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Research paper

## Depleting and motivating self-regulation in preschoolers

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## ABSTRACT

Baumeister and Vohs (2007) highlighted two influences on self-regulation: willpower and motivation. Willpower provides the strength for self-regulation, and is believed to become depleted with use. Motivation has an impact on self-regulation by providing the drive/energy to act according to a goal. The present study examined how willpower and motivation interact to influence the self-regulation of three- and four-year-olds. A delay of gratification (DoG) choice task was used to measure self-regulation. Executive function tasks were used to deplete willpower and different reward quantities were used to manipulate motivation. For four-year-olds and/or children labelled as high delayers, larger delayed rewards led to more choices for the delayed reward. The effects of willpower depletion were less clear. Children labelled as high delayers chose the delayed reward less when depleted, but low delayers showed the opposite effect. Overall, we agree with recent studies demonstrating that more research is needed to examine possible mechanisms and moderators of Baumeister and Vohs' (2007) model of self-control.

## 1. Introduction

Humans are often faced with choices in life that involve a significant amount of restraint or control over their own behaviour. For example, they may have to choose between spending money or saving it. Decisions such as these are said to involve self-regulation. Self-regulation is achieved when someone performs one action instead of an equally or more enticing action. It often involves ignoring an impulse (e.g., eat a cookie) in favour of a distant or more abstract goal (e.g., lose weight; Baumeister & Exline, 2000). Self-regulation is challenging and entails having control over one's thoughts, emotions, impulses, motivations, and quality of performance (Forgas, Baumeister, & Tice, 2009). Some researchers distinguish between self-regulation and self-control. They argue that self-regulation involves all forms of adaptation, including homeostatic processes, while self-control refers only to change that is conscious and deliberate (Baumeister, Vohs, & Tice, 2007). For the purpose of this study, self-regulation and self-control will be used interchangeably to denote intentional control over behaviour.

The importance of self-regulation in daily life is very evident. On one hand, the breakdown of self-control has been implicated in many social problems, such as crime, drug use, or risky sexual behaviours (Crandall, Magnusson, Novilla, Novilla, & Dyer, 2017; DeLisi & Vaughn, 2014; Schecory, Perry, & Addad, 2011). On the other hand, high self-control is known to be related to many desirable outcomes. Wolfe and Johnson (1995) found self-regulation to be the most robust predictor of college GPA out of 32 personality variables, while Duckworth and Seligman (2005) found that self-regulation was a better predictor of GPA than ITangney, Baumeister, and Boone (2004) found that higher self-regulation was related to better eating regulation, less alcohol use, more emotional stability, better personal relationships, and better anger management. They also failed to find evidence of a curvilinear

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pattern (i.e., there were no negative effects of having too much self-control). However, the outcomes of extremely high self-control remain unclear, as curvilinear patterns have been found in research on effortful control (a similar and related construct; Murray & Kochanska, 2002). Nonetheless, the positive outcomes of good self-control are well established, and these positive outcomes can be predicted from self-regulation assessed at a very early age. Self-regulation measured in preschool and childhood has been found to predict academic and social competency in adolescence, as well as health, drug use, financial difficulties, and crime in adulthood (Mischel, Shoda, & Peake, 1988; Moffitt et al., 2011). Given the long-term implications of early self-control, it is important to understand how self-control operates and develops in young children. Therefore, the broad intent of the present study was to examine a) if the self-regulation of preschoolers can be described using a model that has previously only been applied to adults, b) how self-regulation changes over the preschool years, and c) factors that increase or decrease self-regulation in young children. Through this research, we hoped to gain a better understanding of preschoolers' self-control and ways to encourage the development of this crucial behaviour.

The model of self-regulation tested in the current study was developed by Baumeister and colleagues (Baumeister & Vohs, 2007). In this model, there are two primary influences on self-regulation: willpower and motivation. Willpower is treated as a property of the person, and is an internal resource that provides the strength needed to bring about change and control impulses (Baumeister & Vohs, 2007). According to Baumeister and colleagues, willpower is a limited resource that can become depleted (Baumeister & Heatherton, 1996). Indeed, they used a muscle metaphor to describe willpower, saying that it becomes tired with repeated use. Previous research in adults has supported the willpower depletion hypothesis (Baumeister, Bratslavsky, Muraven, & Tice, 1998). In a paradigm known as the sequential task paradigm (Inzlicht & Schmeichel, 2012) participants in an experimental group perform a task requiring self-control, while participants in a control group perform a task that does not require self-control. Subsequently, the performance of all participants is measured on a second self-control task. Using this paradigm, researchers have found that resisting temptation, making choices, and suppressing emotions all led to less persistence on a puzzle task (Baumeister et al., 1998). Furthermore, Muraven, Tice, and Baumeister (1998) established some evidence of external validity for willpower depletion using autobiographical reports.

Motivation, the second component of Baumeister and colleagues' model of self-control, has been defined as a drive or wish to perform a behaviour (Baumeister & Vohs, 2007). While willpower is described as a personal variable, motivation is typically influenced by the situation at hand (e.g., how good a cookie smells). Muraven and Slessareva (2003) examined how willpower and motivation interact to influence self-control using a modified version of the sequential task paradigm. All participants performed an initial task, which either involved self-regulation or did not. Subsequently, half of the participants were given motivating information, and half were not. Performance was then measured on a second task that required self-regulation. Muraven and Slessareva replicated the results of past experiments, showing that participants became depleted after performing two tasks in a row. In addition, they found that motivating participants led them to achieve self-regulation even when their willpower was depleted. Therefore, there is evidence to support both willpower and motivation as influences on adults' self-regulation.

While the Baumeister and Vohs (2007) model of self-regulation has been supported in adult literature, only one study has been conducted that examined this model in young children. Gunzenhauser and von Suchodoletz (2014) found evidence of willpower depletion in preschoolers, using an emotion regulation task to deplete willpower and an attention task as a measure of self-regulation. However, no research has looked at how other factors, such as motivation, interact with self-regulation and willpower in children. Therefore, the present study expanded on the work done by Gunzenhauser and von Suchodoletz (2014) to examine how both willpower and motivation influence the self-regulation of preschoolers.

In young children, self-regulation is often measured using the delay of gratification (DoG) choice paradigm (Mischel, Shoda, & Rodriguez, 1989). In this task, over a series of trials, children must choose between a less valuable immediate reward and a more desirable delayed reward. The variable of interest in the DoG choice task is the number of times children opt for the delayed reward, and choosing the delayed reward is believed to involve self-regulation (Garon, Longard, Bryson, & Moore, 2012). Children's performance on the DoG choice task is known to be influenced by many factors. One such factor is motivation; Lemmon and Moore (2007) found that children chose the delayed reward more as it (and presumably children's motivation) increased in size relative to the immediate reward. Another factor is age; Thompson, Barresi, and Moore (1997) found that four-year-olds chose the delayed reward more often than three-year-olds, and this finding was replicated by Lemmon and Moore (2007).

Although DoG tasks are the most common measures of self-regulation in children, executive function tasks have been used as well. Executive functions (EFs) are broadly defined as any adaptive or goal-directed behaviours or abilities, and include functions such as working memory (holding and manipulating information in your head), inhibition (restricting a behaviour or response), and shifting (switching from one mental set to another; Garon, Bryson, & Smith, 2008; Miyake et al., 2000). The relationship between EF and self-regulation has been frequently discussed but is not yet well defined. Many researchers believe that there is considerable overlap between these two constructs (Zelazo & Carlson, 2012). Indeed, relationships have been found between EF and self-regulation tasks. Schmeichel, Volokhov, and Demaree (2008) found that working memory ability predicted emotion regulation, and inhibition tasks such as the Stroop task have been used to deplete participants' self-regulation resources (Muraven, Shmueli, & Burkley, 2006). Therefore, it is likely that EF tasks are measuring something very similar to, if not equivalent to, self-regulation, and draw from the same resources as well. It was for this reason that EF tasks were used to deplete children's willpower in the present study.

The specific objective of the present study was to examine how willpower and motivation interact to influence the outcome of self-regulation attempts by preschoolers. One pilot experiment and one full experiment were conducted that followed highly similar procedures. Both experiments used EF tasks to deplete children's willpower, and both used the DoG choice task as a measure of self-regulation. The second experiment simply added an additional EF task to maximize children's willpower depletion. Furthermore, both experiments manipulated relative motivation of the immediate and delayed rewards by changing the size of the immediate reward, while holding the delayed reward constant. Given that age differences have been found among preschoolers on the DoG choice task

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