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Disruptive behavior disorders and indicators of disinhibition in adolescents: The BRIEF-SR, anti-saccade task, and D-KEFS color–word interference test☆

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ABSTRACT

Disinhibition contributes to the development of disruptive behavior disorders (DBD) in adolescents. Self-reports and behavioral tasks are commonly used to assess disinhibition, each with their unique strengths and limitations. Accordingly, it is important to identify which measure, or combination thereof, is the most effective in predicting DBD symptoms. This study assessed the relationship between DBD (symptoms of ADHD/ODD/CD) and two behavioral disinhibition tasks: the anti-saccade task and the D-KEFS color–word interference test, as well as a self-report measure (the BRIEF-SR). The results indicated that the BRIEF-Inhibit scale accounted for the majority of the variance in the DBD sum score. The anti-saccade task and color–word interference test were also significantly associated with an increase in the number of DBD symptoms endorsed. These behavioral tasks accounted for 9% additional variance than the self-report alone. Therefore, combining self-report measures with behavioral disinhibition tasks may provide the most thorough assessment of adolescent DBD.

Introduction

Disinhibition refers to difficulties with behavioral, cognitive, and emotional regulation (Tarter et al., 2003). Classically, it has been defined as "human behavior that has been interpreted as arising from lessened controls on response inclinations" (Gorenstein & Newman, 1980, p. 302). Accordingly, impulsivity is an essential component of disinhibition, as problems with impulsivity stem from difficulties in inhibitory processing (Logan, Schachar, & Tannock, 1997). There is substantial evidence demonstrating that disinhibition contributes to the development of disruptive behavior disorders (DBD) in adolescents, as defined by symptoms of attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and conduct disorder (CD; Clark, Chung, Thatcher, Pajtek, & Long, 2012; Dougherty et al., 2003; Habeych, Folan, Luna, & Tarter, 2006).

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Furthermore, instruments used to measure disinhibition, such as self-report measures and laboratory-based behavioral tasks, are widely used in both clinical and research settings, but the empirical evidence regarding the relationships among these instruments and their relationship to DBD remain somewhat unclear.

Self-report measures of disinhibition, such as the Behavioral Rating Inventory of Executive Function, Self-Report version (BRIEF-SR) and the Barratt Impulsivity Scale require participants to complete a battery of items that assess different constructs of disinhibition. Alternatively, laboratory-based behavioral tasks, such as the anti-saccade task and Stroop task, also provide effective assessments of disinhibition in both nonclinical populations (Enticott, Ogloff, & Bradshaw, 2006) and clinical populations (Holmes et al., 2010). These measures of disinhibition may provide valid measures of different underlying etiological factors.

Self-report and behavioral measures each have specific advantages and limitations. While self-report measures may be biased by faulty memory and subject to social desirability pressures, they are easy to administer and interpret, making them very popular and accessible. Alternatively, behavioral tasks, such as the behavioral disinhibition tasks used in the present study, are not subject to the same social desirability and recall biases as self-report measures, because they infer impulsivity from observed behavior. Further, behavioral inhibition tasks are sensitive to state-dependent impulsivity and may be more adaptable to repeated administration when compared to self-report measures (Dougherty et al., 2003). However, these tasks are typically administered in a controlled environment, which diminishes ecological validity (Enticott et al., 2006), and may produce practice effects with repeated administrations (i.e., better performance after more trials due to increased familiarity with the task; Falleti, Maruff, Collie, & Darby, 2006; Heiman, 2002).

Centrally, these behavioral measures are effective predictors of clinically diagnosed DBD. Response disinhibition and working memory deficits have been shown to discriminate between children with and without ADHD on a variety of behavioral tasks (Berger, Alyagon, Hadaya, Atzaba-Poria, & Auerbach, 2013; Dolan & Lennox, 2013; Holmes et al., 2010). Importantly, the deficiencies found in children with ODD and CD were not due to the comorbid diagnosis of ADHD (Saarinen, Fontell, Vuontela, Carlson, & Aronen, 2014). Finally, four separate meta-analyses were conducted examining the relationship between a variety of executive functioning behavioral tasks (including disinhibition tasks such as the Stroop task and go/no go task) and externalizing behavior problems in preschool children (i.e., a diagnosis or symptoms of ADHD and ODD/CD). Results showed that executive function deficits, in particular difficulty with inhibition, were associated with externalizing behavior problems (Schoemaker, Mulder, Deković, & Matthys, 2013). Taken together, these findings imply that behavioral measures may compliment the information provided by DBD diagnosis. In the current study, we specifically use the anti-saccade task and the D-KEFS color–word interference task because previous research has suggested that these measures are reliable predictors of DBD in adolescent populations, details of which are provided below.

Self-report measures of disinhibition

Self-report measures of disinhibition have been designed to assess overall severity as well as hypothesized distinct dimensions (e.g., impaired inhibitory control, impulsive decision-making; Ivanov, Schulz, London, & Newcorn, 2008). The BRIEF-SR is a self-report instrument that is designed to measure impulsivity across the domains of cognition, behavior, and mood along with other executive functioning dimensions. More specifically, the Inhibit scale from the BRIEF assesses disinhibition. Scores on the BRIEF are correlated with symptoms of DBD in adolescents (Clark et al., 2012; Mahone et al., 2002) and are predictive of ADHD subtypes (Isquith & Gioia, 2000; McCandless & O'Laughlin, 2007; Reddy, Hale, & Brodzinsky, 2011).

Behavioral disinhibition tasks

Behavioral disinhibition tasks measure an individual's ability to inhibit a reflexive, pre-potent response (i.e., a response they are ready to give). Individuals with higher levels of disinhibition have more difficulty inhibiting these automatic responses. One of the most established disinhibition tasks is the Stroop task (Stroop, 1935). Based upon the classic Stroop task, the Delis–Kaplan Executive Function System (D-KEFS) color–word interference test measures the ability to read the name of a color rather than naming the ink color in which the word is printed (Delis, Kaplan, & Kramer, 2001a). This test, along with three other tests from the D-KEFS (trail making, verbal fluency, and tower tests) has identified executive dysfunction in children with ADHD using summary scores, but not contrast scores (Wodka, Loftis, et al., 2008) or process scores (Wodka, Mostofsky, et al., 2008). Slower response times and higher error rates have also been found in children with ADHD compared to controls (Bledsoe, Semrud-Clikeman, & Pliszka, 2010; Holmes et al., 2010). Finally, response inhibition, as measured by condition three on the color–word interference test, has been shown to be more elevated in boys with ADHD than girls (O'Brien, Dowell, Mostofsky, Denckla, & Mahone, 2010), in unaffected siblings of children with ADHD compared to controls (Nikolas & Nigg, 2014), and to predict future working memory deficits (Tillman, Brocki, Sørensen, & Lundervold, 2013).

More recently, the anti-saccade (Hallet, 1978) task has emerged as a popular measure of response inhibition (Geier & Luna, 2009; Munoz & Everling, 2004). This task requires the participant to suppress reflexive eye movements, also termed prepotent saccades, and make a voluntary eye movement to the location opposite of a presented stimulus (Geier & Luna,