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Self-reported impulsivity, but not behavioral approach or inhibition, mediates the relationship between stress and self-control

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HIGHLIGHTS

- Whether cumulative stress was associated with poor self-control was examined.
- Mediation by impulsivity and behavioral approach and inhibition was examined.
- Only impulsivity mediated the stress and self-control relation.
- There were no gender differences in patterns of mediation.
- This research has implications for behavioral interventions targeting self-control.

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ABSTRACT

Stress has been associated with poor self-control. Individual differences in impulsivity and other behavioral tendencies may influence the relationship of stress with self-control, although this possibility has not been examined to date. The present research investigated whether cumulative stress is associated with poor self-control, and whether this relationship is mediated by impulsivity, behavioral approach, and behavioral inhibition in men and women. A community sample of 566 adults (319 women and 247 men) was assessed on the Cumulative Adversity Interview, Brief Self-control Scale, Barratt Impulsivity Scale, and Behavioral Activation System and Behavioral Inhibition System Scale (BIS/BAS). Data were analyzed using regression and bootstrapping techniques. In the total sample, the effects of cumulative stress on self-control were mediated by impulsivity. Neither behavioral inhibition nor behavioral approach mediated the association between cumulative stress and self-control in the total sample. Results were similar when men and women were considered separately, with impulsivity, but not behavioral inhibition or approach, mediating the association between cumulative stress and self-control. Impulsive individuals might benefit preferentially from interventions focusing on stress management and strategies for improving self-control.

1. Introduction

Self-control involves the capacity to alter one's responses in order to adhere to values, morals, and social expectations and to support the pursuit of long-term goals (Tice, Baumeister, Shmueli, & Muraven, 2007). Self-control is related to the performance of desired behaviors (e.g., assignment completion, physical exercise) and the inhibition of undesired behaviors (e.g., delinquency, sexual infidelity) across multiple behavioral domains (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012). Self-control encompasses emotion regulation, restraint, and behavioral control (Carlson & Wang, 2007; Maloney, Grawitch, & Barber, 2012). Potential contributory factors to self-control may include the psychological constructs of behavioral approach, behavioral inhibition, and impulsivity (Ansell, Gu, Tuit, & Sinjha, 2012; Hamilton, Ansell, Reynolds, Potenza, & Sinha, 2013; Tull, Gratz, Latzman, Kimbrel, & Lejuez, 2010). The first two constructs are based on Gray's theories of approach and avoidance: behavioral approach is characterized by appetitive, goal-oriented functioning and positive affect, while behavioral inhibition is characterized by inhibition in response to aversive stimuli (Gray, 1972). On the other hand, impulsivity reflects a tendency for rapid action with diminished regard for future consequences (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001).

Abbreviations: CAI, Cumulative Adversity Interview; BIS, Behavioral Inhibition System; BAS, Behavioral Approach System; BIS-11, Barratt Impulsiveness Scale, Version 11; BSCS, Brief Self-control Scale.

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Impulsivity (Blanco et al., 2009; Dawe, Gullo, & Loxton, 2004; Lejuez et al., 2010), behavioral approach (Franken & Muris, 2006; Hundt, Kimbrel, Mitchell, & Nelson-Gray, 2008; O'Connor, Stewart, & Watt, 2009) and behavioral inhibition (Hamilton, Sinha, & Potenza, 2012) are positively associated with addictive behaviors such as substance abuse and pathological gambling. Although impulsivity, behavioral approach and behavioral inhibition each contribute to addictive behaviors, they are distinct constructs that loaded onto separate factors in a principal component analysis (Meda et al., 2009). Behavioral approach and behavioral inhibition reflect a psychological orientation to rewarding and aversive stimuli, respectively, while, impulsivity reflects a behavioral tendency toward rapid action with diminished ability or willingness to consider future consequences.

Self-control is distinct from these constructs, as it refers to an ability, capacity or willingness to alter one's responses in order to adhere to long-term goals; failures of self-control are implicated in addictive behaviors (Berkman, Falk, & Lieberman, 2011; Monterosso, Piray, & Luo, 2012). Understanding psychological factors that may impact self-control is critical for public health, given the role of diminished self-control in a broad range of potentially addictive behaviors, including drug abuse (Volkow, Wang, Tomasi, & Baler, 2013), overeating (Brook, Lee, Finch, Balka, & Brook, 2013; Volkow et al., 2013), pathological gambling (Bergen, Newby-Clark, & Brown, 2012; Slutske, Moffitt, Poulton, & Caspi, 2012), online gaming (Kim, Namkoong, Ku, & Kim, 2008), problem drinking (Visser, deWinter, Veenstra, Verhulst, & Reijneveld, 2013), and smoking (Wilson & Maclean, 2013). Higher levels of trait impulsivity, behavioral approach and behavioral inhibition each may impair self-control and increase the likelihood of engagement in addictive behaviors. Taken together, self-control encompasses a broad range of capacities and tendencies, with impulsivity and behavioral approach and inhibition representing constructs that may underlie or relate importantly to self-control.

Stress decreases self-control (Muraven & Baumeister, 2000), and exposure to stressful circumstances in childhood may influence the development of self-control (Duckworth, Kim, & Tsukayama, 2013; Kempsill & Pratt, 2000). Stress is experienced when organisms perceive that a challenge exceeds their resources for coping (Baum, Gatchel, & Krantz, 1997; Baum, Grunberg, & Singer, 1982; Baum, Singer, & Baum, 1981). This perception sets in motion a series of physiological events involving the hypothalamic–pituitary–adrenal axis and the sympathetic nervous system in an attempt to regain homeostasis (McEwen, 2000). Physiological responses to stressors may alter brain motivational pathways, such as those involving the medial prefrontal cortex, a region implicated in self-control and the inhibition of impulses (Arnsten & Goldman-Rakic, 1998; Sinha, 2008). Repeated stress and increased engagement in addictive behaviors may generate or accelerate neurobiological alterations which further promote diminished self-control, particularly among individuals with greater impulsiveness, and this process could lead stressed individuals to engage in addictive behaviors (Sinha, 2008). Cumulative stress may increase the risk for multiple addictive behaviors (Sinha, 2008), which is consistent with associations between cumulative stress and addictive behaviors characterized by poor self-control. The effects of stress on the neurobiology of self-control support the possibility that impulsivity and behavioral approach and inhibition may mediate the relationship between stress and diminished self-control. The relationship between stress and self-control varies among individuals (Job, Dweck, & Walton, 2010; Moller, Deci, & Ryan, 2006; Muraven & Baumeister, 2000; Tice et al., 2007). Impulsivity, behavioral approach, and behavioral inhibition may contribute to individual differences in the effects of stress on self-control.

Women and men differ with respect to addictions and other behaviors characterized by poor self-control (Desai, Maciejewski, Pantalon, & Potenza, 2006; Williams & Ricciardelli, 2003). Gender-related differences have been noted in the effects of self-control on gambling (Beaver et al., 2010), and in addictive processes related to self-control, including drinking behaviors (Holmila & Raitasalo, 2005; Livingston & Room, 2009; Wilsnack et al., 2000). Similar levels of impulsivity in men and women have been reported (Hamilton et al., 2012; Patton, Stanford, & Barratt, 1995), although a meta-analysis of impulsivity studies revealed slightly elevated levels of impulsivity in men compared with women (Cross, Copping, & Campbell, 2011). Taken together, these lines of research suggest that any existing gender-related differences in trait impulsivity are minimal. Gender-related differences have been reported more consistently in research examining behavioral approach and inhibition, with women having higher levels of behavioral inhibition and reward responsiveness than men (Cross et al., 2011; Hamilton et al., 2012; Perry et al., 2013). Even when assessed as toddlers, girls were significantly more behaviorally inhibited than boys (Smith et al., 2012). Because there are gender-related differences in dimensions of behavioral approach and inhibition, any mediational effects of the constructs in the relationship of stress and self-control also may differ by gender.

Statistical mediation was used in the present study to examine the roles of impulsivity and behavioral approach and inhibition in the relationships between cumulative stress and decreased self-control. To examine mediation, statistical associations may be used within a cross-sectional sample to determine statistically whether associations with retrospectively assessed stressful life events support theoretically predicted relationships. Although the cross-sectional design does not allow for the examination of stress, self-control, behavioral approach and inhibition, and impulsivity over time, associations among these variables have been established in studies with longitudinal designs (Alloy et al., 2008; Eisenberg et al., 2007; Kempsill & Pratt, 2000; Wardell, O'Connor, Read, & Colder, 2011). For this reason, it is reasonable to model retrospective reports of stressful life events over the course of the lifespan, as measured in the present study, and examine their relationships to self-control, impulsivity, behavioral approach, and behavioral inhibition. It should be noted that manipulations that decreased self-control may have increased approach motivation in one report (Schmeichel, Harmon-Jones, & Harmon-Jones, 2010). However, based on the directionality suggested by previous longitudinal studies (Alloy et al., 2008; Eisenberg et al., 2007; Kempsill & Pratt, 2000; Wardell et al., 2011), and based on the more stable natures of trait impulsivity and behavioral inhibition and approach compared with self-control, which fluctuates depending upon the situation (Muraven & Baumeister, 2000), we hypothesized that trait impulsivity, behavioral inhibition, and behavioral approach dimensions would influence self-control.

The present research was conducted to determine whether behavioral approach, behavioral inhibition, and impulsivity statistically mediate the relationship between stress and self-control, and whether the relationships are similar or distinct in men and women. Life stress, behavioral approach, behavioral inhibition trait impulsivity, and self-control were assessed in a community-based sample of men and women. Based on previous research in which exposure to childhood stress had a detrimental impact on the development of self-control (e.g., Kempsill & Pratt, 2000), it was hypothesized that cumulative stress would be associated with decreased self-control. Based on effects of stress on the neural correlates of impulsivity and self-control (Arnsten, 2009), we hypothesized that self-reported impulsivity would mediate the relationship between stress and self-control. In addition, we hypothesized that behavioral approach dimensions, but not behavioral inhibition, would mediate the relationship between stress and self-control. This hypothesis was based on several studies indicating that behavioral approach moderated the effects of a major stressor on the development of externalizing symptoms, which involve reduced self-control (Colder & O'Connor, 2004; Gudino, Nadeem, Kataoka, & Lau, 2012). By contrast, behavioral inhibition moderated effects of the stressor on internalizing symptoms, such as those associated with depression and anxiety, which do not generally involve reduced self-control. Based on research in which sex differences were found in BIS and BAS dimensions (Carver & White, 1994; Hamilton et al., 2012) but less consistently so in impulsivity (Hamilton et al., 2012; Patton et al., 1995), we