; 20 males, 10 females). All children's scores were utilized in analyses given that symptom counts—not diagnostic thresholds—were used as dependent variables (described below). [Table 1](#) summarizes demographic characteristics. Exclusion criteria were: (a)  $IQ < 70$ ; or (b) a diagnosis of schizophrenia, pervasive developmental disorder, or other psychotic disorder.

### 2.2. Measures

#### 2.2.1. Disruptive Behavior Disorder Rating Scale (DBD; [Pelham, Gnagy, Greenslade, & Milich, 1992](#))

The DBD consists of 45 questions designed to measure DSM-IV symptoms of ADHD (e.g., “is often ‘on the go’ or acts as if ‘driven by a motor’”), Oppositional Defiant Disorder (e.g., “often argues with adults”), and Conduct Disorder (e.g., “has broken into someone else's house, building, or car”). Items on the DBD were rated using 4 point Likert scales from 0 (*not at all*) to 3 (*very much*). Parent and teacher ratings were combined on an item-by-item basis using the highest score. Symptom counts for ADHD and conduct problems (symptoms of Oppositional Defiant Disorder and Conduct Disorder combined) were

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