Bidirectional Relations Between Prosocial Behavior and Self-Regulation Across Adolescence

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Bidirectional Relations Between Prosocial Behavior and Self-Regulation Across Adolescence

Madison Kate Memmott

A thesis submitted to the faculty of Brigham Young University in partial fulfillment of the requirements for the degree of Master of Science

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ABSTRACT

Bidirectional Relations Between Prosocial Behavior and Self-Regulation Across Adolescence

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The purpose of this study was to take a multidimensional perspective to prosocial behavior and self-regulation by analyzing longitudinal, bidirectional relations between prosocial behavior toward strangers, friends, and family members and behavioral, cognitive, and emotional dimensions of self-regulation across adolescence. Participants included reports from 500 adolescents (age Time 1 = 12, Time 2 = 14, Time 3 = 16, Time 4 = 18; 52% female, 77% European American) taking part in the Flourishing Families Project. Nine cross-lagged panel models were conducted analyzing longitudinal associations between each target of prosocial behavior and each dimension of self-regulation. Results revealed that in early adolescence, prosocial behavior toward strangers and cognitive self-regulation were bidirectionally related. Prosocial behavior toward strangers was significantly associated with cognitive self-regulation from age 12 to age 18 and cognitive self-regulation was significantly associated with prosocial behavior toward friends across adolescence. Further, behavioral and emotional self-regulation were significantly related to prosocial behavior toward family from age 12 to age 18. Gender was significantly associated with initial levels of study variables but was not significantly relate to patterns of association. Discussion focuses on how findings fit into existent theory and research.

Keywords: prosocial target, self-regulation, multidimensionality, cross-lagged model
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Bidirectional Relations Between Prosocial Behavior and Self-Regulation Across Adolescence

Prosocial behavior has been linked to a variety of positive developmental outcomes, including enhanced self-regulatory skills (Eisenberg et al., 1996). In turn, self-regulation has been shown to be a powerful characteristic utilized by adolescents for a variety of tasks, such as helping others (Padilla-Walker & Christensen, 2011). Prosocial behavior and self-regulation are important aspects of youth development, as past research has shown each is related to a host of desirable outcomes across adolescence. The broad purpose of the current study is to assess longitudinal, bidirectional relations between targets of prosocial behavior and dimensions of self-regulation in adolescents between the ages of 12 and 18. As such, this study is significant because it will not only help increase understanding regarding change in prosocial behavior aimed toward different targets as well as dimensions of self-regulation, but it will also clarify the association of each with the other over time. Therefore this study will result in a more nuanced understanding of both prosocial behavior and self-regulation during the adolescent period. Results are pertinent to involved individuals who are concerned about how to foster positive development in youth, as these individuals can potentially implement the results of this study into therapeutic practice, policy, or parenting practices, in order to help teens follow a positive trajectory into young adulthood and beyond.

Prosocial Behavior

Prosocial behavior is voluntary behavior intended to benefit others (Eisenberg, Spinrad, & Knafo-Noam, 2015) and includes behaviors such as holding the door open for a stranger who has his hands full, offering encouragement to a friend who had a bad day at school, or cleaning the house to help a stressed family member relax, among many other actions. Personal characteristics such as sympathy, empathy (Eisenberg, Eggum, & Di Giunta, 2010), benevolence
(and other personal values, Schwartz, 2010), as well as self-regulation (DeWall, Baumeister, Gailliot, & Maner, 2008) have been linked to increased prosocial behavior during adolescence. In addition, engagement in prosocial behavior has been linked to a variety of positive outcomes during the teenage years, including perspective taking (Stams, et al., 2006), sympathy (Padilla-Walker & Christensen, 2011), and self-esteem (Barber, Eccles, & Stone, 2001). Recent research reveals engagement in prosocial behavior also serves as a protective factor against a host of negative outcomes, such as substance use (Carlo, Crockett, Wilkinson, & Beal, 2011), emotional exhaustion (Grant & Sonnentag, 2010), and aggression (Carlo, et al., 2014; Eisenberg, Fabes, & Spinrad, 2006; Romano, Tremblay, Boulerice, & Swisher, 2005). Consequently, the positive correlates of prosocial behavior have caught the attention of researchers in the past three decades, especially in relation to other positive developmental outcomes like self-regulation.

**Targets of Prosocial Behavior**

Recent research extends beyond the traditional study of prosocial behavior toward unidentified others and calls for a relational approach to prosocial behavior (Padilla-Walker & Carlo, 2014), which is characterized by studying prosocial behavior in relation to who is being helped (e.g. the “target”). Targets of prosocial behavior most commonly studied include strangers, friends, and family members, which are fairly related (correlation coefficients typically range from .54-.60, Padilla-Walker & Christensen, 2011), though distinct (Padilla-Walker & Carlo, 2014). Scholars posit that it is fundamentally important to study prosocial behavior in a relational context (i.e. toward friends and family members), in order to understand how past experiences and ongoing relationship quality may be associated with engagement in helping behaviors toward specific individuals (Lewis, 2014). Conceptualized in this way, it is logical that prosocial behavior toward strangers may be fundamentally differentially motivated compared to
prosocial behavior aimed toward friends or family members. This is potentially rooted in the fact that an ongoing relationship does not play a part in the likelihood or frequency that an adolescent may choose to assist a stranger, compared to a friend or family member. In addition, Padilla-Walker, Dyer, Yorgason, Fraser, and Coyne (2015a) found that across adolescence, the frequency of prosocial behavior usually varies based on target. More particularly, adolescents tend to help friends at an increasing rate, family members at a stable or subtly decreasing rate (Padilla-Walker et al., 2015a), and strangers at a stable or slightly increasing rate (Padilla-Walker, Carlo, & Memmott-Elison, under review). Therefore, it is important for scholars to study prosocial behavior in relation to who is being helped, in order to more fully delineate nuances in prosociality.

**Strangers**

A relatively large body of research focuses on strangers as recipients of prosocial behavior. This research suggests that motivations are different for helping strangers as opposed to family members (Padilla-Walker & Carlo, 2014), such that helping family members may be more of an issue of commitment and heightened concern, whereas helping strangers may depend on individuals’ dispositional traits, moral identity, and whether the task is convenient for the helper or not. It is noteworthy that prosocial behavior towards strangers is commonly studied in volunteering contexts, and is associated with increased optimism and well-being (Mellor et al., 2008), as well as decreased problem behaviors, aggression, (Padilla-Walker, Carlo, & Nielson, 2015c), and delinquency (Eccles & Barber, 1999). It is noteworthy that prosocial behavior toward strangers has been shown to be particularly protective against negative developmental outcomes (Padilla-Walker et al., 2015c), potentially because helping a person that one does not know requites a more explicit effort to be prosocial, leading to enhanced benefits from engaging
in prosocial behavior. In general, prosocial behavior aimed toward strangers is most consistently predicted by dispositional variables (e.g., sympathy and self-regulation, Padilla-Walker & Christensen, 2011), compared to other socialization or contextual sources.

**Friends**

Friends have been shown to be an increasingly popular target of prosocial behavior across the lifespan, especially during adolescence (Padilla-Walker & Carlo, 2014), when friendships are especially salient. This is probably because teens seek to strengthen already existing relationships with friends by helping, as has been suggested by past work (Padilla-Walker, Fraser, Black, & Bean, 2015d). Although the literature is generally not well established in regards to friends as prosocial targets, there is a broader literature that focuses on prosocial behavior toward peers. This research suggests that adolescents’ prosocial behavior toward friends or peers is related to greater life satisfaction and positive affect, as well as decreased negative affect and depressive symptoms (Kahana, Bhatta, Lovegreen, Kahana, & Midlarsky, 2013), and that having autonomous motivation for helping friends is linked to increased personal well-being, vitality, and self-esteem (Weinstein & Ryan, 2010). Therefore, it appears that the “benefits” of helping friends or peers may be related to both positive social feelings and outcomes in addition to (decreased) negative behaviors. Further, positive parenting has been shown to act as a precursor to prosocial behavior toward friends, and other research suggests that friendship relationship quality (Padilla-Walker et al., 2015d), as well as dispositional traits like self-regulation, sympathy (Padilla-Walker & Christensen, 2011), and sympathy (Padilla-Walker et al., 2015d) serve as antecedents to prosocial behavior aimed toward friends.

**Family**
Multidimensional research on prosocial behavior also focuses on family members as targets and suggests that across adolescence, individuals are more likely to help someone they know rather than a stranger (Killen & Turiel, 1998), and that mothers are more frequent targets of child prosocial behavior than are fathers (Eberly & Montemayor, 1998). In addition, research suggests that prosocial behavior toward family members is linked to positive developmental outcomes, like cooperation in the family context (during early childhood, Dunn & Munn, 1986), increased empathy (in younger siblings during childhood, Tucker, Updegraff, McHale, & Crouter, 1999), and increased volunteering outside the home (in older adulthood, Burr, Choi, Mutchler, & Caro, 2005) to name a few. Applying these findings to the time period of adolescence, there is some evidence that suggests prosocial behavior toward family is unique in that it can strengthens familial bonds, and lead to increased prosocial behaviors aimed toward strangers. It is worth mentioning that prosocial behavior toward family members is most consistently linked to features of parent-child connectedness (Clark & Ladd, 2000).

Thus, past research has clearly shown that prosocial behavior tends to vary by target. Consequently, the value of studying prosocial behavior as a multidimensional construct is clear, leading to greater explanation of the variance of prosocial behavior. However, less is known about how helping different targets is associated with various outcomes, such as self-regulation. Therefore, this study will contribute to the prosocial literature by elaborating on the distinct relations between prosocial behavior toward strangers, friends, and family members and dimensions of self-regulation.

**Theoretical Foundations for Links Between Prosocial Behavior and Self-Regulation**

It is important to understand why prosocial behavior and self-regulation would theoretically be associated over time, in order to justify the current study and demonstrate how
findings will impact the research literature. As such, this section will aim to elaborate on theoretical links between prosocial behavior and self-regulation. Moral identity is best defined as the degree to which being a moral person is important to an individual’s sense of self (Blasi, 1984; 1995) and research suggests that individuals strive to make choices that are consistent with their moral identity (Sood & Forehand, 2005). Moral identity theory suggests that engagement in prosocial behavior over time signifies the development of a moral identity (Hart, Atkins, & Ford, 1998), as engagement in prosocial behavior becomes a purposeful demonstration of who a person believes himself or herself to be, as opposed to merely mundane or impulsive action.

Conceptualizing self-regulation as an aspect of personality as has been done in past research (Baumeister, Gailliot, DeWall, & Oaten, 2006), self-regulation likely influences relationships with others, where interactions with others become opportunities to help. Then individuals engage in prosocial behavior, which in turn leads to a more developed moral identity as well as individual resilience in the form of increased self-regulation (Hart et al., 1998).

Self-regulation is the ability to overcome one’s natural responses, including thoughts, emotions, impulses, and performance, and to change one’s resulting behavior (Baumeister, & Tierney, 2011) and is important because it has been shown to provide the basis for intentional behavior (Bandura, 1991). For example, even if a person expected or wanted to perform a given behavior, he or she could not do so without self-regulation acting as motivation for that behavior (Bandura & Simon, 1977). Moving forward, the cognitive-affective processing systems (CAPS) theory of personality (Cervone & Shoda, 1999; Lapsley, in press; Mischel & Shoda, 2008, 1995) posits that temperament is one dispositional trait among many that is increasingly incorporated into socio-cognitive units such as scripts, schemas, and competencies (Mischel, 1990) and that in turn, these units are used to prescribe individuals with patterns of moral behavior in situations or
settings where a moral response is needed. Since self-regulation is widely considered an aspect of temperament (Kochanska, Philibert, & Barry, 2009), it is likely that self-regulation may be directly associated with the development of different competencies, such as prosocial competencies. Further, the CAPS model suggests that dispositional features (e.g. self-regulation) and contextual factors (opportunities to be prosocial) affect one another as they jointly facilitate stable patterns of behavior (Lapsley, in press), and potentially strengthen one’s moral (prosocial) identity. Applied to the current study, it is possible that self-regulation and engagement in prosocial opportunities maybe associated with one another.

**Self-regulation**

Self-regulation is also referred to as self-control or willpower (Baumeister, & Tierney, 2011), though the term self-regulation will be used throughout this article for consistency. Research generally shows that self-regulation is biologically rooted, emerges within the first two years of life, is widely considered an aspect of temperament or personality (Kochanska et al., 2009) and is stable from childhood to early adolescence (Raffaelli, Crockett, & Shen, 2005) and from early to late adolescence (Geldhof, Bowers, Gestsdóttir, Napolitano, & Lerner, 2015). Although self-regulation is fairly stable, some research suggests that self-regulation is continually shaped during adolescence, usually by constructs such as parenting practices (Moilanen, Rasmussen, & Padilla-Walker, 2015), relationship quality in the parent-early adolescent relationship (Moilanen, Shaw, & Fitzpatrick, 2010), available ecological assets like access to resources, institutions, and social networks (Lerner, Bowers, Geldhof, Gestsdóttir, & DeSouza, 2012), and moral self-perceptions (Conway & Peetz, 2012), which are often conceptualized as individuals engage in altruistic or cooperative behaviors (Sachdeva, Iliev, & Medin, 2009). In addition, research shows self-regulation is predictive of a host of positive
developmental outcomes during adolescence, including academic achievement (Bakracevic Vukman, & Licardo, 2010), goal implementation (Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011), happiness (a review, Baumeister, & Exline, 2000), and increased prosocial behavior (in emerging adulthood, DeWall, Baumeister, Gailliot, & Maner, 2008). Interestingly, research does not reveal any negative outcomes related to optimal self-regulation (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012), which is likely based on the fact that there are few personal failures or successes that occur that are not directly associated with self-regulation in some way.

It is important to note that in an effort to expand understanding of self-regulation, researchers have distinguished between three distinct dimensions, particularly behavioral, cognitive, and emotional self-regulation (Vohs & Baumeister, 2011). Correlations between dimensions of self-regulation range from $r = .02 - .46$ in past research (see Pelletier, Fortier, Vallerand, & Brière, 2001), which suggests that although dimensions of self-regulation are related to one another, they are also distinct enough to warrant conceptualizing and analyzing each separately.

**Behavioral**

Behavioral self-regulation includes, “the manifestation of executive function skills in overt, observable responses in the form of children’s gross motor actions” (Ponitz, McClelland, Matthews, & Morrison, 2009, p. 605). Behavioral self-regulation is the least studied dimension of regulation and in light of the way it is conceptualized in the current study, is also referred to as impulsivity control. For instance, a teen who restrained herself from tripping a person she was angry with would demonstrate behavioral self-regulation, as would a teen who resisted the urge to bounce his leg when he was nervous. Research suggests that behavioral self-regulation is
distinctly linked to several outcomes, including but not limited to more regulated eating habits, decreased risk for the development of disordered eating (e.g. drive for thinness, bulimia, body dissatisfaction, etc.), decreased aggressive behavior, and increased prosocial behavior (McMahon et al., 2013). Finally, parental training programs (for teens with behavioral or attention problems, Hartman, Stage, & Webster-Stratton, 2003), parental discipline tactics, and adolescent-parent attachment (Chapple & Johnson, 2007) have been linked to increased behavioral self-regulation.

Cognitive

Cognitive self-regulation consists of the power to control one’s consciousness (including thoughts), usually in a goal-oriented fashion (Binswanger, 1991). For example, a teen who created a study plan to prepare for a set of standardized tests and followed that plan over a series of weeks or months demonstrates cognitive self-regulation. Other technical terms for cognitive self-control include effortful control (in young children; Eisenberg et al., 2009) as well as intentional self-regulation (Bowers et al., 2011). Cognitive self-regulation is more commonly studied than behavioral self-regulation, potentially because of the way it is operationalized, with a focus on intentionality and goal-seeking. Conceptualized in this way, cognitive self-regulation is linked to a greater variety of outcomes compared to behavioral self-regulation, such as increased self-perceptions of competence, confidence, character, connection with others, and caring (i.e. sympathy and empathy for others, Bowers et al., 2011), volition/agency (Binswanger, 1991), subsequent planning for the future, and academic performance (Torrance, Fidalgo, & García, 2007). Though no research to our knowledge analyzes the association between cognitive self-regulation and prosocial behavior, it is likely that this link exists, where adolescents who want to help others are enabled to do so as they set and achieve goals while utilizing cognitive
self-regulation. It is also noteworthy that biological predispositions (i.e. temperament, Rothbart & Jones, 1998), quality of the mother-child relationship, caregiver sensitivity, and social interactions (Kopp, 1982) have been correlated with cognitive self-regulation in past research.

**Emotional**

Finally, emotional self-regulation occurs when a person controls both experiential and expressive aspects of his or her emotions (Thompson, 1994). That means a person who resisted the urge to cry about a bad grade while at school would exhibit emotional regulation by choosing to restrain his or her initial emotional response. Emotional self-regulation is frequently studied because of links to relational and social outcomes, like decreased social problems with peers, delinquency (Trentacosta & Shaw, 2009), internalizing symptoms (Eisenberg, Spinrad, & Eggum, 2010), better work performance (Keith & Frese, 2005), and enhanced social competence (Shields, Cicchetti, & Ryan, 1994). Further, constructs such as parental acceptance and control (Finkenauer, Engels, & Baumeister, 2005), as well as sociocultural contexts like income and risk factors (Raver, 2004) have been linked to emotional self-regulation in adolescence.

Taken together, there is significant evidence that suggests behavioral, cognitive, and emotional dimensions of self-regulation can each protect against negative development and foster positive development throughout adolescence. However, less is known regarding relations of each dimension; that is, it is unclear whether dimensions of self-regulation are related to distinct outcomes, or whether different dimensions of self-regulation have similar relations with various constructs (as research supports both lines of thought—see above). Therefore, the current study will help address this discrepancy in the literature by clarifying specific associations between behavioral, cognitive, and emotional self-regulation and prosocial behavior. In addition, it is noteworthy that the bulk of research seems to focus on the role of self-regulation as a
protective factor, as opposed to a facilitator of positive development. As such, this study will greatly add to the research literature by more clearly illuminating the positive correlates of the dimensions of self-regulation with positive behaviors, specifically prosocial behavior.

**Links Between Self-Regulation and Prosocial Behavior**

The desire to engage in prosocial behavior likely requires behavioral, cognitive, and emotional self-regulation. For example, adolescents will need to control their behaviors in order to focus on helping others, often by avoiding impulsive behaviors that may distract from helping. They will also need to recognize opportunities to help others, consider different approaches to helping, and evaluate which course of action to take and why. Finally, teens will need to control their emotions in order to effectively help others by avoiding emotional distress (Van Huelle, 2013) and focusing on the helping situation at hand. Thus, past research supports the notion that engaging in behavioral, cognitive, and emotional self-regulation will promote the development of prosocial behavior. Further, adolescents’ self-regulatory skills that are utilized (in order to engage in prosocial behaviors) will be strengthened through use over time (Muraven & Baumeister, 2000; Muraven, Baumeister, & Tice, 1999), resulting in teens’ greater capacity and propensity to engage in prosocial actions in the future. It is also probable that teens who believe that helping others is central to their moral identity (Aquino & Reed, 2002) will utilize self-regulation in order to help them engage in prosocial behavior and therefore maintain their moral identity. Thus, dimensions of self-regulation likely facilitate the development of prosocial behaviors because behaviorally-, cognitively-, and emotionally-regulated individuals will be better equipped to effectively engage in opportunities to help others, compared to those who are poorly regulated.
On the other hand, engagement in prosocial behavior likely facilitates the development of different dimensions of self-regulation, since behavioral, cognitive, and emotional self-regulation are used as individuals engage in helping behaviors—which requires balancing selfish and other-oriented motivations (DeWall et al., 2008). For example, an adolescent who focuses on encouraging a friend who is having a hard day will be enabled to inhibit impulsive tendencies (e.g. being verbally aggressive) as her attention is focused on more positive social interactions, avoid thoughts that divert from her experience of helping others, and learn to regulate her emotions more effectively in order to provide emotional assistance to others. Thus, as adolescents choose to develop their prosociality, they will simultaneously develop their self-regulatory skills. However, it is worth noting that because self-regulation is biologically based (Kochanska et al., 2009) and fairly stable (Raffaelli et al., 2005), prosocial behavior may be more weakly associated with changes in self-regulation than self-regulation is with prosocial behavior.

Thus, it is likely that engaging in prosocial behavior leads to increased self-regulation, and self-regulation leads to increased prosocial behavior. It is noteworthy that a paucity of research exists that focuses on multidimensional links between dimensions of self-regulation and targets of prosocial behavior. In fact, no research to our knowledge examines dimensions of self-regulation in relation to prosocial targets, which is surprising, given the increasing focus on the etiology of both prosocial behavior and self-regulation in recent years (see Padilla-Walker and Carlo, 2014 and Vohs and Baumeister, 2016, respectively). However, research does exist that considers self-regulation (dimension not specified) in relation to prosocial behavior toward strangers, friends, and family members. This research suggests that diminished self-regulation is related to decreased prosocial behavior aimed toward unidentified targets, strangers, and friends (Dewall et al., 2008) and that greater self-regulation is linked to increased prosocial behavior.
aimed toward strangers and friends, but not to family members (Padilla-Walker & Christensen, 2011). Thus, self-regulation might be especially important for prosocial behavior toward strangers, which is more likely to be high cost due to a lack of an existent relationship to motivate behavior. Unfortunately, the specific dimension of self-regulation that was being measured was not specified in either of the studies discussed above, and both articles utilized cross-sectional designs. As such, it is difficult to theorize potential links between dimensions of self-regulation and targets of prosocial behavior, but it is clear that the current study offers nuanced contributions to the current research literature by elaborating on longitudinal, bidirectional links between targets of prosocial behavior and dimensions of self-regulation.

**Gender**

It is important to note that gender has been related to both prosocial behavior and self-regulation. For instance, research suggests that females are more prosocial toward family members and friends (Padilla-Walker, et al., 2015a), while males are generally more prosocial toward strangers (i.e. in chivalrous or heroic situations, Eagly & Crowley, 1986). In addition, research suggests that females are better behaviorally (Bjorklund & Kipp, 1996) and cognitively regulated (Böhm, Smedler, & Forssberg, 2004), while males more effectively regulate their emotions (Thayer, Rossy, Ruiz-Padial, & Johnsen, 2003), though it is worth noting that research in this area is not particularly consistent. As such, we anticipate that gender will be significantly related to longitudinal, bidirectional links between targets of prosocial behavior and dimensions of self-regulation. More specifically, we suggest gender will be linked to initial levels of prosocial behavior directed toward different targets as well as dimensions of self-regulation, as has been shown in past research (for prosocial behavior, Padilla-Walker & Christensen, 2011; for self-regulation, Matthews, Ponitz, & Morrison, 2009). However, research has shown that gender
does not necessarily moderate levels of prosocial engagement (Fu, Padilla-Walker, & Brown, 2017) or self-regulation (Raffaelli et al., 2005), so we do not expect gender to be associated with patterns of associations between self-regulation and prosocial behavior.

**The Current Study**

Based on past research, moral identity theory (Hart et al., 1998), and CAPS theory (Cervone & Shoda, 1999; Lapsley, in press; Mischel & Shoda, 2008; 1995), the purpose of this study is to assess potential longitudinal, bidirectional relations between behavioral, cognitive, and emotional dimensions of self-regulation and prosocial behavior toward strangers, friends, and family members across adolescence. Although previous research has investigated the link from self-regulation to prosocial behavior (Padilla-Walker & Christensen, 2011) and from prosocial behavior to self-regulation (Eisenberg et al., 1996), no research to our knowledge has specifically analyzed bidirectional links between these multidimensional constructs over a five-year period across adolescence, which will allow us to more fully understand the development of these processes. In addition, this study will increase understanding regarding the comparative strength and relative consistency of the relation of prosocial behavior with self-regulation and vice versa, which is increasingly important given the positive correlates of prosocial behavior and self-regulation during adolescence. These findings have the potential to be incorporated into public scholarship pieces or intervention programs, which can help parents, teachers, and other involved individuals facilitate positive development in youth. Taken together, it is clear that the current study will help fill several gaps in the research literature. Overall, the findings of this study will aid academics by generating ideas for future research on distinct relations between dimensions of self-regulation and targets of prosocial behavior, leading to an expansion of the study of self-regulation and prosocial behavior, respectively.
Hypotheses

Below I make several hypotheses regarding longitudinal associations between targets of prosocial behavior and dimensions of self-regulation. It is worth noting that research focusing on associations between dimensions of self-regulation and targets of prosocial behavior is rare, so all paths between study variables will be analyzed, as a portion of this study is exploratory in nature. However, many specific hypotheses are being tested in reaction to previous research and theory.

1. I hypothesize prosocial behavior toward strangers, friends, and family will be differentially related to dimensions of self-regulation.

   a. I hypothesize prosocial behavior toward strangers will be significantly associated with cognitive self-regulation, since helping strangers is high-cost (Padilla-Walker & Fraser, 2014) and might especially signify the development of a moral identity.

   b. I expect that helping friends and family members will be significantly related to cognitive and emotional self-regulation, since helping those one knows has strong emotional undertones (Lewis, 2014) and has been linked to long-term goals such as relationship maintenance and strengthening (Padilla-Walker & Carlo, 2014).

2. I hypothesize behavioral, cognitive, and emotional self-regulation will be differentially related to targets of prosocial behavior.

   a. I expect behavioral self-regulation will be significantly associated with prosocial behavior toward strangers, as has been shown in past research (DeWall et al., 2008).
b. I anticipate cognitive self-regulation will be most strongly related to prosocial behavior toward strangers because cognitive regulation is intentional in nature and is considered a salient representation of an individual’s moral identity. As such, it makes logical sense that those who believe helping is a part of who they are will be more willing to help others, even those they do not have a relationship with.

c. Because relationships are emotionally rooted (Saarni, 1990) and ongoing relationship quality tends to increase the likelihood of acting prosocially toward those one knows (Lewis, 2014), I expect emotional self-regulation will be significantly associated with prosocial behavior toward friends and family.

3. I hypothesize that although engagement in prosocial behavior and self-regulation will be bidirectionally related (Cervone & Shoda, 1999; Lapsley, in press; Mischel & Shoda, 2008, 1995), where self-regulation will be more strongly related to prosocial behavior than prosocial behavior to self-regulation. This is rooted in the idea that self-regulation is a biological aspect of temperament (Kochanska et al., 2009) that is fairly stable through childhood and adolescence (Raffaelli et al., 2005), whereas prosocial behavior tends to have greater variability.

4. Finally, I hypothesize females will report initially higher levels of prosocial behavior towards friends and family, as well as behavioral and cognitive self-regulation and that males will report initially higher levels of prosocial behavior toward strangers and emotional self-regulation. In addition, I expect gender will not be related to associations between prosocial behavior and self-regulation.

**Method**

**Participants**
The participants for this study were taken from the Flourishing Families Project (FFP), which is an ongoing, longitudinal study of inner family life involving families with a child between the ages of 10 and 14 at Wave 1. Although data for the FFP was originally collected by wave, data was reorganized by participants’ age for use in the current study. For example, in the restructured data at the initial time point all participants were 10 years old, at the second time point all participants were 11 years old, and at the third time point all participants were 12 years old, etc. The sample for this study consists of children drawn from the FFP study’s Time 3 assessment (age = 12 years, total \( n = 500 \) children, 314 two parent families and 96 single parent families). For clarity in the current study, from this point forward we will refer to age 12 data as Time 1 and so on (e.g. \( M_{\text{age}} \text{ at Time 1} = 12 \), \( M_{\text{age}} \text{ at Time 2} = 14 \), \( M_{\text{age}} \text{ at Time 3} = 16 \), \( M_{\text{age}} \text{ at Time 4} = 18 \)). We purposely chose two-year time gaps between data points in order to assess whether longitudinal associations between study variables were strong enough to persist over time. At Time 1, approximately 78% participants were of European American ethnicity, 8% were African American, with smaller percentages for Hispanics (2%) and Asian Americans (.5%). In addition, approximately 12% of participants were considered multi-ethnic in nature (based on a combination of two or more ethnic cultures among family members) or “other”. In terms of parental education, 49.4% of mothers and 70.63% of fathers had a bachelor’s degree or higher. For income categories, approximately 13% made less than $25,000 per year, 34% made between $25,000 and $50,000 a year, and 53% made more than $50,000 per year. It is worth noting that in the past 9 years, the sample has retained 90% of the original sample.

**Procedure**

Participant families for the FFP were selected from a large northwestern city and were interviewed during 2007 for a Wave I data sample. Subsequently, families were interviewed at
yearly intervals in their home for the first 5 years and data collection occurred via the Internet over the next 5 years of data collection, ending in 2016. Families were primarily recruited using a purchased national telephone survey database (Polk Directories/InfoUSA). This database claimed to contain 82 million households across the United States and had detailed information about each household, including presence and age of children. Families identified using the Polk Directory were randomly selected from targeted census tracts that mirrored the socio-economic and racial stratification of reports of local school districts. All families with a child between the ages of 10 and 14 living within target census tracts were deemed eligible to participate in the FFP. Of the 692 eligible families contacted, 423 agreed to participate, resulting in a 61% response rate. However, the Polk Directory national database was generated using telephone, magazine, and Internet subscription reports; so families of lower socio-economic status were under-represented. Therefore, in an attempt to more closely mirror the demographics of the local area, a limited number of families were recruited into the study via other means (e.g., referrals, fliers; n = 77, 15%). By broadening the approach, the social-economic and ethnic diversity of the sample was increased.

All families were contacted directly using a multi-stage recruitment protocol. First, a letter of introduction was sent to potentially eligible families (this step was skipped for the 15% of families who responded to fliers). Second, interviewers made home visits and phone calls to confirm eligibility and willingness to participate in the study. Once eligibility and consent were established, interviewers made an appointment to come to the family’s home to conduct an assessment interview that included video-taped interactions, as well as questionnaires that were completed in the home (for the first 5 waves of data collection). Subsequent data collection took place over the Internet via an online questionnaire that was administered to participants using
Qualtrics. The most frequent reasons cited by families for not wanting to participate in the study were lack of time and concerns about privacy.

**Measures**

**Dimensions of self-regulation.** A 13-item self-regulation measure (Novak & Clayton, 2001) assessed children’s ability to regulate disruptive behavior (behavioral) and negative emotions (emotional) as well as set and attain goals (cognitive). From age 12-18 (Time 1-5) reliability coefficients ranged from .78-.84 for the 5-question emotional self-regulation subscale, .70-.77 for the 4-question cognitive self-regulation subscale, and .80-.84 for the 4-question behavioral self-regulation subscale. Adolescent participants self-reported on items such as, “I have a hard time controlling my temper”, “Once I have a goal, I make a plan to reach it”, and “I get distracted by little things” on a 4-point Likert scale ranging from 1 (never true) to 4 (always true). Higher scores indicated greater behavioral, cognitive, and emotional self-regulation.

**Targets of prosocial behavior.** At each age (e.g. ages 12-18 years), adolescents completed the self-reported Inventory of Strengths (Peterson & Seligman, 2004) in order to measure prosocial behavior toward strangers, friends, and family members. Cronbach’s Alpha reliability coefficients were found to range from .84-.88 for prosocial behavior aimed toward strangers, .84-.91 for prosocial behavior aimed toward friends, and .88-.91 for prosocial behavior aimed toward family. In terms of how much they disagreed or agreed with statements about themselves, participants answered questions like “I help people I don’t know, even if it is not easy for me”, “I voluntarily help my friends”, and “I love to make my family happy”. These and other items were adapted to pertain to participants’ actions toward strangers, friends, and family members. Responses on each of the three 5-item subscales were collected on a 5-point Likert-type scale, ranging from 1 (not like me at all) to 5 (very much like me), with higher scores.
indicating greater levels of kindness and generosity toward strangers, friends, and family members.

**Analysis Plan**

First, descriptive statistics, frequencies, and bivariate correlations will be conducted in order to assess preliminary relations between dimensions of self-regulation and targets of prosocial behavior, as well as characteristics of the sample. Next, two MANOVAs will be estimated in order to reveal gender differences between males and females in initial levels of prosocial behavior toward strangers, friends, and family members as well as behavioral, cognitive, and emotional self-regulation, respectively. Then nine cross-lagged panel models will be estimated using structural equation modeling in MPLUS in order to assess longitudinal, bidirectional relations between study variables, while controlling for gender, maternal education, and family income. Cross-lagged paths from prosocial behavior toward self-regulation and from self-regulation toward prosocial behavior, respectively, will be constrained to be equal in each model in order to determine whether relations are consistent across time and development. In cases where constraining cross-lagged paths to be equal results in a decrease of model fit, culprit parameters will be allowed to vary freely. Good model fit includes a CFI value equal to or greater than .90 and an RMSEA value below .08 (Little, 2004). Due to a limited sample size, all variables will be analyzed as manifest variables and nine separate models will be estimated for prosocial behavior toward strangers, friends, and family in relation to the three dimensions of self-regulation. This is an attempt to optimize the current sample while avoiding issues of multicollinearity (since intercorrelations between targets of prosocial behavior are quite high, .14-.54 in the current sample). By attempting to limit multicollinearity in this way, I also limit the probability of producing suppressor effects (Kraha, Turner Nimon, Zientek, & Henson,
A cross-lagged model was chosen because it will reliably address the research questions pertinent to the current study by simultaneously assessing the consistency of each construct over time, as well as the “direction of predictive influence” among prosocial targets and dimensions of self-regulation (Little, 2013, pg. 181). More specifically, a cross-lagged panel model was chosen over a growth curve model because a cross-lagged model can estimate change over time while revealing a direction and strength of associations, whereas a growth curve simply estimates change but does not indicate a direction of associations.

Next, a multiple group analysis will test for structural invariance in three separate models estimating associations between prosocial behavior toward strangers, friends, and family in relation to behavioral, cognitive, and emotional self-regulation for males and females. First, I will specify two separate but identical models, one for males and one for females. I will then label all of the parameters of each model and place constraints that force the corresponding regression paths for male and female models to be equal. Then I will estimate the model and check the Wald test. If the Wald test is not significant, then I will understand that constraining the male and female models to be equal does not result in a decrease of model fit, and I will proceed to report a single group model. However, if the Wald test is significant, I will understand that constraining the male and female models to be equal results in a decrease in model fit. As such, I will then set each corresponding set of constraints equal to each other (one set at a time), estimate the model, and check the Wald test in order to reveal the paths that are significantly different for males and females. As I find paths that are not significantly different for males and females, I will leave the constraints in my model and will proceed to test another pair of corresponding constraints; on the other hand, if I find paths that are significantly different from one another, I will label them differently in order to let them freely vary, and then will proceed to
test other corresponding constraints. Once I have tested each corresponding set of constraints, I will estimate my model and report results.

**Results**

**Descriptive Statistics and Correlations**

First, descriptive statistics were conducted in order to assess characteristics of the sample and preliminary relations between variables. Means and standard deviations for each continuous variable were estimated and are represented in Table 1. Next, bivariate correlations were estimated between variables. At Time 1, prosocial behavior toward strangers was significantly associated with behavioral, cognitive, and emotional self-regulation. And prosocial behavior toward friends and family were significantly associated with cognitive self-regulation but were not significantly associated with behavioral or emotional self-regulation. All relations between study variables at all time points are reported in Table 1.

**A MANOVA to Assess Gender Differences in Initial Levels of Study Variables**

A MANOVA exploring gender differences in prosocial behavior toward strangers, friends, and family at Time 1 was estimated. Results revealed there were overall differences between males and females in prosocial behavior toward strangers, friends, and family, $F(3, 377) = 11.19, p < .001$. More specifically, females reported higher levels of prosocial behavior toward all targets. Results are presented in Table 2.

In addition, a MANOVA exploring gender differences in behavioral, cognitive, and emotional self-regulation at Time 1 was estimated. Results showed there were overall differences between males and females in behavioral, cognitive, and emotional self-regulation, $F(3, 473) = 4.10, p = .0069$. More specifically, males and females did not report significantly different levels
of behavioral and cognitive self-regulation and males reported higher levels of emotional self-regulation compared to females. Results are presented in Table 2.

Cross-lagged Models

Next, nine cross-lagged models were estimated examining bidirectional links between prosocial behavior toward strangers, friends, and family members and behavioral, cognitive, and emotional self-regulation. For the sake of parsimony, only models with significant results other than stability paths are presented in-text. See Table 3 for models that revealed no significant cross-lagged paths.

Longitudinal associations between prosocial behavior toward strangers and cognitive self-regulation were estimated. Constraining the path from cognitive self-regulation at age 12 toward prosocial behavior at age 14 and the path from cognitive self-regulation at age 14 toward prosocial behavior at age 16 resulted in decreased model fit, $Wald's \text{ test}(1) = 4.484, p = .0342$. In addition, constraining the path between cognitive self-regulation at age 12 toward prosocial behavior at age 14 and cognitive self-regulation at age 16 toward prosocial behavior at age 18 decreased model fit, $Wald's \text{ test}(1) = 6.282, p = .0122$. As such, these parameters were left free to vary. Model fit was acceptable, $\chi^2 (33) = 130.80, p < .000$, CFI = .92, RMSEA = .08. Results revealed cognitive self-regulation at age 12 was significantly linked to prosocial behavior at age 14 ($B = .13, p = .003$). In addition, prosocial behavior at age 12, 14, and 16 was significantly associated with cognitive self-regulation at age 14 ($B = .11, p < .000$), 16 ($B = .10, p < .000$), and 18 ($B = .11, p < .000$), respectively. Being female was linked to prosocial behavior at age 12 ($B = -.12, p = .009$) but gender was not associated with cognitive self-regulation. In addition, maternal education and income were not significantly associated with any variables in the model.
Prosocial behavior ($B$ ranged from .48-.62) and cognitive self-regulation ($B$ ranged from .40-.47) were stable across time. Results are presented in Figure 1.

Longitudinal associations between prosocial behavior toward friends and cognitive self-regulation were estimated. Model fit was acceptable, $\chi^2 (33) = 108.85$, $p < .000$, CFI = .91, RMSEA = .07. Results revealed prosocial behavior at age 12, 14, and 16 was significantly associated with cognitive self-regulation at age 14 ($B = .06, p = .025$), 16 ($B = .06, p = .025$), and 18 ($B = .07, p = .025$), respectively. However, cognitive self-regulation at any age was not significantly linked to prosocial behavior toward strangers at any age. Being female was significantly associated with prosocial behavior ($B = -.32, p < .000$), though gender was not significantly linked to cognitive self-regulation. Maternal education and income were not significantly related to any variables in the model. In addition, prosocial behavior ($B$ ranged from .49-.54) and cognitive self-regulation ($B$ ranged from .44-.49) were fairly stable over time. Results are represented in Figure 2.

Longitudinal associations between prosocial behavior toward family and behavioral self-regulation were estimated. The model fit the data well, $\chi^2 (34) = 77.17$, $p < .000$, CFI = .95, RMSEA = .05. Results revealed prosocial behavior was not significantly linked to behavioral self-regulation across any age. However, results showed that behavioral self-regulation at age 12, 14, and 16 was significantly associated with prosocial behavior at age 14 ($B = .05, p = .046$), 16 ($B = .05, p = .046$), and 18 ($B = .05, p = .045$), respectively. Being female was significantly linked to prosocial behavior at age 12 ($B = -.16, p = .001$), but gender was not associated with behavioral self-regulation. Maternal education and income were not significantly associated with any variables in the model. Prosocial behavior ($B$ ranged from .52-.57) and behavioral self-regulation ($B$ ranged from .46-.54) were stable over time. Results are represented in Figure 3.
Longitudinal associations between prosocial behavior toward family and emotional self-regulation were estimated. Model fit was acceptable, $\chi^2 (34) = 101.54, p < .000$, CFI = .93, RMSEA = .06. Results showed that prosocial behavior was not significantly associated with emotional self-regulation across any age. On the other hand, emotional self-regulation at age 12, 14, and 16 was significantly associated with prosocial behavior at age 14 ($B = .05, p = .028$), 16 ($B = .05, p = .029$), and 18 ($B = .06, p = .029$), respectively. Being female was significantly associated with prosocial behavior at age 12 ($B = -.17, p < .000$) and being male was significantly linked to emotional self-regulation at age 12 ($B = .11, p = .016$). In addition, prosocial behavior ($B$ ranged from .51-.56) and emotional self-regulation ($B$ ranged from .51-.55) were fairly stable across time. Results are represented in Figure 4.

**Multiple Group Analyses**

In addition, a multiple group analysis was conducted for each of the nine cross-lagged models in order to assess whether gender moderated longitudinal associations between targets of prosocial behavior and dimensions of self-regulation. Results revealed that gender did not moderate relations between (a) prosocial behavior toward strangers and behavioral self-regulation, *Wald’s statistic*(17) = 18.687, $p = .3468$; (b) prosocial behavior toward strangers and cognitive self-regulation, *Wald’s statistic*(18) = 20.636, $p = .2982$; (c) prosocial behavior toward strangers and emotional self-regulation, *Wald’s statistic*(17) = 27.243, $p = .0546$; (d) prosocial behavior toward friends and behavioral self-regulation, *Wald’s statistic*(17) = 9.101, $p = .9370$; (e) prosocial behavior toward friends and cognitive self-regulation, *Wald’s statistic*(17) = 11.71, $p = .8172$; (f) prosocial behavior toward friends and emotional self-regulation, *Wald’s statistic*(18) = 19.95, $p = .3356$; (g) prosocial behavior toward family and behavioral self-regulation, *Wald’s statistic*(17) = 8.59, $p = .9523$; (h) prosocial behavior toward family and
cognitive self-regulation, \(Wald’s\ statistic(18) = 5.19\ p = .9972;\) and (i) prosocial behavior toward family and emotional self-regulation, \(Wald’s\ test(17) = 21.88,\ p = .1894.\)

**Discussion**

The purpose of this study was to assess longitudinal, bidirectional relations between behavioral, cognitive, and emotional dimensions of self-regulation and prosocial behavior toward strangers, friends, and family members across adolescence. There was some evidence for bidirectional relations between prosocial behavior toward strangers and cognitive self-regulation in early adolescence. In addition, prosocial behavior toward strangers was significantly associated with cognitive self-regulation across adolescence, and cognitive self-regulation was significantly associated with prosocial behavior toward friends across adolescence. Further, behavioral and emotional self-regulation were significantly related to prosocial behavior toward family from age 12 to age 18. This study also found that initial levels of prosocial behavior toward strangers, friends, and family, tended to vary by gender and that dimensions of self-regulation did not vary based on gender (except for emotional self-regulation). Also, gender did not moderate longitudinal associations between targets of prosocial behavior and dimensions of self-regulation. Given the two-year lag between each time point and the fact that previous levels of each variable were taken into account in analyses, the results of this study are especially notable, thereby providing a foundation for future research centered on relations between prosocial behavior and self-regulation.

**Bidirectional Relations**

We found that from early (age 12) to mid (age 14) adolescence, prosocial behavior toward strangers was linked to higher levels of cognitive self-regulation and that higher levels of cognitive self-regulation were associated with increased prosocial behavior toward strangers.
These results are in line with past theory that specifies engagement in prosocial behavior can signify the development of a moral identity (Hart et al., 1998), especially when the helping behavior is high cost (e.g. directed toward a stranger). More specifically, based on moral identity theory, it is likely that individuals employ their cognitive self-regulation in order to behave in ways that are analogous to their developing moral identity (i.e. engage in prosocial behavior) and that when individuals engage in prosocial behavior toward strangers, they are likely to further develop their cognitive self-regulation after utilizing it to engage in prosocial behavior. It is likely that cognitive self-regulation is especially pertinent to prosocial behavior aimed toward strangers because helping those one does not know might require greater intentionality and motivation compared to helping friends or family. These findings are important because they highlight nuanced bidirectional interrelations between aspects of positive youth development. As such, researchers, therapists, and others who are involved with adolescents can use these findings to help facilitate the development of prosocial behavior and self-regulation. It is worth acknowledging that future research should seek to consider cross-lagged mediation, which would potentially enrich these findings by elaborating on the nature of longitudinal relations between prosocial behavior toward strangers and cognitive self-regulation.

**Unidirectional Associations**

In addition, results showed that prosocial behavior toward strangers continued to promote cognitive self-regulation through adolescence. Thus, it may be that helping strangers is high cost and therefore results in greater strides of intentionality (i.e. cognitive self-regulation) over time. However, it is also worth noting that prosocial behavior toward strangers was much more stable than cognitive self-regulation, so it is just as possible that these constructs were not bidirectionally related across adolescence because there was not enough available variability in
prosocial behavior toward strangers to be predicted by cognitive self-regulation. Although this postulate goes against hypotheses, is in line with some research that suggests prosocial behavior toward strangers is stable over time (from childhood to adolescence, see Zimmer-Gembeck, Geiger, & Crick, 2005). With this in mind, future researchers should aim to clarify longitudinal interrelations between prosocial behavior toward strangers and cognitive self-regulation, in order to clearly reveal consistent associations between these constructs.

Results also showed that cognitive self-regulation was significantly related to prosocial behavior toward friends from age 12 to age 18. Past research suggests that youth sometimes engage in prosocial behavior as attempts to create or strengthen relationships with others (Padilla-Walker & Carlo, 2014). Compounded with the salience of friendships during adolescence, it is probable that adolescents create goals to create and or strengthen friendships (i.e. utilize their cognitive self-regulation) and then take the necessary steps in order to achieve this goal (by engaging in prosocial behavior toward their friends).

Results also indicated that behavioral and emotional self-regulation promoted increased prosocial behavior toward family across adolescence. Our measure of behavioral self-regulation specifically measured impulsivity control, while the measure of emotional self-regulation mainly measured anger regulation. From this perspective then, our findings suggest that inhibition of impulsive behavioral tendencies and anger uniquely promote helping family and not other targets. Research suggests that during the teen years, adolescents experience especially conflictual relationships with family members such as parents (Csikszentmihalyi & Larson, 1986). In situations with family where adolescents become angry or distracted, the ability to regulate their behavior and emotions will likely enable them to engage in positive family interactions, such as prosocial behavior. Or perhaps adolescents who are better behaviorally and
emotionally regulated are more likely to experience empathy for their family members and engage in increased prosocial behavior toward family as a result. Granted, this claim needs to be empirically justified. Compared to family, friends and strangers are targets of anger or victims of distraction far less than family members, which is one potential reason why behavioral and emotional self-regulation are not significantly related to prosocial behavior toward strangers or friends.

Taken together, though contrary to hypotheses, it appears that self-regulation is more strongly associated with prosocial behavior than prosocial behavior with self-regulation. These results are in line with past theory that suggests self-regulation serves as the foundation for all human behavior, including prosocial behavior (Bandura, 1991; Bandura & Simon, 1977). Given that prosocial behavior toward various targets was more stable than dimensions of self-regulation in this study, the link from self-regulation to prosocial behavior appears to be especially strong, which may be rooted in the fact that self-regulation is a biological aspect of temperament (Kochanska et al., 2009) that serves as a foundation for (prosocial) interactions with various others. This is especially important for parents, teachers, counselors, and other individuals who work with adolescents to understand, so that they can provide teens with opportunities to improve their self-regulatory skills, in order to in turn increase youth engagement in prosocial behavior.

**Gender Differences in Relations Between Prosocial Behavior and Self-regulation**

Multiple group analyses revealed that gender did not moderate associations between prosocial behavior toward strangers, friends, and family and behavioral, cognitive, and emotional self-regulation. These results suggest that gender is significantly related to initial levels of prosocial behavior toward different targets and dimensions of self-regulation, but is not
significantly related to the pattern of associations. These findings were not surprising, given past research that found similar results (for prosocial behavior, Fu et al., 2017; Padilla-Walker et al., 2015; for self-regulation, Matthews et al., 2009; Raffaelli et al., 2005).

Results also revealed that being female was significantly associated with higher initial levels of prosocial behavior toward strangers, friends, and family. These results are in line with past research that makes similar conclusions (see Padilla-Walker & Christensen, 2011). Therefore this study further suggested that female adolescents tend to report engaging in higher levels of prosocial behavior toward all targets than male adolescents. These findings might be based on the fact that females report being more empathetic (Mestre, Samper, Frías, & Tur, 2009) and are therefore potentially more sensitive to others’ feelings and needs (e.g. the need for assistance). However, more recent research suggests that females may report higher levels of prosocial behavior toward different targets due to the way prosocial behavior is measured (Nielson, Padilla-Walker, & Holmes, 2017), so it is highly likely that the way prosocial behavior was measured skewed male and female reports of prosocial behavior.

On the other hand, results revealed no gender differences in behavioral and cognitive self-regulation. These results were somewhat surprising, given past research that reveals females report greater behavioral (Bjorklund & Kipp, 1996) and cognitive (Böhm et al., 2004) self-regulation than males. These results are important because they posit males and females potentially have the same capacity to control their behavior and to set and attain goals across adolescence, which may have important implications for academic and other positive outcomes. In addition, results revealed male adolescents reported higher levels of emotional self-regulation than female adolescents, which is consistent with past findings that utilize young adult samples (see Thayer et al., 2003). This is probably because although females tend to be more emotionally
sensitive and responsive to the feelings and needs of others, they tend to dwell and ruminate about their emotions for longer periods of time (Thayer et al., 2003) and are more susceptible to stressors (Lewis et al., 2015), which leads to a decreased ability to regulate how they are feeling.

Non-Findings

This study did not reveal other longitudinal bidirectional relations between targets of prosocial behavior and dimensions of self-regulation. Prosocial behavior toward strangers, friends, and family members as well as behavioral, cognitive, and emotional self-regulation were fairly stable over time, so it is possible that there was so much stability in constructs over time that there was not enough open variability for the other construct to predict. Or, it may be that the way behavioral, cognitive, and emotional self-regulation were measured explain results of non-significance. More specifically, our behavioral self-regulation measure captured fidgeting behavior and our emotional self-regulation scale captured anger suppression, as opposed to alternatives such as control over physical impulses other than fidgeting and regulation of personal distress. Therefore it is possible that if future researchers were to assess longitudinal associations between targets of prosocial behavior and dimensions of self-regulation while utilizing different measures of behavioral, cognitive, and emotional self-regulations, they might find more statistically significant findings, as is suggested by strong theoretical links between prosocial behavior and self-regulation (Cervone & Shoda, 1999; Lapsley, in press; Mischel & Shoda, 2008, 1995). Another possible explanation for non-significant findings could be that the current study measured only one type of prosocial behavior, as opposed to different types of prosocial behavior that might require more self-regulation, like emotional or compliant prosocial behavior. Since emotional prosocial behavior includes being emotionally available and responsive to another who is emotionally distressed and compliant prosocial behavior includes
regulating one’s behavior in order to ensure one acts in requested ways, it is possible that emotional as well as cognitive and behavioral self-regulation might be especially pertinent to these prosocial behaviors, respectively. As such, future researchers should seek to analyze different types of prosocial behavior in relation to different dimensions of self-regulation, in order to further delineate these associations.

**Limitations and Future Directions**

This study was not without limitations. For instance, the sample used in this study was disproportionately White and came from high SES backgrounds and 2-parent families. As such, the results of this study should not be generalized to all populations and researchers should seek to analyze links between targets of prosocial behavior and dimensions of self-regulation in more diverse samples, in order to assess whether demographic predictors moderate associations between prosocial behavior and self-regulation. In addition, this study utilized self-report close-ended survey data. Although these methods have been used consistently in adolescent research, scholars have also noted the rich contribution of other-report questionnaires (e.g. teacher or parent reports) and qualitative data. As such, researchers should aim to analyze links between targets of prosocial behavior and dimensions of self-regulation while using additional methods. Also, one major limitation of this study was the fact that longitudinal, bidirectional relations between targets of prosocial behavior and dimensions of self-regulation were analyzed in separate models, as opposed to being analyzed in one overall model. Because of this, we were not able to assess how specific targets of prosocial behavior and dimensions of self-regulation were related while taking into account other targets and dimensions. Therefore researchers should utilize a larger sample with more power in order to analyze multidimensional links between prosocial behavior and self-regulation within the same model.
Despite these limitations, this study was one of the first to take a multidimensional approach to both prosocial behavior and self-regulation within the same study. In addition, this study explained relations between targets of prosocial behavior and dimensions of self-regulation across all of adolescence (i.e. from age 12 to age 18), which provides the field with a more thorough description of how age might be associated with these links. Overall, this study revealed that prosocial behavior toward strangers is significantly associated with cognitive self-regulation, cognitive self-regulation is especially influential on prosocial behavior aimed toward friends, and behavioral and emotional self-regulation are especially influential on prosocial behavior aimed toward family. Therefore target of prosocial behavior and dimension of self-regulation are important to consider, in order to reveal nuances in patterns and associations of prosocial behavior and self-regulation. As such, we hope this study will serve as a somewhat comprehensive background for future research that seeks to analyze prosocial behavior and self-regulation in bidirectional, longitudinal, multidimensional contexts.
References


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Table 1. Correlations between all study variables.

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Note: pbst = prosocial behavior toward strangers; pbfr = prosocial behavior toward friends; pbfa = prosocial behavior toward family; bsr = behavioral self-regulation; csr = cognitive self-regulation; esr = emotional self-regulation; meduc = maternal education. *p < .05.
### Table 1. Correlations between all study variables continued.

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Note: bsr = behavioral self-regulation; csr = cognitive self-regulation; esr = emotional self-regulation; meduc = maternal education.  
*p < .05.
Table 2. Mean differences by gender for main study variables.

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Note: *$p < .05$, **$p < .01$, ***$p < .001$. PBST = prosocial behavior toward strangers, PBFR = prosocial behavior toward friends, PBFA = prosocial behavior toward family, BSR = behavioral self-regulation, CSR = cognitive self-regulation, ESR = emotional self-regulation.
Table 3. Results of non-significant cross-lagged models.

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<th>RMSEA</th>
<th>SR Stability Paths</th>
<th>PB Stability Paths</th>
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<td>1. PBST and BSR</td>
<td>$\chi^2 (34) = 114.01^{***}$</td>
<td>.92</td>
<td>.07</td>
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<td>.55-.61***</td>
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<td>2. PBST and ESR</td>
<td>$\chi^2 (34) = 147.301^{***}$</td>
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<td>.51-.56***</td>
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<td>3. PBFR and BSR</td>
<td>$\chi^2 (33) = 106.35^{***}$</td>
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<td>.07</td>
<td>.47-.57***</td>
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<td>4. PBFR and ESR</td>
<td>$\chi^2 (32) = 131.114^{***}$</td>
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<td>5. PBFA and CSR</td>
<td>$\chi^2 (34) = 87.70^{***}$</td>
<td>.95</td>
<td>.06</td>
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Figure 1. Results of non-significant cross-lagged models.

Note: Endogenous and exogenous error terms and correlations are not displayed in the figure for parsimony. SR = self-regulation. PB = prosocial behavior. **p < .01; ***p < .001. Significant paths between control variables and main study variables are not displayed in the figure for parsimony. Non-significant paths are not displayed in the figure for parsimony.
Figure 2. Cross-lagged paths between prosocial behavior toward friends and cognitive self-regulation.

Note: Endogenous and exogenous error terms and correlations are not displayed in the figure for parsimony. SR = self-regulation. PB = prosocial behavior. ***p < .001. Significant paths between control variables and main study variables are not displayed in the figure for parsimony. Non-significant paths are not displayed in the figure for parsimony.
Figure 3. Cross-lagged paths between prosocial behavior toward family and behavioral self-regulation.

Note: Endogenous and exogenous error terms and correlations are not displayed in the figure for parsimony. SR = self-regulation. PB = prosocial behavior. Significant paths between control variables and main study variables are not displayed in the figure for parsimony. Non-significant paths are not displayed in the figure for parsimony.
Figure 4. Cross-lagged paths between prosocial behavior toward family and emotional self-regulation.

Note: Endogenous and exogenous error terms and correlations are not displayed in the figure for parsimony. SR = self-regulation. PB = prosocial behavior. *p < .05; ***p < .001. Significant paths between control variables and main study variables are not displayed in the figure for parsimony. Non-significant paths are not displayed in the figure for parsimony.