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Zooming in on children's behavior during delay of gratification: Disentangling impulsigenic and volitional processes underlying self-regulation

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ABSTRACT

When delaying gratification, both motivational and regulatory processes are likely to be at play; however, the relative contributions of motivational and regulatory influences on delay behavior are unclear. By examining behavioral responses during a delay task, this study sought to examine the motivational (anticipatory behavior) and regulatory mechanisms (executive function and self-control strategies) underlying children's self-regulation. The participants, 65 5- to 9-year-old children (M_{age} = 7.19 years, *SD* = 0.89), were video-recorded during a delay procedure and later coded for anticipatory behaviors (e.g., gazing intensely at the tablet) and self-control strategies. Children also completed two executive function (EF) tasks. We found that anticipatory behavior was curvilinearly related to delay time. Children showing either very low or very high levels of anticipatory behavior were not able to wait the entire time. Furthermore, our results indicated that anticipatory behavior interacted with EF to predict delay time. Specifically, anticipatory behavior was negatively related to delay time only if EF abilities were low. Finally, self-control strategies also interacted with EF to predict children's ability to delay. Spontaneous engagement in self-control strategies such as fidgeting and engagement in alternative activities were beneficial for children with low EF but were unrelated to delay time for children with high EF. Results indicate the value of examining motivational and regulatory influences on delay behavior. Lapses in self-regulation may be due to the combination of powerful

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impulsigenic (i.e., anticipatory behavior) and weak volitional processes (i.e., EF, self-control strategies).

Introduction

Delaying gratification is challenging. Yet, children encounter many *don't contexts* (cf. Kochanska, Coy, & Murray, 2001) in which they are requested to suppress pleasant rewarding behavior. Learning to resist temptation in favor of long-term goals requires self-regulation, which is an essential component of social and cognitive development and predicts important later life outcomes (e.g., Blair & Raver, 2015; Moffitt et al., 2011). When delaying gratification, both motivational and regulatory processes are likely to be at play (e.g., Duckworth & Steinberg, 2015; Metcalfe & Mischel, 1999); however, how and why children are able to wait for a reward is still poorly understood. Even when delaying successfully, there is variation in what children do during the waiting time. Recent research suggests that these behaviorally observable differences (e.g., some children look directly at the rewards, whereas others divert their gaze away; some children wait calmly, whereas others fidget) are associated with differences in physiological and behavioral profiles (Wilson, Lengua, Tininenko, Taylor, & Trancik, 2009) and predict performance more than 10 years later on a task that requires cognitive control at the level of response execution (Eigsti et al., 2006). By examining behavioral responses during a delay task, the current study sought to examine the motivational and regulatory mechanisms underlying children's delay behavior. Specifically, we hypothesized that regulatory (executive function) and motivational processes (anticipatory behavior) would interact to predict 5- to 9-year-olds' ability to delay. Furthermore, we hypothesized that various regulatory processes (executive function, observed self-control strategies) would also interact to predict children's ability to delay.

Volitional and impulsigenic processes underlying self-regulation

Delay of gratification tasks are complex in that they likely elicit both motivational and regulatory processes. Variation in children's motivational and/or regulatory systems, therefore, may explain successful self-regulatory behavior during delay tasks. Indeed, "lapses in self-control may be due to deficiencies in volitional processes, but they may also be due to excessively powerful impulsigenic processes," as Duckworth and Steinberg (2015, p. 35) put it in their recent review. The authors argued for distinguishing the overt expression of self-control (the term is used synonymously with the construct we refer to as self-regulation) from its underlying psychological processes, which they group into two functionally distinct categories: *volitional processes* (e.g., executive function, metacognitive/self-control strategies) that facilitate self-controlled behavior and *impulsigenic processes* (e.g., reward sensitivity/temptation, reactive undercontrol, cravings, anxiety) that undermine self-controlled behavior by inclining individuals to act on immediately rewarding but ultimately costly and potentially harmful actions. Many influential theories of self-regulation reflect this taxonomy by using various terms to describe these two processes at play—for example, reactive attentional processes related to fear versus effortful control (Derryberry & Rothbart, 1997), reactive versus effortful control (Eisenberg & Morris, 2002), and hot versus cool systems (Metcalfe & Mischel, 1999). Research has shown that both impulsigenic and volitional processes contribute to adjustment (Lengua, 2003) and that taking both into account may differentiate the types of problems children are likely to develop (Eisenberg et al., 2004; Rubin, Stewart, & Coplan, 1995). Therefore, disentangling impulsigenic processes from volitional processes underlying children's self-regulation is crucial because it may have potential implications for children's adjustment.

Teasing volitional processes apart from impulsigenic processes, however, is challenging. First, children with high effortful control may partially modulate the expression of impulsive tendencies and behaviors (Spinrad, Eisenberg, & Gaertner, 2007). In the context of a delay task, for instance, those