A Developmental Cascade Model of Prosocial Behavior, Academic Competence, and Peer Exclusion across Preadolescence: Links to Adolescent Depression

By

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Abstract

The current research used longitudinal data from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (*N*=1103) to examine the developmental cascades of prosocial behavior, academic competence, and peer exclusion from 3rd grade to 6th grade, and how they are linked with adolescent depression at 15 years old. The results in the current research showed that 3rd grade prosocial behavior decreased 4th grade peer exclusion and increased 4th grade academic competence; 4th grade peer exclusion, in turn, negatively influenced 5th grade prosocial behavior, and 4th grade academic competence positively influenced 5th grade prosocial behavior; then, 5th grade prosocial behavior decreased 6th grade peer exclusion; finally, 6th grade peer exclusion increased depression at 15 years old. Implications for developmental cascade models, progressions, and preventive interventions were discussed.

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Chapter One

1. Introduction

Developmental psychologists have long held that peer interactions have unique impacts on children's social, emotional, and cognitive development beyond interactions with parents and teachers. Positive interactions with peers provide children rich opportunities to facilitate academic learning and develop interpersonal skills. Empirical studies have demonstrated that children who are accepted by peers typically do better in academic and social domains; conversely, those who are excluded or rejected by peers are more likely to have academic problems, behavioral problems, and affective disorders (e.g., Boivin & Hymel, 1997; Parke, Rubin, Erath, Wojslawowicz, & Buskirk, 2006; Ryan, 2011). In particular, the harm of peer exclusion on adjustment is more significant than the benefits of peer acceptance (e.g., Caputi, Lecce, Pagnin, & Banerjee, 2012; Crick, 1996; Ladd, Price, & Hart, 1990; Vandell & Hembree, 1994). For example, peer exclusion decreases prosocial behavior, but peer acceptance does not necessarily lead to an improvement in prosocial behavior (e.g., Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007; Wentzel, 2003). In addition, peer rejection negatively influences later academic achievement, but peer acceptance fails to predict an increase in academic achievement (Ladd, Birch, & Buhs, 1999). Thus, the negative dimension of peer interaction—peer exclusion—is the focus of the current research.

Peer exclusion is defined as the extent to which children are the targets of peers' nonaggressive rejecting behaviors, including behaviors such as ignoring, avoiding, or refusing to associate with them (Buhs, Ladd, Herald, 2006). Different from peer rejection, which is an

attitudinal construct that represents peers' negative attitude toward a target child, peer exclusion represents peer actions toward the child in a concrete manner (Boivin & Hymel, 1997). Peer exclusion can be seen as a marker and behavioral expression of peer rejection (Coie, 1990). The experience of being excluded by peers is stable over time in the school context (e.g., Bukowski & Newcomb, 1984; Coie & Dodge, 1983). First, peers tend to interpret the exclusion as justifiable and warranted because excluded children have a negative reputation and lack allies and friends to support them. (Buhs et al., 2006; Dodge, 1983; Rogosch & Newcomb, 1989). Also, peers may fear that association with the excluded children will lead to being stigmatized and targeted for the same forms of peer exclusion (Buhs & Ladd, 2001). Thus, peer exclusion is relatively stable and may have long-term negative impacts on children's development. Given that, researchers are keenly interested in understanding the factors that exacerbate or alleviate peer exclusion, particularly those preventable and treatable.

Although much attention has been put on preventing risk factors for peer exclusion, there is an emerging shift from preventing risk factors to a focus on promoting protective factors of peer exclusion. Prosocial behavior and academic competence, which are important indexes of school adjustment, may have protective influences on alleviating peer exclusion (e.g., Coie & Krehbiel, 1984; Farmer & Rodkin, 1996; Ladd, 1981; Layous, Nelson, Oberle, Schonert-Reichl, & Lyubomirsky, 2012; Lochman, Coie, Underwood, & Terry, 1993; Pakaslahti, Karjalainen, & Keltikangas-Järvinen, 2002). Both prosocial tendencies and academic competence tend to be stable across time (Chen, Huang, Chang, Wang, & Li, 2010; Davis & Franzoi, 1991; Eisenberg et al., 1999; Moilanen, Shaw, & MaxwellIn, 2010). *Prosocial behavior* refers to a broad category of actions that are defined by society as generally beneficial to other people, which

usually involves “sharing, cooperating, helping, feeling empathy, and caring for others” (Olweus, Block, & Radke-Yarrow, 1986; Radke-Yarrow, Zahn-Waxler, & Chapman, 1983). The characteristics of prosocial behavior are beneficial for maintaining positive interactions and reducing social exclusion. *Academic competence* is defined as success at the attainment of academic outcomes relative to peers (Blechman, Tinsley, Carella, McEnroe, Michael, 1985). High academic achievers may also be excluded less by peers because they have positive peer reputation, being viewed as preferred partners for academic tasks, and also explicitly or implicitly being preferred by teachers who may influence students’ judgment of whether they like or dislike the target child (e.g., Véronneau, Vitaro, Brendgen, Dishion, & Tremblay, 2010).

As theoretical and empirical work has underscored, there may exist a bidirectional relationship between school adjustment and peer experiences (Coie, 1990; Parker & Asher, 1987; Price & Dodge, 1989). To specify, school adjustment influences the quality of peer experiences and, reciprocally, the quality of peer experiences may also influence school adjustment. Based on these trends, there may exist a reciprocal association between peer exclusion with prosocial behavior and academic competence. Empirical research has shown that prosocial behavior and academic competence are protective factors of later peer exclusion (e.g., Caputi et al., 2012; Dishion, 1990; Ollendick, Weist, Borden, & Greene, 1992; Vitaro, Gagnon, & Tremblay, 1990), and peer exclusion hinders future prosocial behavior and academic competence (e.g., Guay, Boivin, & Hodges, 1999; Ladd, 1990; Twenge et al., 2007; Wentzel, 2003). Moreover, prosocial behavior and academic competence are also associated with each other reciprocally (e.g., Chen, Rubin, Li, 1997). Thus, the existing literature implies that peer exclusion, prosocial behavior, and academic competence may be reciprocally

associated with each other in a dynamic process. Studies using the same dataset as the current research show that prosocial behavior decreases peer exclusion (Carter, Halawah, Trinh, 2018) and increases academic competence (Burt & Roisman, 2010; El Mallah, 2014); additionally, these studies show that peer exclusion impedes school engagement (Perdue, Manzeske, & Estell, 2009).

Developmental theorists and psychologists are interested in the dynamic development of functions and behaviors over time. Functions and behaviors in one domain at one developmental period influence other domains at a later developmental period in an interactive, transactional, and dynamic process (Cicchetti & Cannon, 1999; Masten & Coatsworth, 1998; Masten & Cicchetti, 2010). The term *developmental cascade* is used to describe this dynamic and transactional pathway across different domains and dimensions over the course of development (Bornstein, Hahn, & Haynes, 2010). A distinguishing characteristic of developmental cascade is the interplay of individual and environment over time. That is, the development of an individual is a product of continuous dynamic interactions between the individual and the individual's environment (Sameroff, 2009). This is similar to Thelen's (2005) argument that "development happens not because of either a genetic program or imperatives from the environment, but by a seamless interweaving of events in time, both internal and external" (p. 265). Specifically, a behavior or a characteristic of an individual influences the individual's social environment; then, other people in the social environment give responses to the individual, and the individual's subsequent behavior is influenced by other people's responses and again impacts others in the social environment (Fruzzetti, Shenk, & Hoffman, 2005).

Although the existence of a dynamic and interactive association among prosocial behavior, academic competence, and peer exclusion seems plausible, the directionality and developmental specificity of it are still unknown. For example, some studies assess prosocial behavior, academic competence, and peer exclusion concurrently; thus, it is not possible to disentangle the directionality of the link among them. Although there are some longitudinal studies investigating the cross-lagged association among peer exclusion, prosocial behavior, and academic competence, few of them include these three variables simultaneously in one study with more than two time intervals. Longitudinal research with only one time interval has limitations on catching how the study variables dynamically influence each other over time. For example, the research of Zimmer-Gembeck, Geiger, & Crick (2005) indicated that social preference (high peer acceptance and low peer rejection) in 3rd grade predicted prosocial behaviors in 6th grade. However, how the association between social preference and prosocial behavior changes during this period (from 3rd grade to 6th grade) is unknown. According to Sameroff and MacKenzie (2003), specific aspects of the environmental context may either gain or lose power as individuals go through time. The effects of specific aspects of individual characteristics and behaviors on the social environment may also change with time. For example, 3rd grade social preference predicts 4th grade prosocial behavior, but 4th grade social preference may not predict 5th grade prosocial behavior. Thus, it is necessary to use a longitudinal design with at least three time points to investigate how the cascade effects of prosocial behavior, academic competence, and peer exclusion vary across time.

Two exceptions — the research of Welsh, Parke, Widaman, and O'Neil (2001) and Ladd, Birch, and Buhs (1999) —include prosocial behavior, academic competence, and peer

exclusion simultaneously in one study with more than two time intervals. However, these two studies also have limitations to revealing the nature of the dynamic relationship among peer exclusion, prosocial behavior, and academic competence. In the research of Welsh et al. (2001), prosocial behavior and peer status were combined to represent the index of social competence, which makes it hard to distinguish the different associations of prosocial behavior and peer status with academic competence. According to Blair et al. (2015), it is important to distinguish different dimensions even if they are in the same developmental domain. Although both peer status and prosocial behavior belong to the domain of social competence, each of them reflects a distinct component (Hinde, 1995). For example, some aggressive and non-prosocial students are still perceived as ‘‘popular’’ within peer groups (Vaillancourt & Hymel, 2006). Thus, although the research of Welsh et al. (2001) found that social competence and academic competence are reciprocally related, the unique relationship between prosocial behavior and peer status with academic competence is still unknown. Another multiple-wave longitudinal research study, Ladd et al. (1999), showed that peer rejection was a mediator between kindergarteners' social behavior and academic achievement. To specify, kindergarteners' initial behavioral orientations influenced the peer relationship, and the stressful aspect of peer relationships (peer rejection) adversely impacted academic competence. However, the alternate path was not tested in the research of Ladd et al. (1999). Thus, it is unclear whether prosocial behavior and academic competence jointly contribute to the peer relationship, and peer exclusion not only adversely impacts academic competence but also prosocial behavior. Also, the design of Ladd et al. (1999) does not control for within-time stability effects and concurrent links among peer exclusion, prosocial behavior, and academic competence, which may at least

partly explain the predictive relations. Finally, the participants of Ladd et al.'s (1999) research are kindergarteners, so whether this pattern can be replicated in other developmental stages is unclear.

Due to the limitations of existing research, the nature of the dynamic relationship among peer exclusion, prosocial behavior, and academic competence is still unknown. For example, it is unclear whether both prosocial behavior and academic competence are protective factors of peer exclusion or if only one of these two variables stands out as the main protective factor; it is also unclear whether both prosocial behavior and academic competence would be negatively influenced by peer exclusion or if only one of these two variables stands out as the main outcome. Furthermore, it is unclear whether there are developmental changes in the longitudinal associations among prosocial behavior, academic competence, and peer exclusion across different ages. To address these unsolved issues, the first research question in the current research asks about the process by which prosocial behavior, academic competence, and peer exclusion might sequentially affect one another. The first research question was examined within the developmental stage of preadolescence. Preadolescence (9–12) is viewed as a time of rapid and complex changes in the biological, cognitive, and social domains. In preadolescence, prosocial reasoning includes more than approval-oriented considerations but also abstract principles, internalized affective reactions, and self-reflective empathy (Eisenberg et al., 1987). Besides, a major social concern is the integration into one's peer group for preadolescents, which makes the influence of peer experiences, such as peer exclusion, particularly strong (Buhrmester & Furman, 1986). Also, the demand for academic achievement increases and academic competence is increasingly valued in the school context in

preadolescence (McMichael, 1980). Thus, preadolescence is a critical period to reveal the dynamic relationship among prosocial behavior, academic competence, and peer exclusion.

Additionally, the current research aims to investigate how the cascades of prosocial behavior, academic competence, and peer exclusion in preadolescence are linked with adolescent depression. Depression has been defined in the literature in three major ways: (1) depressed mood, (2) depressive syndromes, and (3) clinical depression (Petersen, Compas, & Brooks-Gunn, 1992; Petersen, Compas, Brooks-Gunn, Stemmler, & Grant Petersen, 1993, for a review). Depressed mood is a symptom that refers to the presence of sadness, unhappiness, or blue feelings in response to many stressful situations, which may or may not be associated with other problems and may last for a brief or long period of time. Depressive syndromes are viewed as a series of behaviors and emotional problems that occur in the state of depression, involving changes in mood, behavior, relationships, somatic state, cognition, and perception. For example, depressed individuals have low mood such as sadness, loneliness, anxiety, or despair; show psychomotor retardation or agitation activities; report a poor relationship with significant figures; feel fatigue and have disturbances of sleep and appetite; and have a negative view of self, world, and future (see Carr, 2004 for a review). Clinical depression includes major depressive disorder (MDD) and dysthymic disorder (DD), in which the diagnosis of clinical depression is based on a review of the presence, duration, and severity of sets of depressive syndromes.

Adolescence is a period of increased vulnerability to depression. According to the 2017 National Survey on Drug Use and Health (NSDUH), an estimated 3.2 million adolescents aged 12 to 17 in the United States had at least one major depressive episode. This number

represented 13.3% of the U.S. population aged 12 to 17. Adolescent depression is associated with a number of negative functions. For example, depression during adolescence may impair adolescents' cognitive functioning, relationship with parents and peers, academic performance, and even cause a suicide attempt (e.g., Kessler & Walters, 1998). Moreover, depression is not a transient phenomenon that adolescents outgrow: depressed adolescents are more likely to develop depression in adulthood (Fergusson & Woodward, 2002; Rutter, Kim-Cohen, & Maughan, 2006). For example, Harrington, Rutter, and Frombonne (1996) found that 84% of depressed youths experienced depressive episodes in adulthood. Thus, not surprisingly, depression during adolescence is also associated with poor outcomes in adulthood, such as low income levels and low educational aspirations (e.g., Franko et al., 2005; Rao et al., 1995).

Given the prevalence, recurrence, and long-term negative consequence, adolescence stands out as a particularly critical period for research on depression. Researchers have paid much attention to the risk and protective factors of adolescent depression. Avennevoli, Knight, Kessler, and Merikangas (2008) classified the risk factors of adolescent depression as three major categories: family and genetic factors, biological factors, and life stress. Family and genetic factors include a family history of depression and problematic parenting. Biological factors include personal characteristics and traits such as neurobiological systems, cognition, and temperament/personality. Stressful life events include the disruption of significant social bonds and the failure to achieve valued goals, such as peer exclusion and academic failure. In correspondence with the risk factors, protective factors include personal and contextual factors, such as good parental adjustment, secure parent-child attachment, high self-efficacy, optimistic attributional style, social competence to make and maintain friendships, high levels of social

support, and low levels of stress (Carr, 2004).

As discussed above, we can see that there is a complex and multifactorial risk and protective structure of depression. Just like Garber (2006) argued that, a single factor is insufficient to explain and prevent depression, the accumulation and interaction among multiple factors may be what influences the likelihood of depression. Kovacs (2006) also argued that any risk or protective factors may affect subsequent depression through multiple mechanisms. Although some proximal factors and mechanisms have received some noteworthy empirical and theoretical attention, the mechanisms of distal factors remain unclear. Thus, more studies are needed to reveal the predictive significance of known correlates and the dynamic interplay between distal and proximal factors over time (Avennevoli et al., 2008). A cascade model with multiple risk and protective factors of depression across time may reveal the developmentally salient factors in relation to adolescent depression and the influencing mechanisms from distal factors to proximal factors, which would contribute to theory development and inform the targets and sensitive timing for preventative efforts. Thus, the second research question asks how prosocial behavior, academic competence, and peer exclusion in preadolescence interweave to influence adolescent depression.

Two studies were used to address the two major research questions in the current research. Study 1 investigated the dynamic cascades among peer exclusion, prosocial behavior, and academic competence in preadolescence. Study 2 investigated the process by which preadolescents' prosocial behavior, academic competence, and peer exclusion interweave to influence subsequent adolescent depression. Developmental cascade models were used in Study 1 and Study 2. Developmental cascade models overcome covariation among

characteristics at each time point as well as stability in each over time , which is crucial for examining the developmental timing of when different constructs come sequentially and the cascade effects among them (Masten, Long, Kuo, McCormick, & Desjardins, 2009). Accordingly, the cascade model of prosocial behavior, academic competence, peer exclusion, and depression may inform the best timing and targets of interventions to reduce adolescent depression.

Chapter Two

Study 1

2.1 Literature Review

Prosocial Behavior and Peer Exclusion

The characteristics of prosocial behavior lay the groundwork for maintaining positive peer interaction and decreasing peer exclusion (Newcomb, Bukowski, & Pattee, 1993). In turn, peer experiences may also influence the prosocial behavior towards peers. First, according to the peer socialization theory, peer interactions provide unique opportunities for children to learn and practice prosocial skills (Hartup, 1992). Compared with parent-child and teacher-student interactions which involve more unilateral power, peer interactions provide a more mutually reciprocal context in which children can develop certain types of socio-emotional competence (Laible, 2007; Youniss, 1980). For example, prosocial skills such as cooperation and conflict negotiation develop from positive peer interactions (Cillessen, Bukowski, & Haselager, 2000; Rudolph & Clark, 2001). Thus, students who are excluded by peers may lack the opportunity for the positive socialization and even affiliate with other deviant peers who devalue prosocial behaviors and support antisocial behaviors (Farmer & Rodkin, 1996). In addition, children who are excluded by peers may have insecure peer attachment, which accompanies a negative working model of peers (Deković & Gerris, 1994). According to attachment theory, insecure individuals who hold negative beliefs about other people's intentions, traits, and actions are more likely to possess self-focused goals and aggressive strategies and less likely to perform prosocial behaviors (Bowlby, 1973; Mikulincer & Shaver, 2007). For example, Twenge et al. (2007) argued that the inner state resulting from social exclusion might gear individuals to cope

with threats rather than to be nice to others. In contrast, accepted children who have secure peer attachment may see others as nice, trustworthy, and deserving of care, which promotes a more sensitive caregiving orientation and a greater desire to protect others' welfare (Schwartz, 2010; Mikulincer et al., 2003).

Cross-sectional research has demonstrated that prosocial behaviors are negatively associated with peer exclusion and positively associated with peer acceptance in both childhood and adolescence (e.g., Rubin & Daniels-Beirness, 1983; Bierman, Smoot, & Aumiller, 1993; Pakaslahti et al., 2002; Wenzel & Erdley, 2003; Ojanen, Grönroos, & Salmivalli, 2005; Zimmer-Gembeck, Hunter, & Pronk, 2007). However, the correlational nature of the data from cross-sectional research precludes strong conclusions concerning the direction of effects. In another word, it is unclear whether prosocial behavior reduces peer exclusion, or peer exclusion impedes prosocial behavior, or these two variables influence each other bidirectionally. Thus, longitudinal research has been conducted to examine the direction of the link between prosocial behavior and peer exclusion. Longitudinal research finds that prosocial behavior is a protective factor of later peer exclusion. For example, Vitaro et al. (1990) demonstrated that the lack of prosocial behavior at an early age would lead to a stable rejected status: compared with children who were rejected in kindergarten but no longer being rejected in 1st grade, children who had stable rejected status in both kindergarten and 1st grade did not display more aggressive behavior but less prosocial behavior in kindergarten. Similarly, Caputi et al. (2012) found that the negative association between prosocial behavior and peer exclusion was significant between ages 5 and 6 and was also significant between ages 6 and 7. Research using the same dataset as the current study also indicates that young adolescents who

have lower initial levels of social competence experienced higher levels of peer exclusion later (Carter et al., 2018).

Although the research above indicates that prosocial behavior is a protective factor of later peer exclusion, it is necessary to determine whether the group is newly formed. According to the research of Denham and Holt (1993), in a newly formed group, social preference (high or most-liked/low or least-liked) was associated with prosocial behavior: friendlier and more cooperative children were more well-liked. Nonetheless, after a summer vacation, social preference was predicted by earlier social preference rather than prosocial behavior. This finding indicates that, in an existing group, peer reputation appears to be emerging as a more important factor than prosocial behavior in children's judgment of whether they like or dislike a peer. This result supports Dodge's (1980) argument that being labeled by peers, especially negative labels, may have an effect on maintaining reputations even when behaviors that have contributed to the reputation disappear. In addition, previous peer status has also been demonstrated as a moderator between prosocial behavior and peer status. To specify, the display of prosocial behavior may be more critical for children with a relatively low status among peers than for those with an average or high status. The research of Chen, Li, Li, Li, and Liu (2000) revealed that early prosocial behavior predicted later social preference, but only for children with low social preference scores; the association was not significant for children with high social preference scores. Further, the research of Henricsson and Rydell (2006) found that prosocial behavior might not predict later social preference for all low-status children: the influence of prosocial behavior on later social preference was only significant for low-status children with internalizing problems but not for low status children with externalizing

problems. Henricsson and Rydell (2006) argued that perhaps it was particularly difficult for externalizing-rejected children to escape negative stereotypes and reputations.

The importance of early peer reputation leads to a limitation in some previous studies which identify the directional effects of prosocial behavior and peer exclusion in an already existing peer group. It is uncertain whether the observed behavior differences in an existing peer group is the cause or the consequence of peer exclusion (Dodge, 1983). Thus, research investigating children's initial behaviors in a newly formed group may give an illumination on the directional effects of prosocial behavior and peer exclusion. Coie and Kupersmidt (1983) observed a newly formed group composed of boys who were known to have markedly different social status in their previous peer groups. It turned out that children continued to run into the same behavior patterns in newly formed groups (e.g., excluded children engaged in less prosocial behaviors in the newly formed groups). This result implies that children's peer exclusion is at least partially predicted by a lack of prosocial behavior.

However, the research of Dodge (1983) demonstrated that the change in children's behavior in a newly formed group might be a consequence of their peer experiences. Dodge (1983) observed the development of peer status and prosocial behavior in 2nd grade boys' newly formed peer groups over time. The observational data indicated that the prosocial behaviors during their initial encounters with peers indeed significantly predicted the social status that they came to acquire. For example, rejected boys did engage in low rates of cooperative play and social conversation, and they displayed more inappropriate behaviors such as verbal and physical aggression. Moreover, the differences in the frequency of prosocial behaviors (interactive cooperative play and social conversation) between unpopular boys (rejected or

neglected) and other boys became greater over time. Dodge (1983) asserted that the lack of prosocial behavior of excluded boys in the later sessions was a consequence of their excluded status. That is, peer exclusion may in turn influence prosocial behavior. Other recent empirical research studies also support this finding. For example, the research of Zimmer-Gembeck, Geiger, & Crick (2005) demonstrated that social preference (high peer acceptance and low peer rejection) in 3rd grade positively predicted children's prosocial behaviors in 6th grade. Wentzel (2003) distinguished the effects of peer acceptance and peer rejection on later prosocial behavior in a group of 6th grade students as they progressed through middle school, and found that students who were identified as rejected by peers in 6th grade were designated as being less prosocial in 8th grade; however, students who were identified as accepted by peers in 6th grade were not more prosocial in 8th grade than other students. The reason why peer acceptance does not predict later prosocial behavior may be that both coercive strategies and prosocial strategies are used by popular children to achieve social dominance and maintain their exclusive status (Hawley, 2003). Especially during adolescence, popular teenagers would forgo prosocial actions and treat others negatively through relational aggression to maintain or increase their status (Cillessen & Mayeux, 2004).

Experimental research also investigates the association between prosocial behavior and peer exclusion. DiLorenzo and Foster (1984) asked children to rate how much they liked and disliked the boys with different behaviors in a video and found that children disliked peers who were uncooperative. Hamlin, Wynn, and Bloom (2010) also found that infants as young as three months old showed a preference for a prosocial puppet over an antisocial puppet. Researchers also identified children with low peer status, taught them relevant prosocial skills,

and examined whether their peer status improved with an increase of prosocial behaviors. For example, Ladd (1981) and Lochman et al. (1993) demonstrated that children with low social preference evidenced significant and lasting gains after receiving social skills training. In addition, Layous et al. (2012) instructed 9- to 11-year-old preadolescents to perform three acts of kindness for anyone they wished (versus visit three places) per week over the course of four weeks; those who performed kind acts experienced significantly bigger increases in peer acceptance than students who visited places. Regarding the influence of peer exclusion on prosocial behavior, the research of Twenge et al. (2007) indirectly demonstrated the negative influence of peer exclusion on prosocial behavior with experimental designs. Twenge et al. (2007) found that social exclusion manipulations caused a large and significant reduction in displays of prosocial behavior across seven experiments in which different prosocial behavior, different manipulations, and different recipients were used. However, consistent with the results of Wentzel (2003), participants who received social acceptance feedback were no more helpful or less helpful than those in the control groups, which implies that peer acceptance may have limited impact on promoting prosocial behavior.

Academic Competence and Peer Exclusion

In general, high academic achievers may be less excluded by peers because they are viewed as preferred partners for school tasks and are explicitly or implicitly preferred by teachers whose behaviors and attitudes influence other students' judgment (Véronneau et al., 2010). However, empirical evidence of the link between academic competence and peer exclusion is conflicting. On the one hand, extent research shows that academic competence is a predictor of peer

acceptance and academic incompetence is a risk factor of peer exclusion (e.g., Dishion, 1990; Gottlieb, Semmel, & Veldman, 1978; Green, Forehand, Beck, & Vosk, 1980; Newcomb et al., 1993; Ollendick et al., 1992). For example, Jason, Reyes, Danner, and De La Torre (1994) found that 88% of low accepted/high rejected 3rd–5th graders transferring to new schools with above average achievement scores were able to overcome the initial negative social status nominations by the end of one semester. Experimental research also shows that 4th graders with increased academic achievement suffer less from peer difficulties compared with the control group (e.g., Coie & Krehbiel, 1984). The effects of academic competence on alleviating peer exclusion may intensify as the demand for academic achievement increases and academic competence is highly valued by peers in the school environment. As the research of McMichael (1980) indicated, incompetence in academic tasks plays an increasing role in eliciting rejection over the first two years of elementary school. However, on the other hand, some research indicates that the link between academic competence and peer rejection may not exist or be positive among some groups. For example, Cauce, Felner, and Primavera (1982) found that among disadvantaged adolescent males, academic achievement was negatively associated with informal support from friends.

The inconsistent evidences of the association between academic competence and peer exclusion may reflect a cultural effect in addition to potential sampling fluctuations or design idiosyncrasies. Previous research shows that African American students who strive to achieve academic success are thought to be “acting white,” which makes peers in this group devalue academic success and conformity to authority (Fordham & Ogbu, 1986). This is also true for underprivileged youth in inner-city schools (e.g., Luthar, 1995). Students with academic

incompetence may not be excluded by peers in a culture in which academic achievement is not valued. In contrast, in a culture in which academic achievement is greatly valued, students with academic difficulties tend to have lower prestige and reputation than their classmates who have academic success. For example, traditional Asian culture values academic success (Ho, 1986). Children are expected by parents and teachers to perform optimally at academic work, and children who are deficient in academic competence are often regarded as abnormal and problematic (Wu & Tseng, 1985). For example, the research of Chen et al. (1997) shows that Chinese students' academic competence was positively associated with peer acceptance and negatively associated with peer rejection.

Although academic achievement is generally valued (or devalued) in a certain culture, there is also intra-cultural variation. One possible source of within-culture variation is the different norms within different peer groups. That is, the ethos of the peer group plays a critical role in the association between academic competence and peer exclusion. Social exclusion is a function of both individual and group characteristics. To specify, social exclusion is not an invariant correlate of certain personal characteristics but a relationship between the judged person and those doing the judging. Thus, social exclusion cannot be understood without considering the peer group context, and the type of behavior one's peers find dislikable and likable depends on the group's characteristics (Vosk, Forehand, Parker, & Rickard, 1982). The person-group similarity model (Byrne, 1971) also reveals that liking increases with the similarity of attitudes and interests, and the socially rejected person is someone who does not "fit in" with the other members of the group. Wright, Giammarino, and Parad (1986) also proposed a mechanism that appears to underlie the link between similarity and attraction:

similarities provide group partners with consensual validation of their attitudes and enhance consistency among their cognitions, in turn, increasing the frequency of positive interactions. Thus, the nonsignificant association or even positive association between academic competence and peer exclusion may exist in the groups in which academic success is not prevalent or valued. As a result, students with low academic achievement may not experience much pressure from their peers in that context, but students with high academic achievement may be seen as those who do not "fit in." As the research of Chen, Chang, and He (2003) indicated, the positive association between academic competence and peer preference was stronger in the group with higher mean levels of academic performance. That is, students in high-achievement groups may be particularly sensitive to the importance of academic competence when they evaluate peers. Taken together, the link between academic competence and peer exclusion is sensitive to culture and group-norms.

In addition to the culture and group norms, the influence of academic competence on peer exclusion may also be sensitive to developmental stages. During early childhood (kindergarten and preschool), academic learning is not a dominant activity in children' school life. Unlike older children and adolescents who spend significant time on academic activities, kindergarteners and preschoolers spend significant amounts of time on physical, emotional, and social development. Further, learning activities for young children are constructed through free play that provides them opportunities to choose from different materials and activities, and tests are rarely used (Bryant, Clifford, & Peisner, 1991). Thus, the differences of young children's academic competence are not salient, and academic competence is less important when teachers and peers evaluate whether they like or dislike a target child in early childhood

(e.g., Tal & Babad, 1989; Taylor, 1989). Thus, the protective role of academic competence on peer exclusion appears to be weak during early childhood.

The importance of academic competence may be greater in middle childhood. Academic competence is increasingly demanded and valued in the primary school environment and more social comparisons of achievement occur as children enter the 3rd and 4th grades (McMichael, 1980; Ruble, Boggiana, Feldman, & Loebl, 1980). In this developmental period, children spend more time on academic activities, with group cooperation an important format of learning tasks (Kutnick, Blatchford, & Baines, 2005; Kutnick, Ota, & Berdondini, 2008). Thus, children with high academic competence will be more helpful and make more significant contributions to collaborative study than children with low academic competence. In addition, teacher's preference for or dislike of a trait may also influence other students' judgment of the focal child's trait and their preference for or dislike of that child (e.g., Chang et al., 2007; Hughes, Cavell, & Willson, 2011). That is, in the classroom context, teachers who set the rules and norms can be expected to exert strong influences on children's opinions and evaluations. Existing literature indicates that academic competence emerges as a significant predictor of teacher preference for older children than for younger children (e.g., Tal & Babad, 1989; Tal & Babad, 1990; Gorman et al., 2002), and peer-perceived teacher liking/disliking is a predictor of peer status (Hendrickx, Mainhard, Boor-Klip, & Brekelmans, 2017; Taylor & Trickett, 1989).

However, the protective role of academic achievement in peer exclusion may decline in adolescence (Brown, 1990). One of the developmental changes in adolescence is teenagers' increasing needs for autonomy. According to Brown and Steinberg (1990), adolescents tend to

perceive school as a restrictive, rule-laden environment governed by adult authority figures; while students with high academic achievement seem to accept and affirm the legitimacy of adult control that many other peers want to question and challenge it. In addition, teacher's influence on students' judgement also decrease in adolescence (Kuklinski & Weinstein, 2001). Consequently, students with high academic achievement may not necessarily be liked by peers in adolescence. Empirical research has supported this assumption. For example, the research of Véronneau et al. (2010) showed that academic achievement was a good predictor of peer status in middle childhood but not in adolescence. Vannatta, Gartstein, Zeller, and Noll (2009) also found that academic competence was a more significant predictor of peer acceptance in elementary school than in middle or high school.

At the same time, peer experience may also in turn influence students' academic development. Excluded children were found to be at more risk for long-term academic difficulties than their non-excluded classmates (see Parker & Asher, 1987 for a review). According to cognitive theorists, cognitive learning cannot take place in a social vacuum, and positive interaction with peers facilitates children's cognitive development (Doise & Mugny, 1984; Vygotsky, 1978). Excluded students who become marginalized from peer activities may lack the positive peer interaction that can provide them the cognitive scaffolding, which is necessary to develop academic competence (Coie, 1990). In addition to the lack of peer interaction, lack of peer social support may also put excluded students at risk for academic difficulties. Peer support is an important resource of classroom support for children. According to Wentzel, Battle, Russell, and Looney (2010), peers can provide classroom support from four dimensions: 1) Communicating expectations and values, 2) Providing help, advice, and

instruction, 3) Creating a safe environment, and 4) Providing emotional support. Peer support significantly contributes to students' academic competence. Specifically, students who are accepted and supported by peers tend to affiliate with the peer group in which academic competence is highly expected and valued, get more help from peers on academic tasks, and perceive more emotional support from peers, which tend to lead to positive attitudes toward school and effective cognitive functioning; on the other hand, students who are excluded by peers may affiliate with other excluded peers who have low motivation in academic achievement, have limited opportunity to get academic assistance and information from peers, and tend to have higher levels of distress and insecurity which are related to psychological and emotional problems (e.g., low self-efficacy) (e.g., Coie 1990; Cooper, Ayers-Lopez, & Marquis, 1982; DuBois, Felner, Brand, Adan, & Evans, 1992; Estell & Perdue, 2013; Farmer & Rodkin, 1996; Furrer & Skinner, 2003; Jacobsen, Edelstein, & Hofmann, 1994; Wentzel, 1991; Wentzel & Caldwell, 1997; Wentzel, 2005). Thus, children who experience peer exclusion may have a negative school attitude and are absent from school and classroom participation more often than children who have not experienced exclusion (e.g., Bierman, 2004; Buhs & Ladd, 2001; DeRosier, Kupersmidt, & Patterson, 1994; Kupersmidt & Coie, 1990). The research using the same data set as the current study shows that social support from peers in the 3rd grade predicts school engagement in 5th grade (Perdue et al., 2009). A negative school attitude, a decline of classroom participation, and an increase of school avoidance may be the mediators between peer exclusion and academic failure (e.g., Buhs & Ladd, 2001; Buhs et al., 2006; Kupersmidt & Coie, 1990). Some longitudinal research also indicates that early peer exclusion directly predicts subsequent academic incompetence (e.g., Guay et al., 1999;

Ladd, 1990; Lopes et al., 2002; Lopes & Dubois, 2005). For example, the research of Greenman, Schneider, and Tomada (2009) investigated whether the impact of changes in peer exclusion predict corresponding changes in children's academic performance trajectories. It turned out that children who became more rejected by peers than before exhibited an academic decline, while students who became less rejected showed academic improvement.

Prosocial Behavior and Academic Competence

Extant research shows that children who have prosocial tendencies are more likely to have a better cognitive self-control and engage in more academically related behaviors. (e.g., Elias, Zins, Graczyk, &Weissberg, 2003; Ladd et al., 1999; Ladd, Kochenderfer, & Coleman, 1996; Normandeau & Guay, 1998; Wentzel, 1993). Additionally, positive social relationship may be a potential mediator of the link between prosocial behavior and academic competence. Prosocial behavior may promote positive parent-child relationship, positive teacher-student relationship, and positive peer relationship, which in turn, facilitate the development of academic competence. According to socio-cognitive theories, intellectual and academic development is socially situated and relies heavily on interpersonal supports and guidance (Bandura, 1997; Newman, 1991). Positive interactions with parents, teachers, and peers create an environment with rich language and social exchanges that promote cognitive development (Howes, 1996). As the research of Flook, Goldberg, Pinger, and Davidson (2015) showed that, prosocial behavior training promoted children's cognitive flexibility. Especially in the school context, students learn alongside and in collaboration with peers (Denham & Brown, 2010). Prosocial behaviors (such as cooperating, listening, and taking turns) promote positive peer

interaction and supportive relationships with peers, and supportive relationships with peers may motivate school bonding and create the feeling of security and self-efficacy, which lay the foundation for achieving academic success (Bandura, Pastorelli, Barbaranelli, & Caprara, 1999; Burt & Roisman, 2010; Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Konold & Pianta, 2005).

Longitudinal research shows that prosocial behavior has a positive effect on academic achievement. For example, Malecki and Elliot (2002) found that prosocial behavior in 3rd grade predicted academic achievement in 4th grade. The research of Caprara et al. (2000) also showed that prosocial behavior in 3rd grade predicted academic achievement five years later, even when earlier academic achievement held constant. Furthermore, Caprara and his colleagues also used an experimental design to demonstrate that the prosocial behavior intervention was effective in improving young adolescents' academic achievement (Caprara et al., 2014). Research using the same dataset as the current research found that prosocial behavior in 6th grade predicted academic achievement in 9th grade (El Mallah, 2014).

Academic competence may also influence students' prosocial behavior. According to Sullivan (1953), before one can turn attention to others' needs, one must be free from intense personal concerns. Compared with high academic achievers who have positive school attitudes and high self-esteem, low academic achievers may be frustrated, display low self-esteem, and become isolated from class groups (Coie & Krehbiel, 1984; Eliason & Richman, 1988; McConaughy & Ritter, 1986). Low academic achievers who have low peer status are deprived of the most positive forms of recognition, leaving the adoption of negative behaviors as the most effective means for them to receive recognition in the classroom context (Bursuck &

Asher, 1986). Although some low academic achievers have prosocial tendencies, they have limited opportunity to display prosocial behavior because other peers are less inclined to initiate social contact with them (Youniss, 1994). Further, according to Hymel, Wagner, and Butler (1990), the behavior of students who have low peer reputation may be less acceptable and less memorable than the same behavior displayed by popular children. Thus, even when low academic achievers engage in prosocial behaviors, these behaviors may be not perceived by others.

The influence of academic competence on prosocial behavior has been supported by empirical research. Cross-sectional research shows that academic competence is significantly correlated with prosocial tendencies, positive interactions with peers, and appropriate classroom conduct; while, aggressive and disruptive behaviors are negatively correlated with academic competence or positively related to academic deficiency (e.g., Chen et al., 1997; Green et al., 1980; Reid, Gonzalez, Nordness, Trout, & Epstein, 2004). Longitudinal research also indicates that academic competence consistently influences social competence over time. For example, Welsh et al. (2001) found that academic competence in 1st grade influenced 2nd grade social competence, and this pattern was replicated from 2nd grade to 3rd grade. Morgan, Farkas, Tufis, and Sperling (2008) also found that reading problems in 1st grade predicted poor task engagement, poor self-control, and externalizing and internalizing behavior problems in 3rd grade. Further, experimental research has demonstrated that children who participated in an academic remediation program became more competent in peer social interactions and also experienced fewer socioemotional difficulties than those in the control group (Coie & Krehbiel, 1984).

The Current Study

The aim of Study 1 was to investigate the processes by which prosocial behavior, academic competence, and peer exclusion may sequentially affect one another in preadolescence. Thus, the current study tested a series of hypothesized models, progressively evaluating the concurrent correlations among prosocial behavior, academic competence, and peer exclusion, within-domain stability across time, and cross-lagged effects whereby one domain contributes to a subsequent change in another domain. Based on the previous literature, the first hypothesis is that there are significant correlations among prosocial behavior, academic competence, and peer exclusion at each time of assessment. To specify, prosocial behavior and academic competence are expected to be positively correlated with one another and both negatively correlated with peer exclusion concurrently. In addition, it is also expected that there are significant stabilities of prosocial behavior, academic competence, and peer exclusion across the study time span.

Given these two major expectations alone (within-time covariance and across-time stability), there can be multiple pathways among prosocial behavior, academic competence, and peer exclusion by which development in one domain can spread to other domains over time. A nested set of structural equation models were used to test the cross-lagged associations among prosocial behavior, academic competence, and peer exclusion (see Figure 1). Figure 1 depicts the nested models. For clarity, concurrent associations of three domains within time are not shown in Figure 1. Given the existing literature, it is hypothesized that (a) prosocial behavior decreases later peer exclusion (added in Model 2), (b) academic competence

decreases later peer exclusion (added in Model 3), (c) transactional effects between prosocial behavior and academic competence will be revealed (added in Model 4), (d) peer exclusion impedes the development of prosocial behavior (added in Model 5), and (e) peer exclusion impedes the development of academic competence (added in Model 6). The directionality of the sequential associations among prosocial behavior, academic competence, and peer exclusion is treated as exploratory, thus no specific hypothesis regarding it would be proposed. The directionality of the sequential associations would be revealed by the significant cross-domain paths in the most plausible model.

2.2 Method

Participants and Procedures

Participants for this research were drawn from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD). The NICHD SECCYD was a multi-site, prospective, longitudinal study that began in 1991 with the recruitment of 8,986 mothers at 10 hospital sites across the United States (Little Rock, AR; Irvine, CA; Lawrence, KS; Boston, MA; Philadelphia, PA; Pittsburgh, PA; Charlottesville, VA; Morganton, NC; Seattle, WA; and Madison, WI). Factors such as location, availability, previous working relationships with site investigators, and patient population contributed to the selection of hospitals at each site. As such, the recruitment procedures were not designed to produce a probability population sample.

Enrollment in the NICHD SECCYD involved three steps: (1) a hospital screening of mother-newborn dyads within 48 hours after birth. Subjects were excluded from the sample if a) the family planned to move, b) the mother was not sufficiently conversant in English, c) the child was hospitalized for more than 7 days following birth or had obvious disabilities, d) the mother had a known or acknowledged substance abuse problem, or e) the mother was less than 18 years old. A total of 8,986 mother-newborn dyads were screened in the hospital; (2) a 2-week phone call to mothers found to be eligible at screening. Of the 8,986 eligible mothers, 5,416 (60%) agreed to be telephoned in 2 weeks. Of that group, 3,015 (56%) were selected using a conditional random sampling plan to ensure that the recruited families a) included mothers who planned to work or to go to school full time (60%) or part time (20%) in the child's first year, as well as some who planned to stay at home with the child (20%), and b) reflected the demographic diversity (economic, educational, and ethnic) of the sites.; and (3) a

1-month interview with families that remained eligible after the 2-week phone call, agreed to the 1-month interview, and kept the interview appointment. Of the 3,015 families selected for participation, 1,526 (51%) agreed to participate and 1,364 (89%) actually participated in the initial data collection visit and gave signed consent when the child was 1 month old. Of the 1,364 families, the mean age of the mothers at their child's birth was 28.11 years (*SD*=5.63), approximately half (53%) of the mothers planned to work full time during their child's first year of life, 23% planned to work part time, and 24% planned to stay at home with the child. The enrolled families varied in socioeconomic level, sociocultural background, and family composition; for example, 51.7% were boys, 24% were ethnic minority children, 11% mothers had not complete high school, 14% were single-parent mothers, 24% families were classified as living in poverty (as indicated by an income-to-needs ratio of less than one). More information about the sampling plan can be found in NICHD ECCRN (2003) and on the NICHD SECCYD website (http://secc.rti.org or http: //www. nichd.nih.gov/research/supported/seccyd.cfm).

Four phases of data collection occurred subsequent to recruitment. During Phase I of the study (1991-1994), a cohort of 1,364 children and their families were recruited at 1 month of age and studied intensively through age 3. During Phase II of the study (1995-1999), a cohort of 1,220 of the enrolled children and families were followed through 1st grade. During Phase III of the study (2000-2004), a cohort of 1,100 of the enrolled children and families were followed through 6th grade. Phase IV of the study (2005-2008) followed a cohort of 1,056 enrolled children and families through 15 years old. Study 1 focused on Phase III data with four time points: 3rd grade, 4th grade, 5th grade, and 6th grade. During Phase III of the study,

research assistants from the 10 data collection sites assessed each child at home, in child care (if used), in school, and in a laboratory playroom. Data were collected from the study children, the study children's families, after-school caregivers, and teachers. Prior to the start of formal schooling, data were collected on an age-based chronological schedule. With the onset of formal schooling, data were collected on a year-in-school basis. Details about all data collection procedures during Phase III, psychometric properties of the instruments, and descriptions of composites are documented in the study's Manuals of Operation and Instrument Documentation.

The current research focused on Phase III data with four time points: 3rd grade, 4th grade, 5th grade, and 6th grade. For nearly all analyses presented below, the working sample comprised 1,103 of the 1,364 participants, which included participants with valid data for at least one of the core indicators used in the analyses from at least one time point between 3rd grade and 6th grade. Of the current sample, 50.5% were boys; 81.5% were White; .4% were American Indian, Eskimo, Aleutian; 1.5% were Asian or Pacific Islander; 11.8% were Black or African American; 4.8% were Other; 6.1% were Hispanic; 8.4% had mothers who had not completed high school; and 7.2 % of the families were classified as living in poverty.

Measures

Prosocial behavior

Mother-Report Prosocial Behavior with Peers Scale was drawn from Child Behavior Scale (Ladd & Profilet, 1996) to assess children's prosocial behavior. The items on the scale used to gather mothers' reports of children's prosocial behavior included: "Seems concerned when other children are distressed," "Takes turns with play materials," "Kind toward peers," "Listens

to classmates," "Compromises in conflict with peers," "Is cooperative with peers," "Friendly toward other children," "Shows concern for moral issues (e.g., fairness, welfare of others)," and "Offers help or comfort when other children are upset." Mothers rated the study child's prosocial behavior with peers on a 3-point scale (0=not true, 1=sometimes true, and 2= often true). The scores of Prosocial Behavior with Peers ranged from 0 to 2, with higher scores indicating more prosocial behaviors towards peers. Ladd and Profilet (1996) reported Cronbach's alpha reliabilities for Prosocial Behavior with Peers Scale were between .91 and .92, and also showed that the scale had construct validity, concurrent validity, and predictive validity. In the sample for the current study, alphas for Prosocial Behavior with Peers Scale from 3rd grade to 6th grade ranged from .80 to .82.

Peer Exclusion

Peer exclusion was measured by Mother-Report Excluded by Peers Subscale from Child Behavior Scale (Ladd & Profilet, 1996). The items on this subscale included: "Not chosen as playmate by peers," "Peers avoid the child," "Is excluded from peers' activities," and "Is ignored by peers." Mothers rated the study child's peer exclusion on a 3-point scale (0=not true, 1=sometimes true, and 2=often true). The scores of Excluded by Peers ranged from 0 to 2, with higher scores indicating a higher tendency to be excluded by peers. Ladd and Profilet (1996) reported Excluded by Peers Subscale had good reliabilities with Cronbach's alphas between .93 and .96, a stability coefficient for a 4-month interval of .72, and a good validity. In the sample for the current study, alphas for Excluded by Peers Subscale from 3rd grade to 6th grade ranged from .81 to .87.

Academic Competence

Academic competence was measured by Academic Rating Scale (Rock & Pollack, 2002), which is a teacher-reporting measure of academic skills developed for use in the Early Childhood Longitudinal Study (U.S. Department of Education, National Center for Education Statistics, 2001). The measure gave scores on two subscales: language and literacy and mathematical thinking. Language and Literacy Subscale was conducted four times in 3rd grade, 4th grade, 5th grade, and 6th grade. Mathematical Thinking Subscale was conducted three times in 3rd grade, 4th grade, and 5th grade. Considering that scores on Language and Literacy Subscale were highly correlated with the scores on total academic skills in 3rd grade (r = .94), 4th grade (r = .93), and 5th grade (r = .90), scores on Language and Literacy Subscale were used to represent students' academic skill from 3rd grade to 6th grade. Language and Literacy Subscale measured children's skills and behaviors related to listening, speaking, reading, and writing with 10 items in 3rd, 4th, 5th, and 6th grades. Teachers were asked to rate the target child's skills and behaviors for a range of contexts and situations and compare them with other children of the same age and grade level. Items on the subscale were constructed differently in each grade level to reflect developmental differences in the expression of academic skills over time. Example items included: "Conveys ideas clearly," "Understands and interprets a story or other text," "Uses various strategies to gain information." Items were answered on a 5-point scale, ranging from 'not yet demonstrated' through 'proficiency,' with higher numbers indicating better academic skills. Language and Literacy Scale showed good psychometric properties in the Early Childhood Longitudinal Study (U.S. Department of Education, National Center for

Education Statistics, 2001) and a high internal reliability in the NICHD sample (Cronbach's alphas from 3rd grade through 6th grade were .94 — .96).

Control variables

The links between peer exclusion, prosocial behavior, and academic competence could be developmental functions reflective of a common cause. Thus, before concluding that across-lagged associations represent truly dynamic cascade effects, it is necessary to rule out the possibility that such associations could be accounted for by confounding variables. Based on existing literature, children's demographic characteristics (gender and race), family characteristics (family income, maternal education), and school characteristics (school problems) may all serve as confounders (e.g., Christian, Morrison, & Bryant, 1998; Clark & Ladd, 2000; Elicker, England & Sroufe, 1992; Hoffman, 1977; Ladd et al., 1999; McEvoy& Welker, 2000; Smith, Walker, Fields, Brookins, & Seay, 1999). Thus, child, family, and school characteristics were included as controls. Child gender (1 = male, 0 = female), race (1 = Black or African American, 0 = not Black or African American), maternal education (1 = bachelor's degree or above, 0 = less than bachelor's degree) were collected at one month, and family income-to-needs ratio and school problems were collected in 3rd grade.

Family income-to-needs ratio. Family income-to-needs ratio was computed as total family income divided by the poverty threshold for each family size of that year. A family with a score of 1 would be equal to the poverty level.

School problems. School Problems Scale was drawn from Principal Questionnaire: School and Staffing Survey (National Center for Education Statistics, 1999). Principals reported general information about problems in the schools the study child attended through 19 items, including conduct problems, poverty, and delinquency. Example items included: "Physical conflict among students," "Students dropping out," and "Poverty." Items were answered on a 4-point scale, ranging from 'not a problem' through 'serious.' School Problems Score was computed as the sum of the responses, with higher numbers indicating more serious school problems. Cronbach's alpha of School Problem Scale was .88 with the current sample.

Statistical Analysis Plan

Missing data across measures and grades ranged from 7% (prosocial behavior in 3rd grade) to 21.8% (academic competence in 6th grade). It occurred due to attrition and failure to complete all assessments. The mean percentage missing across indicators was 10.38%. All missing data will be treated as ignorable (missing at random), and full information maximum likelihood (FIML) will be used to handle the missing data. Descriptive statistics also indicated that several of the indicators were skewed. To account for the issue of non-normality, maximum likelihood estimation with robust standard errors (MLR) will be used.

For the cascade analysis, a series of path analysis models will be tested to establish the developmental cascades among prosocial behavior, academic competence, and peer exclusion using structural equation modeling (lavaan statistical program) (see Table 1). Model 1 includes within-time correlations among peer exclusion, prosocial behavior, and academic competence as well as stability estimates for each construct between adjacent time points. Because

developmental cascade models control for within-time covariance and longitudinal stability of each construct, all estimates of within-time covariance and longitudinal stability of each construct in Model 1 will be retained in successive models irrespective of their significance levels. Model 2 adds three paths from prosocial behavior to peer exclusion. Model 3 adds three paths from academic competence to peer exclusion. Model 4 adds six paths between academic competence and prosocial behavior. Model 5 adds three paths from peer exclusion to prosocial behavior. Model 6 adds three paths from peer exclusion to academic competence. Given that the focus of this study was to compare the alternative cascade models, the relative fit of the hypothesized models will be evaluated using the sample size adjusted Bayesian Information Criterion (BIC; Raftery, 1995). The adjusted BIC is useful in model selection for the comparison of nested models, the model with the lowest adjusted BIC should be accepted as the best fitting one (Burnham & Anderson, 2004; Kadane & Lazar, 2004).

A final goal of the analysis is to determine whether the significant cascade paths of the most plausible model will remain when control variables are introduced into the model. Thus, once the most plausible model among the cascade models is identified, the effects of control variables will be examined.

2.3 Result

Descriptive Statistics

Descriptive statistics for the study variables are presented in Table 2. Repeated-measures analyses of variance (ANOVAs) were conducted with prosocial behavior, peer exclusion, and academic competence as dependent variables, and with Group (categorical control variables: gender, race, and mother's education, separately) and Time (Grade 3, Grade 4, Grade 5, and Grade 6) as factors.

The Mauchly's test of sphericity for the 2 (gender) * 4 (Grade 3, Grade 4, Grade 5, and Grade 6) repeated-measures ANOVA for prosocial behavior showed that the sphericity cannot be assumed (p<.001). Thus, the Greenhouse-Geisser procedure was chosen to determine whether the effects were significant. The result of the repeated-measures ANOVA for prosocial behavior indicated that the main effect of *Time* was non-significant, $F(2.95, 2586.42)=1.41$, p=.24, nor the interaction effect of *Time* × *Gender*, $F(2.95, 2586.42)=.74$, p=.52, but the main effect of gender on prosocial behavior was significant, $F(1, 878)=19.70$, p< .01. Girls were higher on prosocial behavior than boys in each grade (Grade 3: M_{female}=15.18, SD=.13, M_{male}= 14.56, SD=.13; Grade 4: M_{female}=15.21, SD=.15, M_{male}=14.51, SD=.14; Grade 5: M_{female}=15.39, SD=.13, M_{male}=14.54, SD=.13; Grade 6: M_{female}=15.34, SD=.13, M_{male}=14.66, SD=.13). The Mauchly's test of sphericity for the 2 (race) * 4 (Grade 3, Grade 4, Grade 5, and Grade 6) repeated ANOVA for prosocial behavior showed that the sphericity cannot be assumed (p<.01). The Greenhouse-Geisser correction indicated that the interaction effect of *Time* × *Race* was significant, $F(2.95, 2588.89)=.4.09$, p<.01. Simple effect analysis showed that for African American students, 4th grade prosocial behavior (M=12.27, SD=.29) was significantly lower that 5th grade (M=13.10, SD=.26) and 6th grade prosocial behavior (M=13.07, SD=.27). There

were no significant differences of prosocial behavior among the four-time points for non-African American students. There was a significant main effect of race on prosocial behavior, $F(1, 878)=1101.38$, $p< .01$. Non-African American students were higher on prosocial behavior than African American in each grade (Grade 3: $M_{\text{Non-African American}}=15.15$, $SD=.10$, $M_{\text{African American}}=12.68$, $SD=.26$; Grade 4: $M_{\text{Non-African American}}=15.19$, $SD=.10$, $M_{\text{African American}}=12.27$, $SD=.29$; Grade 5: $M_{\text{Non-African American}}=15.20$, $SD=.10$, $M_{\text{African American}}=13.10$, $SD=.26$; Grade 6: $M_{\text{Non-African American}}=15.25$, $SD=.10$, $M_{\text{African American}}=13.07$, $SD=.27$). The Mauchly's test of sphericity for the 2 (mother's education) * 4 (Grade 3, Grade 4, Grade 5, and Grade 6) repeated-measures ANOVA for prosocial behavior showed that the sphericity cannot be assumed ($p<.01$). The Greenhouse-Geisser correction indicated that the main effect of *Time* was non-significant, $F(2.95, 2587.52)=.96$, $p=.41$, nor the interaction effect of *Time* × *Mother's education*, $F(2.95, 2587.52)=1.42$, $p=.24$, but there was a significant main effect of mother's education on prosocial behavior, $F(1, 878)=56.12$, $p< .01$. Children whose mother had a bachelor or higher education degree were higher on prosocial behavior than children whose mother did not have a bachelor degree in each grade (Grade 3: $M_{\text{bachelor degree}}=15.58$, $SD=.15$, $M_{\text{non-bachelor degree}}=14.40$, $SD=.12$; Grade 4: $M_{\text{bachelor degree}}=15.71$, $SD=.16$, $M_{\text{non-bachelor degree}}=14.30$, $SD=.13$; Grade 5: $M_{\text{bachelor degree}}=15.64$, $SD=.14$, $M_{\text{non-bachelor degree}}=14.52$, $SD=.12$; Grade 6: $M_{\text{bachelor degree}}=15.66$, $SD=.15$, $M_{\text{non-bachelor degree}}=14.57$, $SD=.12$).

The Mauchly's test of sphericity for the 2 (gender) * 4 (Grade 3, Grade 4, Grade 5, and Grade 6) repeated-measures ANOVA for peer exclusion showed that the sphericity cannot be assumed ($p<.01$). The Greenhouse-Geisser correction showed that the main effect of *Time* was significant, $F(2.84, 2555.54)=9.02$, $p<.01$, but the interaction effect of *Time* × *Gender was*

nonsignificant, $F(2.84, 2555.54)=.16$, $p=.91$. Peer exclusion was significantly higher in 6th grade than in 4th grade (Grade 3: $M=.79$, $SD=1.33$; Grade 4: $M=.72$, $SD=1.39$; Grade 5: $M=.83$, $SD=1.39$; Grade 6: $M=.94$, $SD=1.57$). The main effect of gender on peer exclusion was nonsignificant, $F(1, 901)=.78$, $p=.38$. The Mauchly's test of sphericity for the 2 (race) * 4 (Grade 3, Grade 4, Grade 5, and Grade 6) repeated-measures ANOVA for peer exclusion showed that the sphericity cannot be assumed ($p<.01$). The Greenhouse-Geisser correction showed the main effect of *Time* was significant, $F(2.84, 2556.02)=3.60$, $p=.02$, but the interaction effect of *Time* × *Race was nonsignificant*, $F(2.84, 2556.02)=.78$, $p=.50$. The main effect of race on peer exclusion was nonsignificant, $F(1, 901)=3.85$, $p=.05$. The Mauchly's test of sphericity for the 2 (mother's education) * 4 (Grade 3, Grade 4, Grade 5, and Grade 6) repeated-measures ANOVA for peer exclusion showed that the sphericity cannot be assumed ($p<.01$). The Greenhouse-Geisser correction showed the main effect of *Time* was significant, $F(2.84, 2554.97)=8.56$, $p<.01$, but the interaction effect of *Time* × *Mother's education was nonsignificant*, $F(2.84, 2554.97)=.40$, $p=.75$.The main effect of mother's education on peer exclusion was nonsignificant, $F(1, 901)=3.10$, $p=.08$.

The Mauchly's test of sphericity for the 2 (gender) * 4 (Grade 3, Grade 4, Grade 5, and Grade 6) repeated-measures ANOVA for academic competence showed that the sphericity can be assumed ($p=.37$). The result of the repeated ANOVA for academic competence showed that the main effect of *Time* was significant, $F(3, 1263)=25.21$, $p<.01$, but the interaction effect of *Time* × *Gender was nonsignificant*, $F(3, 1263)=1.07$, $p=.36$. Academic competence in 6th grade was significantly higher than academic competence in 3rd grade, 4th grade, and 5th grade, and academic competence in 5th grade was significantly higher than academic competence in 3rd

grade and 4th grade (Grade 3: M=35.68, SD=9.61; Grade 4: M=35.64, SD=9.30; Grade 5: M=37.43, SD=3.99; Grade 6: M=38.68, SD=8.97).The main effect of gender on academic competence was significant, $F(1, 421)=9.92$, $p<.01$. Girls were higher on academic competence than boys in each grade except for 3rd grade (Grade 3: M_{female}=37.48, SD=.66, M_{male}=35.90, SD=.64; Grade 4: M_{female}=37.68, SD=.63, M_{male}=34.95, SD=.61; Grade 5: M_{female}=39.55, SD=.63, M_{male}=36.77, SD=.61; Grade 6: M_{female}=40.37, SD=.59, M_{male}=38.31, SD=.57). The Mauchly's test of sphericity for the 2 (race) * 4 (Grade 3, Grade 4, Grade 5, and Grade 6) repeated-measures ANOVA for academic competence showed that the sphericity can be assumed (p=.36). The result of the repeated-measures ANOVA for academic competence showed that the main effect of *Time* was significant, $F(3, 1263)=3.64$, $p<.01$, but the interaction effect of *Time* × *Race was nonsignificant*, $F(3, 1263)=.61$, p=.61. The main effect of race on academic competence was significant, $F(1, 421)=38.37$, $p<.01$. Non-African American students were higher on academic competence than African American students in each grade (Grade 3: $M_{Non\text{-}African\ American}$=37.36, SD=.47, $M_{African\ American}$=29.85, SD=1.47; Grade 4: $M_{Non\text{-}African\ American}$=36.87, SD=.45, $M_{African\ American}$=30.39, SD=1.42; Grade 5: $M_{Non\text{-}African\ American}$=38.85, SD=.45, $M_{African\ American}$=30.87, SD=1.41; Grade 6: $M_{Non\text{-}African\ American}$=40.06, SD=.42, $M_{African\ American}$=31.90, SD=1.30). The Mauchly's test of sphericity for the 2 (mother's education) * 4 (Grade 3, Grade 4, Grade 5, and Grade 6) repeated ANOVA for academic competence showed that the sphericity can be assumed (p=.35). The result of the repeated-measures ANOVA for academic competence showed that the main effect of *Time* was significant, $F(3, 1263)=24.96$, $p<.01$, but the interaction effect of *Time* × *Mother's education was nonsignificant*, $F(3, 1263)=.66$, p=.58. The main effect of mother's education on academic

competence was significant, $F(1, 421) = 85.52$, $p < .01$. Children whose mother had a bachelor or higher education degree were higher on academic competence than children whose mother did not have a bachelor degree in each grade (Grade 3: $M_{\text{bachelor degree}} = 39.96$, $SD = .63$, $M_{\text{non-bachelor degree}} = 33.71$, $SD = .60$; Grade 4: $M_{\text{bachelor degree}} = 39.56$, $SD = .60$, $M_{\text{non-bachelor degree}} = 33.33$, $SD = .57$; Grade 5: $M_{\text{bachelor degree}} = 41.67$, $SD = .60$, $M_{\text{non-bachelor degree}} = 34.94$, $SD = .57$; Grade 6: $M_{\text{bachelor degree}} = 42.28$, $SD = .57$, $M_{\text{non-bachelor degree}} = 36.65$, $SD = .54$).

Concurrent and longitudinal correlations among main study variables and control variables are presented in Table 3. Prosocial behavior, peer exclusion, and academic competence were stable over time ($r = .44$ to $.68$, $p < .01$). Prosocial behavior and academic competence were negatively associated with peer exclusion concurrently ($r = -.12$ to $-.27$, $p < .01$) and over time ($r = -.13$ to $-.21$ $p < .01$). Prosocial behavior was positively associated with academic competence concurrently ($r = .19$ to $.31$, $p < .01$) and over time ($r = .18$ to $.24$, $p < .01$). Family income-to-needs ratio was positively associated with prosocial behavior ($r = .18$ to $.22$, $p < .01$) and academic competence ($r = .24$ to $.28$, $p < .01$) in each grade, and negatively associated with peer exclusion in 5th grade and 6th grade ($r = -.07$ and $-.071$, $p < .05$). School problem was negatively associated with prosocial behavior ($r = -.13$ to $-.16$, $p < .01$) in each grade and academic competence ($r = -.14$ to $-.20$, $p < .01$) in each grade except for 4th grade.

Cascade Analysis

Table 4 and Table 5 show the standardized path coefficients and the model fit for the nested structural equation modeling models. Model 1 includes within-time correlations among peer exclusion, prosocial behavior, and academic competence as well as stability estimates for each

construct between adjacent time points. All autoregressive paths were positive and significantly different from zero (r=.53 to .67, p<.01), indicating that children's prosocial behavior, peer exclusion, and academic competence at any age were related to the previous occasion.

Model 2 included stability paths, concurrent correlations, and added cascade paths from early prosocial behavior to later peer exclusion. The model fit of Model 2 was statistically better than Model 1, $\Delta\chi^2$=16.47, Δdf=3, p<.01; sample size adjusted Bayesian information criterion (BIC) of Model 2 (54451.93) was smaller than the BIC of Model 1 (54451.93). In Model 2, all autoregressive paths remained positive and significantly different from zero (r=.51 to .67, p<.01). In terms of cross-lagged paths, the path from 3rd grade prosocial behavior to 4th grade peer exclusion was significant (β=-.07, p=.02), the path from 4th grade prosocial behavior to 5th grade peer exclusion was nonsignificant (β=-.03, p=.29), and the path from 5th grade prosocial behavior to 6th grade peer exclusion was significant (β= -.09, p<.01). This result revealed that children's prosocial behavior in 3rd grade was a protective factor of peer exclusion in 4th grade, and children's prosocial behavior in 5th grade was also a protective factor of peer exclusion in 6th grade.

Model 3 included stability paths, concurrent correlations, cascade paths from early prosocial behavior to later peer exclusion, and added cascade paths from early academic competence to later peer exclusion. The model fit of Model 3 was not statistically better than Model 2, $\Delta\chi^2$=5.59, Δdf=3, p=.24; the BIC of Model 3 (54449.57) was bigger than the BIC of Model 2 (54442.96). This result indicated that adding cascade paths from early academic competence to later peer exclusion did not contribute to a better model fit. Thus, the cascade paths from early academic competence to later peer exclusion were not included in the

following models.

Model 4 included stability paths, concurrent correlations, cascade paths from early prosocial behavior to later peer exclusion, and added transactional cascade paths between prosocial behavior and academic competence. The model fit of Model 4 was statistically better than Model 2, $\Delta\chi^2$=81.33, Δdf=6, p<.01; the BIC of Model 4 (54370.41) was smaller than the BIC of Model 2 (54442.96). Standardized path coefficients of Model 4 show that autoregressive paths remained positive and significantly different from zero (r=.51 to .66, p<.01), the cascade path from 3rd grade prosocial behavior to 4th grade peer exclusion (β=-.07, p=.02) and the path from 5th grade prosocial behavior to 6th grade peer exclusion (β=-.09, p<.01) also remained significant. Transactional effects between prosocial behavior and academic competence were positive and significantly different from zero at each time point. Specifically, 3rd grade prosocial behavior predicted 4th grade academic competence (β=.09, p<.01), and vice versa (3rd grade academic competence predicted 4th grade prosocial behavior, β=.07, p=.03); 4th grade prosocial behavior predicted 5th grade academic competence (β=.15, p<.01), and vice versa (4th grade academic competence predicted 5th grade prosocial behavior, β=.09, p<.01); 5th grade prosocial behavior predicted 6th grade academic competence (β=.16, p<.01), and vice versa (5th grade academic competence predicted 6th grade prosocial behavior, β=.06, p=.03).

Model 5 included stability paths, concurrent correlations, cascade paths from early prosocial behavior to later peer exclusion, cascade paths between prosocial behavior and academic competence, and added cascade paths from early peer exclusion to later prosocial behavior. The model fit of Model 5 was statistically better than Model 4, $\Delta\chi^2$=16.2, Δdf=3, p<.01; the BIC of Model 5 (54368.22) was smaller than the BIC of Model 4 (54370.41).

Standardized path coefficients of Model 5 show that autoregressive paths remained positive and significantly different from zero (r=.51 to .66, p<.01), cascade paths from 3rd grade prosocial behavior to 4th grade peer exclusion (β=-.07, p=.02) and from 5th grade prosocial behavior to 6th grade peer exclusion (β=-.09, p<.01) also remained significant. Transactional effects between prosocial behavior and academic competence remained significant (β=.06 to .16, p<.05). In terms of the cascade paths from early peer exclusion to later prosocial behavior, the result showed that 4th grade peer exclusion negatively influenced prosocial behavior in 5th grade (β=-.08, p<.01), but the path from 3rd grade peer exclusion to 4th grade prosocial behavior was nonsignificant (β=-.03, p=.33), nor the path from 5th grade peer exclusion to 6th grade prosocial behavior (β=-.03, p=.22).

Model 6 included stability paths, concurrent correlations, cascade paths from early prosocial behavior to later peer exclusion, cascade paths between prosocial behavior and academic competence, cascade paths from early peer exclusion to later prosocial behavior, and added cascade paths from early peer exclusion to later academic competence. The model fit of Model 6 was not better than Model 5, $\Delta\chi^2$=6.5, Δdf=3, p=.15; the BIC of Model 6 (54373.80) was bigger than the BIC of Model 5 (54368.22). This result indicated that adding cascade paths from early peer exclusion to later academic competence did not contribute to a better model fit. Thus, Model 5 was adopted as the most plausible model in Study 1. Figure 2 shows the standardized path coefficients for the significant paths of Model 5.

Control Variable Analysis

In Model 5, there were nine significant cascade paths. The goal of the control variable analysis was to examine the sensitivity of the significant cascade paths in Model 5. That is, whether the

nine cascade paths would remain significant with different control variables. Five control variables (gender, race, mother's education, family income-to-needs ratio, and school problem) were incorporated into Model 5 separately. Control variables were allowed to correlate with study variables in 3rd grade and to predict study variables in 4th grade, 5th grade, and 6th grade.

When gender was incorporated into Model 5, all the previously significant cascade paths remained significant. When race was incorporated into Model 5, the previously significant cascade path from 3rd grade academic competence to 4th grade prosocial behavior (β=.04, p=.17) and the cascade path from 5th grade academic competence to 6th grade prosocial behavior (β=.04, p=.17) became nonsignificant. Other previously significant cascade paths remained significant. Figure 3 shows that race (0 for non-African American and 1 for African American) was negatively correlated with 3rd grade prosocial behavior and academic competence and positively correlated with 3rd grade peer exclusion. Race also negatively predicted 4th grade prosocial behavior, 4th grade academic competence, 5th prosocial behavior, 5th academic competence, 6th prosocial behavior, and 6th academic competence. African American students had lower levels of prosocial behavior and academic competence than non-African American students. This result indicated race was a factor in partially accounting for the influence of 3rd grade academic competence on 4th grade prosocial behavior and the influence of 5th grade academic competence on 6th grade prosocial behavior.

The similar results showed up with mother's education, family income-to-needs ratio, and school problem included as control variables. When mother's education was incorporated into Model 5, the previously significant cascade path from 3rd grade academic competence to 4th grade prosocial behavior (β=.04, p=.19) and the cascade path from 5th grade academic

competence to 6th grade prosocial behavior (β=.04, p=.17) became nonsignificant. Other previously significant cascade paths remained significant. Figure 4 shows that mother's education (1=bachelor degree or above, 0=less than bachelor degree) was significant positively correlated with 3rd grade prosocial behavior and academic competence, and also significant positively predicted 4th grade prosocial behavior, 4th grade academic competence, 5th prosocial behavior, 5th academic competence, 6th prosocial behavior, and 6th academic competence. Students whose mother did not hold a bachelor's degree had lower levels of prosocial behavior and academic competence than students whose mother hold a bachelor's or higher education degree. This result indicated mother's education was another factor in partially accounting for the influence of 3rd grade academic competence on 4th grade prosocial behavior and the influence of 5th grade academic competence on 6th grade prosocial behavior. Also, when family income-to-needs ratio was incorporated into Model 5, the previously significant cascade path from 3rd grade academic competence to 4th grade prosocial behavior (β=.04, p=.13) and the cascade path from 5th grade academic competence to 6th grade prosocial behavior (β=.05, p=.09) became nonsignificant. Other previously significant cascade paths remained significant. Figure5 shows that family income-to-needs ratio was positively correlated with 3rd grade prosocial behavior and academic competence, and also positively predicted 4th grade prosocial behavior, 4th grade academic competence, 5th prosocial behavior, and 5th academic competence. Students from higher family income-to-needs ratio families had a higher level of prosocial behavior and academic competence than students from lower family income-to-needs ratio families. This result indicated that family income-to-needs ratio was also a factor in partially accounting for the influence of 3rd grade academic competence on 4th grade prosocial behavior

and the influence of 5th grade academic competence on 6th grade prosocial behavior. When school problem was incorporated into Model 5, the previously significant cascade path from 3rd grade academic competence to 4th grade prosocial behavior (β=.06, p=.06) and the cascade path from 5th grade academic competence to 6th grade prosocial behavior (β=.05, p=.06) became nonsignificant, which indicates that school problem was another factor in partially accounting for the influence of 3rd grade academic competence on 4th grade prosocial behavior and the influence of 5th grade academic competence on 6th grade prosocial behavior. Other previously significant cascade paths remained significant. Figure 6 shows that school problem was significant negatively correlated with 3rd grade prosocial behavior and academic competence, and also significant negatively predicted 4th grade prosocial behavior.

2.4 Discussion

The aim of Study 1 was to test the process by which prosocial behavior, academic competence, and peer exclusion sequentially affect one another from 3rd grade to 6th grade. Results of the current study showed that there were developmental cascade effects among prosocial behavior, academic competence, and peer exclusion. The general pattern in the final model revealed that, across 3rd grade to 6th grade, prosocial behavior in 3rd grade decreased peer exclusion in 4th grade; then, peer exclusion in 4th grade in turn negatively influenced prosocial behavior in 5th grade; finally, prosocial behavior in 5th grade decreased peer exclusion in 6th grade; additionally, prosocial behavior and academic competence influenced each other at each time interval in a transactional way. These developmental cascade paths were obtained over and above the covariation among constructs at each time point and the stability in each over time. These results confirmed that functions and behaviors in one domain at one developmental period influenced another domain at a later developmental period in an interactive, transactional, and dynamic process.

The results supported the hypotheses that there are significant correlations among prosocial behavior, academic competence, and peer exclusion at each point of assessment, and there are significant stabilities in prosocial behavior, academic competence, and peer exclusion across the study time span. Regarding the cross-lagged associations among prosocial behavior, academic competence, and peer exclusion, the results showed that the associations varied across different grades. To specify, prosocial behavior significantly decreased later peer exclusion at all grade levels examined except for the path from 4th grade to 5th grade: peer exclusion significantly impeded the development of prosocial behavior only for the path from 4th grade to 5th grade. The results of control variable analysis showed that the path from 3rd

grade academic competence to 4th grade prosocial behavior and the path from 5th grade academic competence to 6th grade prosocial behavior became nonsignificant with the inclusion of control variables (race, mother's education, family income-to-needs ratio, and school problem), but the link from 4th grade academic competence to 5th grade prosocial behavior remained significant.

No Direct Longitudinal Links between Academic Competence and Peer Exclusion

Based on existing research, it was hypothesized that academic competence was a protective factor of peer exclusion. However, the present study indicated that academic competence was not a buffer against later peer exclusion. The first explanation for this could be that, as discussed above in the literature review, the link between academic competence and peer status depends on culture and contexts. Although students' race and school problem were controlled as cultural and contextual variables, other contextual variables such as the class norms and class average academic performance were not included in the current research. Perhaps, classroom context is a more powerful moderator than school context, given that peer status is basically built within one's classroom context.

Another explanation could be that the peer exclusion of students who struggle with academic competence may not only be due to their low academic performance but more to their inappropriate behaviors. Low academic achievers with intellectual disabilities may lack advanced social cognitive information processing skills, which causes them engage in more inappropriate behaviors (inattentive, disorganized, and immature behaviors) and less social behaviors (Crick & Dodge, 1994). For example, Coie and Krehbiel (1984) found that academic

tutoring is effective to improve the social status of low-achieving, socially-rejected children because these children decrease disruptive behavior after attending the academic tutoring. Previous research demonstrating the positive influence of academic competence on peer status may ignore the confounding role of children's social behavior. The current research showed that prosocial behavior positively influenced academic competence and negatively influenced peer exclusion, which implies that the nonsignificant association between academic competence and peer exclusion may be due to the confounding role of prosocial behavior. Consistent with the current research, the research of Vannatta et al. (2009) also showed that academic competence was not a unique predictor of peer acceptance once social behavior was taken into account. Dodge and Murphy (1984) also argued that social behavior was the primary determinant of peer relationship. Given that not all academically incompetent students engage in inappropriate behaviors and not all academically competent students have advanced social skills, academic competence is not necessarily a protective factor of peer exclusion. For example, children who have high academic achievement but low prosocial behavior and high aggressive behavior may also be excluded by peers.

Moreover, it is worth noticing that although academic competence is a peer-valued characteristic in most cases, there are other peer-valued characteristics such as physical attractiveness, leadership, athleticism, and prosocial tendencies, which benefit building positive social status and decreasing peer exclusion. It is likely that students who only have academic competence but lack other peer-valued characteristics may also suffer from peer dislike or exclusion. For example, Fröjd et al. (2008) found that spending too much time on studying and having limited social interaction may lead to the loss of popularity among peers.

Meanwhile, students who lack high academic competence but have many other peer-valued characteristics may not suffer from peer exclusion. Thus, academic competence is not a determinant of one's social status in the peer group.

In addition to the nonsignificant effect of academic competence on later peer exclusion, the effect of peer exclusion on later academic competence was also nonsignificant in the current research. One of the reasons could be that there are different forms of peer exclusion. Excluded children may be actively excluded from peer activities but also may be ignored and neglected in groups. Wentzel (1991) argued that neglected children who lack friends may seek social support from adults, and adult-oriented behavior may promote their academic development. For example, the research of Wentzel and Asher (1995) found that isolated and neglected children have positive academic profiles and are described by teachers as more self-regulated learners. Meanwhile, children who are actively excluded by peers, such as peer abuse, may have a more negative school attitude and may be more likely to decrease academic engagement. Future research should examine whether active exclusion and inactive exclusion have different effects on students' academic development.

Furthermore, from the perspective of methodology, the nonsignificant link between academic competence and peer exclusion may due to the fact that the current study controlled for within-time covariance and the across-time stability. According to Masten and Cicchetti (2010), without controlling the continuity and covariance, the cascade effect across time may represent correlations that already existed at the first-wave or reflect an artifact of unmeasured outcome covariance within time. The results of the current research showed that after controlling for the within-time covariance and across-time stability, direct longitudinal

associations between academic competence and peer exclusion did not exist. This means that the cross-lagged effect between academic competence and peer exclusion that was demonstrated in previous research may be accounted for by the within-time covariance and across-time stability.

Although the direct longitudinal associations between academic competence and peer exclusion did not exist, there were indirect longitudinal links between them, mediated by prosocial behavior. To specify, 4th grade academic competence promoted 5th grade prosocial behavior, which in turn, decreased 6th grade peer exclusion; peer exclusion in 4th grade impeded the development of academic competence in 6th grade through the decrease of 5th grade prosocial behavior. These results suggested that prosocial behavior was a mediator between academic competence and peer exclusion. More research is needed to confirm this finding.

The Specialty of Fourth Grade

Developmental psychologists like to investigate the characteristics of critical developmental stages (infancy, early childhood, middle childhood or preadolescence, early adolescence, and adolescence) and to identify the important differences between one stage and another. However, there are subtle changes and differences within each developmental stage. The findings of the present research revealed that, although the period from 3rd grade to 6th grade can all be seen as preadolescence, the pattern between 4th grade and 5th grade is different from the pattern between 3rd grade and 4th grade and the pattern between 5th grade and 6th grade. To specify, the cascade analysis indicated that the path from 3rd grade prosocial behavior to 4th grade peer exclusion and the path from 5th grade prosocial behavior to 6th grade peer exclusion were

significant, but the path from 4th grade prosocial behavior to 5th grade peer exclusion was nonsignificant; additionally, the path from 4th grade peer exclusion to 5th grade prosocial behavior was significant, but the path from 3rd grade peer exclusion to 4th grade prosocial behavior and the path from 5th grade peer exclusion to 6th grade prosocial behavior were nonsignificant. Control variable analysis showed that the path from 3rd grade academic competence to 4th grade prosocial behavior and the path from 5th grade academic competence to 6th grade prosocial behavior became nonsignificant with the inclusion of control variables (race, mother's education, family income-to-needs ratio, and school problem), but the path from 4th grade academic competence to 5th grade prosocial behavior remained significant. These results suggested that the protective role of prosocial behavior on later peer exclusion was weaker in 4th grade, the negative influence of peer exclusion on later prosocial behavior was stronger in 4th grade, and the protective role of academic competence on later prosocial behavior was stronger in 4th grade, which means 4th grade may be an especially important period in preadolescence.

Previous research has demonstrated that there are some marked changes in 4th grade (around 10 years old). According to McClintock and Gilbert (1996), the adrenal glands mature around age 10 and levels of androgens also increase significantly around age 10. The elevated levels of androgen result in the appearance of secondary sex characteristics in peripheral tissues such as pubic hair in boys and breast development in girls, which marks age 10 as the beginning of puberty (Grumbach & Styne, 2003). Gonadarche, the earliest gonadal changes of puberty, also occurs at approximately 9 or 10 years of age (Grumbach & Styne, 2003). During this period, children may engage in more risk-taking and aggressive behaviors, have more romantic

and sexual interests, become more likely to express individuality, and become more sensitive to social status (see Dahl & Gunnar, 2009 for a review). For example, McClintock and Gilbert (1996) argued that girls wearing ornate earrings or boys forming pre-teenage groups may occur around age 10. The research of Jackson and Tisak (2001) also found that, compared with 7- and 8-year-olds and 11- and 12-year-olds, 9- and 10-year-olds reported being less likely to comfort a friend, more likely to feel good about themselves for not comforting a friend, and less bothered if peers thought they were mean for not comforting a friend. It is possible that 10-year-olds begin to pay more attention to peers' physical attractiveness and other peer-valued characteristics than prosocial behavior when they select friends. It is also possible that at 10 years old, excluded children may forge alliances with other excluded children who support deviant behavior and devalue prosocial behavior. Both the research of Jackson and Tisak (2001) and the current research showed that the pattern of 11- and 12-year-olds is different from the pattern of 10- and 11-year-olds but is similar with the pattern of 9-10-year-olds. Presumably, the effect of hormone changes and the corresponding psychological changes on children's behavior peaks at 10 years old, falling after that, and may reach another peak after children enter into adolescence. This assumption should be examined in the future with multi-wave longitudinal design across childhood and adolescence.

In addition to the hormone and psychological changes around 4th grade, 4th graders also face new challenges and expectations on academics, such as an increased homework load and more traditional instructional practices (Anderson, 2011). Thus, the importance of academic competence may be especially significant in 4th grade. This study showed that the cascade path from 4th grade academic competence to 5th grade prosocial behavior still remained significant

with control variables, which indicates that academic competence in 4th grade has a unique impact on 5th grade prosocial behavior after controlling for the effect of covariates. Academic competence can be an asset to enhance students' resiliency in overcoming new academic challenges in 4th grade. Students with academic competence may pass through this transition smoothly while students who struggle with new challenging schoolwork in 4th grade may be more vulnerable to mood disruptions, low self-esteem, and affiliation with deviant peers, which would negatively influence their prosocial behavior.

The Confounding Role of Race, Mother's Education, Family Income-To-Needs Ratio, and School Problem

The control variable analysis examined whether the inclusion of gender, race, mother's education, family income-to-needs ratio, and school problem would affect the significant cross-domain paths in the most plausible mode (Model 5). The results of the control variable analysis showed that the previously significant cascade paths remained significant with the inclusion of gender; meanwhile, the previously significant cascade path from 3rd grade academic competence to 4th grade prosocial behavior and the path from 5th grade academic competence to 6th grade prosocial behavior became nonsignificant when race, mother's education, family income-to-needs ratio, and school problem were incorporated into the model separately. This result suggested that the influence of academic competence on prosocial behavior may be accounted for by race, mother's education, family income-to-needs ratio, and school problem. Several studies have also documented that race, maternal education, family income, and school problems are predictors of academic competence and prosocial behavior (e.g., Keresteš, 2006;

Davis-Kean, 2005; Garner, Jones, & Miner, 1994; Wentzel, Filisetti, & Looney, 2007).

As important indicators of socioeconomic status (SES), maternal education and family income would affect parental expectations, parenting behavior, home environment, parental involvement in education, and social resources (e.g., attending better school with less school problem), which would in turn influence children's social competence and academic competence. For example, low-income parents who face financial stress may have mental health and emotional problems, and they tend to show more coercive and less responsive parenting styles, which may lead to children's low social competence (Garner et al., 1994). African American students having lower levels of academic and social competence than other-race students (mainly European American students in the current research) may also be due to their lower SES. In the current research, only 8.5% of African American students' mothers had a bachelor's degree, which was much lower than the percentage in other-race students' mothers (42.3%); additionally, family income-to-needs ratio of African American students (1.97) was significantly much lower than other-race students' family income-to-needs ratio (4.71). Even in recent years, African American students are still at risk of lower SES. According to the National Center for Education Statistics (NCES, 2018), in 2016, the percentage of children living in poverty was highest for African American children. African American students with high SES may also have high prosocial behavior and academic competence. For example, the research of Hill and Craft (2003) found that there were no differences between socioeconomically comparable African American and Euro-American parents' home involvement and school involvement on their kids' learning activities.

Chapter Three

Study 2

3.1 Literature Review

The Influence of Peer Exclusion on Depression

The formation and maintenance of social bonds are beneficial for both psychological and physiological outcomes. According to social buffering theories (e.g., Cohen & Wills, 1985), social support not only benefits people directly but also indirectly acts as a buffer against stressful events. Blocked or thwarted social bonds, such as social exclusion, challenge people's fundamental need to affiliate with a social group, thus possibly eliciting negative reactions including anxiety, social withdrawal, low self-esteem, and depression (Abramson, Seligman & Teasdale, 1978; Black & Hutchison, 2007; 1996; Hoyle & Crawford, 1994; McLaughlin-Volpe, Aron, Wright, & Lewandowski, 2005). Consistent with social buffering theories, interpersonal theories of depression and life stress theories also point out that interpersonal difficulties predict subsequent depressive symptoms (Brown & Harris, 1978; Gotlib & Hammen, 1992; Hammen, 1999; Joiner, Coyne, & Blalock, 1999). Social exclusion, as an interpersonal stressor, may contribute to depression through psychological mechanisms such as perceived diminished social support, negative self-views of competence and worth in relationships, ineffective self-regulation abilities, self-conscious emotions, and disrupted biological systems underlying stress responses (Slavich, O' Donovan, Epel, & Kemeny, 2010; see Rudolph, Flynn, & Abaied, 2008 for a review). Empirical research supports the adverse impact of social exclusion on depression. For example, Blackhart, Nelson, Knowles, and Baumeister's (2009) meta-analysis of 47 empirical studies of exclusion in the real world indicated that social exclusion (e.g., other-

nominated or self-perceived exclusion) was significantly associated with depression and distress, and the average weighted effect size was 0.28 ($p < .01$, 95% CI = 0.23, 0.33).

Social exclusion is common in social life. As early as childhood, children may experience social exclusion by peers. Peer exclusion becomes more prevalent during middle childhood and adolescence (Cioe et al., 1990). Youth spend much time with age-mates and put great stock in the expectations and opinions of peers (Furman & Buhrmester, 1992; see Wills, 1985). Thus, peer exclusion, as an aversive, exclusionary, and relational type of peer victimization, is particularly averse to depression for older children and adolescents (Boivin, Poulin, & Vitaro, 1994; Cole, Martin, Powers, & Truglio, 1996; Crick & Grotpeter, 1996; Hawker & Boulton, 2000). Longitudinal research shows that peer exclusion predicts depression, but the link between peer exclusion and adolescent depression is moderated by individual vulnerability, the severity of the exclusion, and other contextual factors (e.g., Nolan, Flynn, & Garber, 2003; Panak & Garber, 1992; see Platt, Kadosh, & Lau, 2013 for a review;). Although manipulated social exclusion in experimental research produces limited persistent depressive symptoms, it causes negative affect (see Blackhart et al., 2009 for a review), which implies that peer exclusion may be a potential cause of depression. Empirical research also shows that peer acceptance or peer support mitigates against depression. For example, the intervention of peer social support promotion reduces adolescent depression (e.g., Thompson, Eggert, & Herting, 2000), which indicates that the lack of social support (peer exclusion) may increase the likelihood of depression.

The Influence of Prosocial Behavior on Depression

As discussed above, supportive relationships are a protective factor of depression. Rather than a self-forming entity, children need to go out and build supportive relationships for themselves. Prosocial behavior, which is an indicator of social competence, may promote interpersonal harmony and build supportive networks. The association between prosocial behavior and peer relationship has been discussed in detail in Study 1. In short, prosocial behavior is negatively associated with peer rejection and positively associated with peer acceptance. Some empirical research has demonstrated that impact of prosocial behavior on depressive symptoms is mediated through peer relationships (e.g., Parren & Alasker, 2009; Henricsson & Rydell, 2006; Zimmer–Gembeck, Hunter, & Pronk, 2007). Not only for peer relationships, students' prosocial behavior is also a critical factor for healthy parent-child relationships and teacher-student relationships (e.g. Birch, & Ladd, 1998; Hamre, Pianta, Downer, & Mashburn, 2008; Newton, Laible, Carlo, Steele, & McGinley, 2014), which can be an asset to enhance students' resiliency in overcoming new challenges, obstacles, and stressful life events (Wang, Brinkworth, & Eccles, 2013). Thus, supportive relationships may be a mediator between prosocial behavior and depression.

Aside from the indirect influence of prosocial behavior on depression through receiving social support, prosocial behavior may also directly buffer depression. Prosocial behaviors, such as helping others, accompanies positive affect, self-efficacy, increased sense of purpose and meaning, the distraction from one's own stress, and the biologically down-regulation of one's emotional stress response, which may alleviate depression (Raposa, Laws, & Ansell, 2016). Longitudinal research shows that prosocial behavior alleviates the negative effects of stress and directly predicts a low level of depression (Bandura et al., 1999; Flynn, Ehrenreich,

Beron, & Underwood, 2015; Krause, 2006; Paulin, Brown, Dillard, & Smith, 2013). However, it is worthy to note that prosocial behavior is a complex and multidimensional concept, and not all subtypes of prosocial behaviors serve as protective factors of depression with the same power. For example, the research of Davis et al (2016) shows that altruistic prosocial behavior serves as a more powerful protective factor against depression than public prosocial behavior that aims at securing the approval of others.

Although extensive research shows that prosocial behavior is a protective factor of depression, there are research studies indicating that prosocial behavior has no effect on reducing depression and even may place children at risk for psychopathology (e.g., Haroz, Murray, Bolton, Betancourt, & Bass, 2013; Hay, 1994; Hay & Pawlby, 2003). The association between a high level of prosocial behavior or caring orientation and depression are posited especially for girls (e.g., Block & Gjerde, 1990; Gore, Aseltine Jr. & Colten, 1993). According to Perren, Stadelmann, Von Wyl, and Von Klitzing (2007), children with high levels of prosocial behavior may be too overly concerned about the needs and opinions of others, and neglect their own feelings and needs. Additionally, these children tend to be compliant and submissive, which can put them at risk for peer abuse or victimization, which lead to their elevated levels of emotional symptoms.

The Influence of Academic Competence on Depression

The role of academic competence on adolescent depression is also inconclusive. On the one hand, academic competence may be a protective factor of depression. First, students with high academic competence tend to perceive fewer academic difficulties and suffer less from

academic failure, which is a stressful life event. Considerable evidence shows that stressful life events are associated with depression in childhood and adolescence (see Grant, Compas, Thurm, McMahon, & Gipson, 2004 for a review). Thus, high academic achievers who face less academic failure may be less depressive than students with low academic competence. For example, the research of Lewinsohn, Gotlib, and Seeley (1995) shows that dissatisfaction with grades is a risk factor of major depressive disorder in adolescence. In addition, according to the self-efficacy theory, a low sense of efficacy to exercise control over things one values can give rise to feelings of futility and despondency (Bandura et al., 1999; Ehrenberg, Cox, & Koopman, 1991). Compared with high academic achievers who have positive self-evaluation and high self-esteem, low academic achievers may be frustrated and display low self-esteem (e.g., Coie & Krehbiel, 1984; Eliason & Richman, 1988; McConaughy & Ritter, 1986). Given that, high academic achievers may suffer less from depression than low academic achievers. Both correlational and longitudinal research studies have demonstrated that academic competence is negatively associated with depression in childhood and adolescence (e.g., Fröjd et al., 2008; Loeber et al., 2001; Yasin & Dzulkifli, 2011; Yousefi, Mansor, Juhari, Redzuan, & Talib, 2010).

On the other hand, some other research studies show that high academic competence is positively associated with depression. For high academic achievers, spending too much time on studying and having limited social interaction may lead to pressure and tiredness from overwork or the loss of popularity among peers (Fröjd et al., 2008). For example, the research of Traub (1983) showed that students with high academic competence were shyer, and they avoided social interaction by devoting time to studying. In addition, students with high

academic competence may also have a tendency towards perfectionism in their studies. Perfectionistic expectations and evaluations on study promote one's achievement and self-esteem but may also lead to a dissatisfaction with the present situation, which causes mental health problems such as depression, anxiety, and obsessive-compulsive disorder (Wang, 2012).

The Current Study

The main aim of Study 2 was to investigate the process by which preadolescents' prosocial behavior, academic competence, and peer exclusion interweave to influence subsequent adolescent depression. Given that Study 1 has revealed the pattern of how prosocial behavior, academic competence, and peer exclusion dynamically influence each other in preadolescence, another aim of Study 2 was to test whether the pattern of developmental cascades among prosocial behavior, academic competence, and peer exclusion in Study 1 remained in Study 2 with adolescent depression added as the outcome variable. Similarly to Study 1, Study 2 also tested six hypothesized models, progressively evaluating the concurrent correlations among prosocial behavior, academic competence, and peer exclusion, within-domain stability across time, and cross-lagged effects that one domain contributed to subsequent change in another domain. The difference is that in Study 2 the paths from prosocial behavior, peer exclusion, and academic competence in 6^{th} grade to depression in 15-year-olds were included in all cascade models. Figure 7 depicts the hypothesized nested models. For clarity, concurrent associations of three domains within time are not shown in Figure 7.

Based on existing research, it was hypothesized that peer exclusion in 6^{th} grade increases depression in 15-year-olds. Given the inconclusive evidence of the influences of prosocial

behavior and academic competence on depression, no specific hypotheses were proposed. Also, whether the pattern of the sequential associations among prosocial behavior, academic competence, and peer exclusion in Study 1 would remain in Study 2 was treated as exploratory.

3.2 Method

Participants, procedures, and measures of prosocial behavior, peer exclusion, academic competence, and control variables were the same as the Study 1. Study 2 added the adolescent depression from Phase IV data as the outcome variable, and analyzed the process that how the cascades of prosocial behavior, peer exclusion, and academic competence across 3rd grade to 6th grade were linked with adolescent depression at 15 years old.

Measures

Depression

Depression was measured by the Short Form Children's Depression Inventory (CDI, Kovacs, 1992) at 15 years old. The CDI has good test–retest reliability, internal consistency, and construct validity (Sitarenios & Kovacs, 1999). The Short Form Children's Depression Inventory comprised of 10 items assessing the degree of children's sadness, low self-esteem, and dysphoric mood over the last two weeks. Children were asked to select the statement that best describes them within the past two weeks. An example item is "I do most things O.K." (scored 0), "I do many things wrong" (scored 1), "I do everything wrong" (scored 2). In the sample for the current study, alpha for the Short Form Children's Depression Inventory at 15years old was .81.

Statistical Analysis Plan

The percentage missing of adolescent depression was 13.2% due to attrition and failure to complete all assessments. FIML will be used to handle missing data and MLR will be used to handle the issue of nonnormality. For the cascade analysis, a series of path analysis models will

be tested to establish the links of adolescent depression and the cascades between prosocial behavior, academic competence, and peer exclusion (see Table 6). Model 1 includes within-time correlations among peer exclusion, prosocial behavior, and academic competence as well as stability estimates for each construct between adjacent time points. In addition, the links from 6th grade prosocial behavior, peer exclusion, and academic competence to 15-year old depression will also be added in Model 1 and be retained in successive models. The same as Study 1, Model 2 adds three paths from prosocial behavior to peer exclusion. Model 3 adds three paths from academic competence to peer exclusion. Model 4 adds six paths between academic and social competence. Model 5 adds three paths from peer exclusion to prosocial behavior. Model 6 adds three paths from peer exclusion to academic competence. For all models, the adjusted BIC will be used for the relative fit of the hypothesized models. Once the most plausible model among the cascade models is identified, the effects of control variables will be examined.

3.3 Result

Descriptive Statistics

Descriptive statistics for depression are presented in Table 1. Three one-way ANOVAs were conducted with depression as the dependent variable and with categorical control variables (gender, race, and mother's education, separately) as factors. The results showed that girls were higher on the level of depression than boys, $F(1, 955)=38.33$, $p< .01$ ($M_{female}=2.52$, $SD=2.99$, $M_{male}=1.49$, $SD=2.10$); there were no differences between African-American students and Non-African American students on depression, $F(1, 955)=1.01$, $p=.32$ ($M_{\text{Non-African American}}=2.04$, $SD=2.70$, $M_{\text{African American}}=1.77$, $SD=2.13$); and there were no differences between students whose mother had a bachelor or higher education degree and students whose mother did not have a bachelor degree on depression, $F(1, 955)=.02$, $p=.88$ ($M_{\text{bachelor degree}}=1.99$, $SD=2.57$, $M_{\text{non-bachelor degree}}=2.02$, $SD=2.68$).

Longitudinal correlations between depression and other study variables are presented in Table 2. Depression at 15 years old was positively associated with peer exclusion from 3rd grade to 6th grade ($r=.10$ to $.14$, $p<.01$). There were no significant associations between depression and prosocial behavior from 3rd grade to 6th grade ($r=-.01$ to $-.03$, $p>.05$) and no significant associations between depression and academic competence from 3rd grade to 6th grade ($r=-.04$ to $.05$, $p>.05$). Depression was neither significantly associated with family income-to-needs ratio ($r=-.03$, $p>.05$) nor significantly associated with school problem ($r=-.01$, $p>.05$).

Cascade Analysis

Table 7 and Table 8 display the standardized path coefficients and model fit for the hypothesized nested structural equation modeling models in Study 2. Model 1 includes within-time correlations among peer exclusion, prosocial behavior, and academic competence, stability estimates for each construct between adjacent time points, and cascade paths from 6th grade prosocial behavior, peer exclusion, and academic competence to 15-year old depression. All autoregressive paths were positive and significantly different from zero (r=.53 to .66, p<.01). The path from 6th grade peer exclusion to 15-year old depression was significant (β=.13, p<.001), the path from 6th grade prosocial behavior to 15-year old depression was nonsignificant (β=-.01, p=.69), and the path from 6th grade academic competence to 15-year old depression was also nonsignificant (β=.06, p=.08).

Model 2 included stability paths, concurrent correlations, cascade paths from 6th grade prosocial behavior, peer exclusion, academic competence to 15-year old depression, and added cascade paths from early prosocial behavior to later peer exclusion. The model fit of Model 2 was statistically better than Model 1, $\Delta\chi^2$=16.06, Δdf=3, p<.01; the sample size adjusted Bayesian information criterion (BIC) of Model 2 (59014.13) is smaller than the BIC of Model 1 (59022.93). In Model 2, all autoregressive paths remained positive and significantly different from zero (r=.51 to .67, p<.01), the path from 6th grade peer exclusion to 15-year old depression also remained significant (β=.13, p<.001). The path from 3rd grade prosocial behavior to 4th grade peer exclusion was significant (β=-.07, p=.02), the path from 4th grade prosocial behavior to 5th grade peer exclusion was nonsignificant (β=-.03, p=.29), and the path from 5th grade prosocial behavior to 6th grade peer exclusion was significant (β=-.09, p<.01).

Model 3 included stability paths, concurrent correlations, cascade paths from 6th grade

prosocial behavior, peer exclusion, academic competence to 15-year old depression, cascade paths from early prosocial behavior to later peer exclusion, and added cascade paths from early academic competence to later peer exclusion. The model fit of Model 3 was not statistically better than Model 2, $\Delta\chi^2$=4.84, Δdf=3, p=.24; the BIC of Model 3 (59020.71) was bigger than the BIC of Model 2 (59014.13). This result indicated that adding cascade paths from early academic competence to later peer exclusion did not contribute to a better model fit. Thus, the cascade paths from early academic competence to later peer exclusion were not included in the following models.

Model 4 included stability paths, concurrent correlations, cascade paths from 6th grade prosocial behavior, peer exclusion, academic competence to 15-year old depression, cascade paths from early prosocial behavior to later peer exclusion, and added cascade paths between prosocial behavior and academic competence. The model fit of Model 4 was statistically better than Model 2, $\Delta\chi^2$=81.07, Δdf=6, p<.01; the BIC of Model 4 (58941.87) was smaller than the BIC of Model 2 (59014.13). Standardized path coefficients of Model 4 showed that autoregressive paths remained positive and significantly different from zero (r=.51 to .66, p<.01), the path from 6th grade peer exclusion to 15-year old depression remained significant (β=.13, p< .01), as well as the cascade path from 3rd grade prosocial behavior to 4th grade peer exclusion (β= -.07, p=.02) and the path from 5th grade prosocial behavior to 6th grade peer exclusion (β=-.09, p<.01). Transactional effects between prosocial behavior and academic competence were positive and significantly different from zero at each time point. Specifically, 3rd grade prosocial behavior predicted 4th grade academic competence (β=.09, p<.01), and vice versa (3rd grade academic competence predicted 4th grade prosocial behavior, β=.07, p=.02);

4th grade prosocial behavior predicted 5th grade academic competence (β=.15, p<.01), and vice versa (4th grade academic competence predicted 5th grade prosocial behavior, β=.09, p<.01); 5th grade prosocial behavior predicted 6th grade academic competence (β=.16, p<.01), and vice versa (5th grade academic competence predicted 6th grade prosocial behavior, β=.06, p=.03).

Model 5 included stability paths, concurrent correlations, cascade paths from 6th grade prosocial behavior, peer exclusion, academic competence to 15-year old depression, cascade paths from early prosocial behavior to later peer exclusion, cascade paths between prosocial behavior and academic competence, and added cascade paths from early peer exclusion to later prosocial behavior. The model fit of Model 5 was statistically better than Model 4, $\Delta\chi^2$=14.86, Δdf=3, p<.01; the BIC of Model 5 (58940.07) was smaller than the BIC of Model 4 (58941.87). Standardized path coefficients of Model 5 showed that autoregressive paths remained positive and significantly different from zero (r=.51 to .66, p<.01), the path from 6th grade peer exclusion to 15-year old depression remained significant (β=.13, p<.01), as well as the cascade path from 3rd grade prosocial behavior to 4th grade peer exclusion (β=-.07, p=.02) and the path from 5th grade prosocial behavior to 6th grade peer exclusion (β=-.09, p<.01). Transactional effects between prosocial behavior and academic competence remained significant (β=.06 to .16, p<.05). In terms of the cascade paths from early peer exclusion to later prosocial behavior, the result showed that 4th grade peer exclusion significantly predicted the decline of prosocial behavior in 5th grade (β=-.08, p<.01); the path from 3rd grade peer exclusion to 4th grade prosocial behavior was nonsignificant (β=-.03, p=.33), and the path from 5th grade peer exclusion to 6th grade prosocial behavior was also nonsignificant (β=-.03, p=.24).

Model 6 included stability paths, concurrent correlations, cascade paths from 6th grade

prosocial behavior, peer exclusion, academic competence to 15-year old depression, cascade paths from early prosocial behavior to later peer exclusion, cascade paths between prosocial behavior and academic competence, cascade paths from early peer exclusion to later prosocial behavior, and added cascade paths from early peer exclusion to later academic competence. The model fit of Model 6 was not statistically better than Model 5, $\Delta\chi^2$=5.47, Δdf=3, p=.13; the BIC of Model 6 (58945.22) was bigger than the BIC of Model 5 (58940.07). This result indicated that adding cascade paths from early peer exclusion to later academic competence did not contribute to a better model fit. Thus, Model 5 was adopted as the most plausible model in Study 2. Figure 8 shows the standardized path coefficients for the significant paths of Model 5.

Control Variable Analysis

Five control variables (gender, race, mother's education, family income-to-needs ratio, and school problem) were incorporated into the most plausible model (Model 5) separately. Control variables were allowed to correlate with the study variables in 3rd grade and to predict study variables at later time-points. When gender was incorporated into Model 5, all previously significant cascade paths remained significant. When race was incorporated into Model 5, the previously significant cascade path from 3rd grade academic competence to 4th grade prosocial behavior (β=.04, p=.17) and the cascade path from 5th grade academic competence to 6th grade prosocial behavior (β=.04, p=.17) became nonsignificant. Other previously significant cascade paths remained significant. Figure 9 shows that race (0 for non-African American and 1 for African American) was negatively correlated with 3rd grade prosocial behavior and academic competence and positively correlated with 3rd grade peer exclusion. Race also negatively

predicted 4th grade prosocial behavior, 4th grade academic competence, 5th prosocial behavior, 5th academic competence, 6th prosocial behavior, and 6th academic competence.

The similar results showed up with mother's education, family income-to-needs ratio, and school problem as control variables. When mother's education was incorporated into Model 5, the previously significant cascade path from 3rd grade academic competence to 4th grade prosocial behavior (β=.04, p=.19) and the cascade path from 5th grade academic competence to 6th grade prosocial behavior (β=.04, p=.16) became nonsignificant. Other previously significant cascade paths remained significant. Figure 10 shows that mother's education (1=bachelor's degree or above, 0=less than bachelor's degree) was significant positively correlated with 3rd grade prosocial behavior and academic competence, and also significant positively predicted 4th grade prosocial behavior, 4th grade academic competence, 5th prosocial behavior, 5th academic competence, 6th prosocial behavior, and 6th academic competence. When family income-to-needs ratio was incorporated into Model 5, the previously significant cascade path from 3rd grade academic competence to 4th grade prosocial behavior (β=.05, p=.13) and the cascade path from 5th grade academic competence to 6th grade prosocial behavior (β=.05, p=.08) became nonsignificant. Other previously significant cascade paths remained significant. Figure 11 shows that family income-to-needs ratio was positively correlated with 3rd grade prosocial behavior and academic competence, and also positively predicted 4th grade prosocial behavior, 4th grade academic competence, 5th prosocial behavior, and 5th academic competence. When school problem was incorporated into Model 5, the previously significant cascade path from 3rd grade academic competence to 4th grade prosocial behavior (β=.06, p=.06) and the cascade path from 5th grade academic competence to 6th grade prosocial behavior (β=.05, p=.06)

became nonsignificant. Other previously significant cascade paths remained significant. Figure 12 shows that school problem was negatively correlated with 3rd grade prosocial behavior and academic competence, and also negatively predicted 4th grade prosocial behavior.

3.4 Discussion

Study 2 aimed to investigate the process by which preadolescents' prosocial behavior, academic competence, and peer exclusion interweave to influence the subsequent adolescent depression. Consistent with the hypothesis, 6th grade peer exclusion directly increased depression at 15 years old. Because of the inconclusive evidence regarding the influences of prosocial behavior and academic competence on depression, specific hypotheses were not proposed. The results of Study 2 showed that the direct influences of 6th grade prosocial behavior and academic competence on depression were nonsignificant. However, there existed indirect influences. Study 2 showed that the patterns of the sequential associations among prosocial behavior, academic competence, and peer exclusion in Study 1 remained in Study 2 with adolescent depression added as the outcome variable. The general pattern in the final model revealed that across 3rd grade to 15 years old, prosocial behavior in 3rd grade decreased 4th grade peer exclusion and increased 4th grade academic competence; peer exclusion in 4th grade, in turn, negatively influenced prosocial behavior in 5th grade, and academic competence in 4th grade positively influenced prosocial behavior in 5th grade; then, prosocial behavior in 5th grade decreased peer exclusion in 6th grade; finally, peer exclusion in 6th grade increased depression at 15 years old. These developmental cascade paths were obtained over and above the covariation among characteristics at each time point, the stability in each over time, and the control of confounding variables.

No Direct Influence of Prosocial Behavior on Adolescent Depression

The result of the current study supported the evidence that prosocial behavior indirectly decreased future depression through interpersonal relationships but failed to demonstrate the

direct influence of prosocial behavior on depression. One explanation for this could be that the subtypes of prosocial behavior were not identified in the current study. It is known that prosocial behaviors include different dimensions (Carlo, Hausmann, Christiansen, & Randall, 2003), and qualitatively distinct features of particular facets of prosocial behavior may have divergent relations with depression. It is likely that some subtypes of prosocial behavior have significant effects on depression, but some may not. For example, altruistic prosocial behaviors serve as more powerful protective factors against depression than public prosocial behaviors (Davis et al., 2016). Thus, researchers should move toward more molecular assessments of prosocial behavior that examine the forms, functions, and motivations of prosocial behavior within the interactional context and their associations with depression.

In addition, the nonsignificant direct link between prosocial behavior and depression may be due to the lack of important moderators in the cascade model. For example, the research of Perren et al (2007) reveals that prosocial behavior is negatively associated with later depression for children with low levels of emotional problems, but positively associated with later depression for those with high levels of emotional problems, which means the emotional problem is a moderator between prosocial behavior and depression. The research of Bohlin et al (2000) also suggested that children with emotional problems (e.g., attachment disorder and depression) might be more likely to use prosocial strategies to gain acceptance. Therefore, it is necessary for future research to further investigate the moderators of the link between prosocial behavior and depression.

Lastly, it is reasonable to infer that the there is a curvilinear correlation rather than a linear correlation between prosocial behavior and depression, which makes the linear association

nonsignificant. Perhaps a low level of prosocial behavior would make individuals suffer from poor interpersonal relationships, which exacerbate depression, but a very high level of prosocial behavior may also induce depression by being too overly concerned for the needs and opinions of others, neglecting one's own feelings and needs, and being compliant and submissive, and thus at risk for peer abuse or victimization (Perren et al., 2007). Future research is needed to test whether there is a curvilinear correlation between prosocial behavior and depression.

No Direct Influence of Academic Competence on Adolescent Depression

Regarding the role of academic competence on depression, the present study showed that the direct influence of academic competence on depression was nonsignificant. There are some possible explanations for this finding: first, perceived academic stress, rather than academic competence, is the critical influencing factor of depression. Not only do students with academic incompetence feel stress due to academic failures, but students with academic competence may also perceive high academic stress. Some high academic achievers may have high standards for themselves and a tendency towards perfectionism. For these students, although they have above-average grades, they still want to achieve more academically and may be more likely to be frustrated and depressed if their perfectionistic expectations cannot be fulfilled. Thus, perceived academic stress may be perceived not only for low academic achievers but also for high academic achievers, though the origins of academic stress is different for these two groups.

Further, although many students perceive academic stress, the effect of perceived stress on depression is moderated by individual vulnerabilities, such as gender, genetics, cognitive

schemas, coping strategies, and personality (Abela & Hankin, 2008; Rose & Rudolph, 2006; Silberg et al., 1999). For example, adolescents who have negative cognitive schemas tend to define themselves more negatively and interpret ambiguous situations in more negative ways if they fail to achieve valued goals which makes them more vulnerable to depression as compared with students with positive cognitive schemas. Beck's (1976) cognitive theory of depression suggests that there are two negative schemas, one relates to interpersonal relationships and another relates to personal achievement. Adolescents who have negative schemas related to personal achievement would be more depressive when they experience academic stress.

In summary, future research should examine the role of perceived academic stress and individual vulnerability in the link between academic competence and depression. This future research could have meaningful implications on selecting the most vulnerable students in depression prevention programs.

Chapter Four
General Discussion

The focus of the current research was to examine the cascade effects among prosocial behavior, academic competence, and peer exclusion from 3rd grade to 6th grade, and how they are linked with depression at 15 years old. Cascade analyses allow for a better understanding of how functions and behaviors in one domain at one developmental period influence another domain at a later developmental period in an interactive, transactional, and dynamic process. The general pattern in this research revealed that prosocial behavior in 3rd grade decreased peer exclusion and increased academic competence in 4th grade; peer exclusion in 4th grade, in turn, negatively influenced prosocial behavior in 5th grade, and academic competence in 4th grade, positively influenced prosocial behavior in 5th grade; then, prosocial behavior in 5th grade decreased peer exclusion in 6th grade; and finally, peer exclusion in 6th grade increased depression at 15 years old. This pattern held for the control of covariation among characteristics at each time point, the stability in each over time, and the confounding variables. The results provided evidence for the role of cascade effects among prosocial behavior, academic competence, and peer exclusion in preadolescence and their influences on adolescent depression, which highlights the importance of utilizing developmental cascade models for identifying dynamic and cross-domain effects across time.

Contributions

The present research enriched the theoretical knowledge on the nature of the dynamic relationship between peer exclusion, prosocial behavior, and academic competence in preadolescence. First, existing literature shows that academic competence, which is a peer-

valued characteristic, may be a buffer against peer exclusion. Intervention studies also show that children who attended academic training suffer less peer difficulties (e.g., Coie & Krehbiel, 1984). However, with a developmental cascade design in the current study, the cross-lagged effects between academic competence and peer exclusion were nonsignificant, which means the link between academic competence and peer exclusion may be at least partially accounted for by the within-time covariance, across-time stability, and especially for the confounding role of prosocial behavior. The results showed that prosocial behavior and academic competence are positively correlated with each other concurrently and across time. As Dodge and Murphy (1984) argued that social behavior was the primary determinant of peer relationship, the finding that high academically achieved children are less excluded by peers may be mainly due to their appropriate social behaviors rather than academic achievement. In addition, with a developmental cascade model, this research also found that the associations among prosocial behavior, academic competence, and peer exclusion varied across 3rd grade to 6th grade. According to Sameroff and MacKenzie (2003), specific aspects of the environmental context may either gain or lose power as individuals go through time; and the effects of specific aspects of individual characteristics and behaviors on the social environment may change with time. Although each developmental stage (infancy, early childhood, middle childhood or preadolescence, early adolescence, and adolescence) has a common characteristic, there are subtle changes and differences within each developmental stage. Research studies, which report data from only two assessment waves, thereby make it impossible to discern the changes of developmental patterns. For example, in the current research, the pattern between 4th grade and 5th grade is different from the pattern between 3rd grade and 4th grade as well as the pattern

between 5th grade and 6th grade. The findings of the present research indicate that although the period from 3rd grade to 6th grade can all be seen as preadolescence, there are differences and changes within this period, and 4th grade may be a special developmental period which has been ignored before. This research also found that peer exclusion in 6th grade had a direct influence on depression at 15 years old. However, although prosocial behavior and academic competence had no direct influences on depression, they had indirect protective influences on depression through peer exclusion. It is known that the accumulation and interaction among multiple factors influences the likelihood of depression (Garber, 2006), thus, not only proximal factors but also distal factors and mechanisms deserve empirical and theoretical attention. In the current research, the cascade model shows the influencing mechanisms from distal factors (prosocial behavior and academic competence) to the proximal factor (peer exclusion), which indicates the mechanisms of how prosocial behavior, academic competence, and peer exclusion interweave to influence depression.

Moreover, findings of the current research also have profound implications for the practice in prevention science. For better designing prevention programs, it is important to study the processes, timing, and conditions of spreading and amplifying effects (Masten, 2005). The investigation of the developmental cascade of peer exclusion, prosocial behavior, and academic competence and how they are linked with adolescent depression would inform the focus and best timing of interventions to reduce adolescent depression. As hypothesized, the associations among prosocial behavior, academic competence, and peer exclusion varied across ages, which highlights the protective roles of prosocial behavior in 3rd grade and 5th grade, the protective role of academic competence in 4th grade, and the risk roles of peer exclusion in 4th grade and

6th grade for adolescent depression. These results have implications for the prevention of adolescent depression with regard to both timing and content. For example, consistent with other research demonstrating the positive effects of promoting prosocial behavior (e.g., Caprara et al., 2014; Layous et al., 2012), the current research showed that promoting prosocial behavior as early as 3rd grade may not only decrease peer exclusion and improve academic competence in preadolescence but can also create spreading protective impacts on depression at 15 years old. That is, interventions focused on promoting young children's prosocial behavior may have the profound benefit in preventing the cascade of risks of adolescent depression. According to the Positive Youth Development (PYD) program, which is an alternative approach to the prevention of depression, the enhancement of competence may mitigate the adversity of risk factors on children's mental health (McWhinnie, Abela, Hilmy, & Ferrer, 2008). Prosocial behavior, as a dimension of social competence, may effectively alleviate depression through improving academic competence and decreasing peer exclusion. With regard to timing, it is important to note that the effect of prosocial behavior on peer exclusion, which is a direct risk factor of adolescent depression, is weaker in 4th grade. This result confirmed that the effect of specific aspects of individual characteristics on the social environment may change with time. Therefore, practitioners and researchers should keep in mind that prosocial behavior intervention in 4th grade may be less effective in decreasing peer exclusion because of the physiological and psychological changes in 4th grade. Nonetheless, 4th grade may be a good time for academic intervention. As the results revealed, academic competence in 4th grade had a unique impact on 5th grade prosocial behavior after controlling the within-time covariance, across-time stability, and confounding variables (family income-to needs ratio, mother's

education, gender, race, and school problem). With new challenges and expectations on academics in 4th grade (Anderson, 2011), academic competence may be an important protective factor for students' later functioning. Specifically, interventions improving academic competence in 4th grade may protect students from the struggle and frustration from academic failure during this sensitive period, and even protect them from engaging in risk-taking behaviors and affiliating with other deviant peers.

Limitations

In spite of its contribution, the current research has some limitations that must be noted. First, the current research used a general concept of prosocial behavior rather than distinguishing subtypes of prosocial behavior and their specific links with peer exclusion, academic competence, and adolescent depression. Prosocial behaviors include different dimensions and there are differing correlates for differing types of prosocial behaviors (Carlo et al., 2003). For example, Hampson (1984) suggests that different situations elicit different behavioral reactions, at least partially differentiated by peer acceptance levels and social status. Also, children's evaluations of specific prosocial behavior vary across age. The research of Jackson and Tisak (2001) found that, compared with 7-8 and 9-10 year-olds, 11-12 year-olds did not view cooperation as a form of prosocial behavior but rather as a lack of working independently on a task. Thus, future research should move toward more specific assessments of prosocial behavior, examining the links between different subtypes of prosocial behavior and students' functioning across age. Based on it, developers and practitioners of interventions would focus on the specific forms of prosocial behavior at each developmental stage to improve students'

functioning.

Second, one disadvantage of utilizing secondary data is that we have to settle for the original measurement. The original measurement in the NICHD SECCYD dataset has some limitations. For example, depression was measured by The Children's Depression Inventory, which does not have adequate sensitivity and specificity to diagnose depression (see a review, Fristad, Emery, & Beck, 1997). In addition, the current research relied only on the mother-report method for assessing children's prosocial behavior and peer exclusion. It is known that each of the potential information sources has distinct advantages and disadvantages and may reflect different aspects of children's behavior and functioning. For example, mother ratings may be influenced by inaccurate recall or memory bias (Robins, 1963). Also, although mothers have a better understanding of their own child compared with teachers, mothers assess the child within the context of home and community rather than the context of school, and they cannot compare the behavior of their own child with other children at his or her age like teachers. Moreover, mother-report peer exclusion cannot provide the information of children's perception of peer relationship. Gest, Graham-Bermann, and Hartup (2001) found that 39% of rejected children had at least one mutual friendship and 31% of popular children did not. Thus, it is possible that some "rejected" children still perceive that they have friend support, but some "popular" children still feel lonely and isolated. Assessing how children themselves feel about their peer relations is important because these perceptions influence children's behaviors and functioning (Phillipsen, Bridges, McLemore, & Saponaro, 1999; Zimmer-Gembeck, Hunter, & Pronk, 2007). Thus, the use of mother-report as the only method assessing prosocial behavior and peer exclusion potentially limits the generalizability of the present findings. In future

research, other assessment methods (e.g., direct observation, laboratory-based assessment, teacher-report, peer-report, and self-report) should be considered in order to gain a more comprehensive picture of child adjustment.

Third, although the cascade model in this study provided important information regarding the cross-lagged associations among prosocial behavior, academic competence, peer exclusion, and adolescent depression, it is unclear whether these associations are causal. For instance, the association between two variables may be due to the fact that they both have a time trend—that is, these two variables increase or decrease over time. Or the association between two variables may due to the shared variables rather than a real relationship between them. For example, there are other social behaviors lying at the core of both prosocial behavior performance and peer status, such as strategies on initiating positive interaction and sustaining interaction therein (Hampson, 1984; Wentzel & Erdley, 1993). Besides social behaviors, other variables such as temperature, physiological disorder, and emotional regulation are also influencing factors of both prosocial behavior and peer status (see Ladd, 1999 for a review). Therefore, experimental and intervention studies are needed to more confidently determine the causal relations among prosocial behavior, academic competence, peer exclusion, and adolescent depression.

Fourth, the current research used sample size adjusted BIC as the only model fit index for the model selection. However, there are other statistical criteria that can be used to select the most plausible model, including Akaike information criterion (AIC), Bayesian information criterion (BIC), bivariate residuals (i.e., residuals>1.96), and entropy. Especially for BIC, recent research shows that it may provide the most reliable indicator on selecting models

(Nylund, Asparouhov, & Muthén, 2007). The model selection would be different when using different statistical criteria. Therefore, future research evaluating the most plausible model should based on more than one statistical criteria.

Fifth, for the control variable analysis, control variables were included one at a time. However, the control variables may be correlated with each other. The result revealed that school problem, maternal education, race, and family income-to-needs ratio were correlated with each other. The confounding effects of the covariates may be changed when they are simultaneously included in the model. Thus, future research needs to model the intersection of these contextual factors and how they relate to prosocial behavior, academic competence, peer exclusion, and depression.

Last, we need to keep in mind that the NICHD SECCYD sample is not nationally representative. For example, the NICHD SECCYD sample includes more highly educated parents and fewer minority families than the US average (NICHD SECCYD, 2003). In addition, the NICHD SECCYD data were collected decades ago, and the results may not accurately represent the current situation. Therefore, one must be cautious in generalizing the study findings to a nationwide present. Moreover, the fact that all the NICHD SECCYD sample was collected in the United States limits the generalizability of the results to other cultures. For example, academic competence may be a more important factor of peer evaluations in Asian countries where academic success is emphasized more (Ho, 1986), which means the protective role of academic competence could be more significant in Asian countries. Thus, future research should investigate whether the cascade pattern in the current research can be found in other cultures.

Conclusions

The developmental cascade model not only affords the tests of alternative theoretical models, but also makes it possible to reduce the influence of cross-time stability, within-time covariance, and confounding variables, which is beneficial to reveal the nature of developmental processes of behaviors and functions over time. This research is the first to use of the cascade models to study the dynamic associations among prosocial behavior, academic competence, and peer exclusion during preadolescence and how they are linked with adolescent depression. By applying a developmental cascade model, this research extends existing literature on the nature of the developmental processes among prosocial behavior, academic competence, and peer exclusion during preadolescence and how preadolescent prosocial behavior, academic competence, and peer exclusion interweave to influence adolescent depression. This research indicates that understanding the timing and significance of adaptive successes and failures have important implications for theory and practice. It is important for future research to replicate the findings of the present research with current, representative samples and to extend the study of cascade effects to other domains of adaptive functioning.

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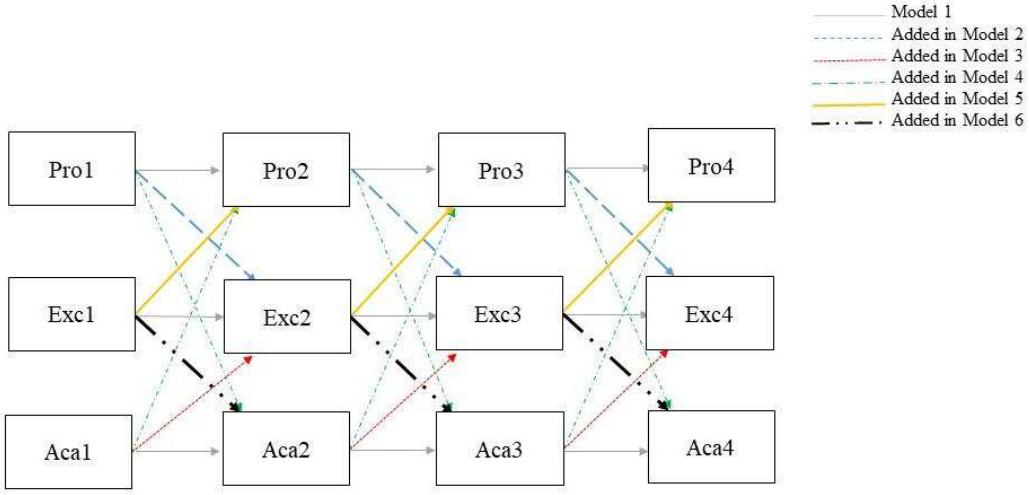

Figure 1. Conceptual presentation of hypothesized nested models in Study 1. Within-time correlations among constructs are included but not shown. Numbers denote time point of data collection (1=3rd grade; 2=4th grade; 3=5th grade; 4=6th grade). Pro=prosocial behavior; Exc=peer exclusion; Aca=academic competence.

Table 1

Hypothesized and Alternative Cascade Models in Study 1.

T1 to T2 cascade path	T2 to T3 cascade path	T3 to T4 cascade path
Model 1—Continuity model (included in all subsequent models)		
Pro1 → Pro2	Pro2 → Pro3	Pro3 → Pro4
Exc1 → Exc2	Exc2 → Exc3	Exc3 → Exc4
Aca1 → Aca2	Aca2 → Aca3	Aca3 → Aca4
Model 2—Adding paths from prosocial behavior to peer exclusion		
Pro1 → Exc2	Pro2 → Exc3	Pro3 → Exc4
Model 3—Adding paths from academic competence to peer exclusion		
Pro1 → Exc2	Pro2 → Exc3	Pro3 → Exc4
Aca1 → Exc2	Aca2 → Exc3	Aca3 → Exc4
Model 4—Adding transactional links between prosocial and academic competence		
Pro1 → Exc2	Pro2 → Exc3	Pro3 → Exc4
Aca1 → Exc2	Aca2 → Exc3	Aca3 → Exc4
Aca1 → Pro2	Aca2 → Pro3	Aca3 → Pro4
Pro1 → Aca2	Pro2 → Aca3	Pro3 → Aca4
Model 5—Adding paths from peer exclusion to prosocial behavior		
Pro1 → Exc2	Pro2 → Exc3	Pro3 → Exc4
Aca1 → Exc2	Aca2 → Exc3	Aca3 → Exc4
Aca1 → Pro2	Aca2 → Pro3	Aca3 → Pro4
Pro1 → Aca2	Pro2 → Aca3	Pro3 → Aca4
Exc1 → Pro2	Exc2 → Pro3	Exc3 → Pro4
Model 6—Adding paths from peer exclusion to academic competence		
Pro1 → Exc2	Pro2 → Exc3	Pro3 → Exc4
Aca1 → Exc2	Aca2 → Exc3	Aca3 → Exc4
Aca1 → Pro2	Aca2 → Pro3	Aca3 → Pro4
Pro1 → Aca2	Pro2 → Aca3	Pro3 → Aca4
Exc1 → Pro2	Exc2 → Pro3	Exc3 → Pro4
Exc1 → Aca2	Exc2 → Aca3	Exc3 → Aca4

Note. Within-time correlations among constructs are included in all cascade models. Numbers denote time point of data collection. Pro=prosocial behavior; Exc=peer exclusion; Aca=academic competence

Table 2. Descriptive Statistics for the Study Variables

Study measures	*N*	*M*	*SD*	*Skewness*	*Kurtosis*
Prosocial behavior					
Grade 3	1016	14.78	2.85	-1.08	1.23
Grade 4	999	14.81	3.09	-1.33	1.93
Grade 5	1005	14.86	2.79	-1.19	1.79
Grade 6	1011	14.94	2.85	-1.11	.85
Peer exclusion					
Grade 3	1018	.79	1.33	1.89	3.65
Grade 4	1018	.72	1.39	2.10	4.15
Grade 5	1012	.83	1.39	1.57	1.43
Grade 6	1018	.94	1.57	1.81	3.07
Academic competence					
Grade 3	987	35.68	9.61	-.53	-.63
Grade 4	758	35.64	9.30	-.56	-.38
Grade 5	817	37.43	8.99	-.67	-.19
Grade 6	741	38.68	8.97	-.83	.09
Depression					
Age 15	957	2.01	2.64	1.78	3.41

Table 3. Bivariate Correlations between the Main Variables across All Assessments

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Prosocial behavior															
1.Grade3	—														
2.Grade4	.62**	—													
3.Grade5	.61**	.64**	—												
4.Grade6	.59**	.61**	.68**	—											
Peer exclusion															
5.Grade3	-.27**	-.21**	-.21**	-.16**	—										
6.Grade4	-.21**	-.19**	-.20**	-.17**	.53**	—									
7.Grade5	-.15**	-.14**	-.19**	-.16**	.47**	.61**	—								
8.Grade6	-.12**	-.15**	-.20**	-.22**	.44**	.58**	.64**	—							
Academic competence															
9.Grade3	.29**	.24**	.27**	.21**	-.14**	-.14**	-.12**	-.10**	—						
10.Grade4	.22**	.19**	.18**	.14**	-.14**	-.14**	-.13**	-.12**	.64**	—					
11.Grade5	.28**	.24**	.28**	.22**	-.17**	-.17**	-.13**	-.14**	.61**	.62**	—				
12.Grade6	.27**	.32**	.33**	.31**	-.15**	-.13**	-.11**	-.12**	.59**	.59**	.61**	—			
Depression															
13. depression	-.03	-.01	-.03	-.03	.10**	.13**	.14**	.13**	.05	-.04	-.02	.05	—		
Control variables															
14. income	.19**	.19**	.22**	.18**	-.05	-.06	-.07*	-.07*	.28**	.28**	.28**	.24**	-.03	—	
15. school problem	-.13**	-.16**	-.16**	-.14**	.00	.01	.02	-.00	-.14**	-.09	-.16**	-.20**	-.01	-.37**	—

Note. All correlations are significant at $p < .01$. ** $p < .01$.

Table 4. Hypothesized Nested Structural Equation Modeling Models Tested in the Cascade Analysis of Study 1

	β	S.E		β	S.E		β	S.E
T1 to T2			T2 to T3			T3 to T4		
Model 1 Baseline								
1. Pro1 → Pro2	.64**	.03	4. Pro2 → Pro3	.65**	.03	7. Pro3 → Pro4	.67**	.02
2. Exc1 → Exc2	.53**	.03	5. Exc2 → Exc3	.60**	.03	8. Exc3 → Exc4	.63**	.03
3. Aca1 → Aca2	.67**	.02	6. Aca2 → Aca3	.67**	.02	9. Aca3 → Aca4	.63**	.03
Model 2								
1. Pro1 → Pro2	.64**	.03	4. Pro2 → Pro3	.65**	.03	7. Pro3 → Pro4	.67**	.02
2. Exc1 → Exc2	.51**	.03	5. Exc2 → Exc3	.60**	.03	8. Exc3 → Exc4	.62**	.03
3. Aca1 → Aca2	.66**	.02	6. Aca2 → Aca3	.66**	.02	9. Aca3 → Aca4	.63**	.03
10. Pro1 → Exc2	-.07*	.03	11. Pro2 → Exc3	-.03	.03	12. Pro3 → Exc4	-.09**	.03
Model 3								
1. Pro1 → Pro2	.64**	.03	4. Pro2 → Pro3	.65**	.03	7. Pro3 → Pro4	.67**	.02
2. Exc1 → Exc2	.51**	.03	5. Exc2 → Exc3	.59**	.03	8. Exc3 → Exc4	.61**	.03
3. Aca1 → Aca2	.66**	.02	6. Aca2 → Aca3	.66**	.02	9. Aca3 → Aca4	.63**	.03
10. Pro1 → Exc2	-.06	.03	11. Pro2 → Exc3	-.03	.03	12. Pro3 → Exc4	-.08**	.03
13. Aca1 → Exc2	-.05	.03	14. Aca2 → Exc3	-.03	.03	15. Aca3 → Exc4	-.02	.03
Model 4								
1. Pro1 → Pro2	.62**	.03	4. Pro2 → Pro3	.64**	.03	7. Pro3 → Pro4	.66**	.02
2. Exc1 → Exc2	.51**	.03	5. Exc2 → Exc3	.60**	.03	8. Exc3 → Exc4	.62**	.03
3. Aca1 → Aca2	.64**	.03	6. Aca2 → Aca3	.64**	.02	9. Aca3 → Aca4	.59**	.03
10. Pro1 → Exc2	-.07*	.03	11. Pro2 → Exc3	-.03	.03	12. Pro3 → Exc4	-.09**	.03
13. Aca1 → Pro2	.07*	.03	14. Aca2 → Pro3	.09**	.03	15. Aca3 → Pro4	.06*	.03
16. Pro1 → Aca2	.09**	.03	17. Pro2 → Aca3	.15**	.03	18. Pro3 → Aca4	.16**	.03
Model 5								
1. Pro1 → Pro2	.62**	.03	4. Pro2 → Pro3	.63**	.03	7. P ro3 → Pro4	.66**	.02
2. Exc1 → Exc2	.51**	.03	5. Exc2 → Exc3	.60**	.03	8. Exc3 → Exc4	.62**	.03
3. Aca1 → Aca2	.64**	.03	6. Aca2 → Aca3	.64**	.02	9. Aca3 → Aca4	.59**	.03
10. Pro1 → Exc2	-.07*	.03	11. Pro2 → Exc3	-.03	.03	12. Pro3 → Exc4	-.09**	.03
13. Aca1 → Pro2	.06*	.03	14. Aca2 → Pro3	.09**	.03	15. Aca3 → Pro4	.06*	.03
16. Pro1 → Aca2	.09**	.03	17. Pro2 → Aca3	.15**	.03	18. Pro3 → Aca4	.16**	.03
19. Exc1 → Pro2	-.03	.03	20. Exc2 → Pro3	-.08**	.02	21. Exc3 → Pro4	-.03	.02
Model 6								
1. Pro1 → Pro2	.62**	.03	4. Pro2 → Pro3	.62**	.03	7. Pro3 → Pro4	.66**	.02
2. Exc1 → Exc2	.51**	.03	5. Exc2 → Exc3	.60**	.03	8. Exc3 → Exc4	.62**	.03
3. Aca1 → Aca2	.63**	.03	6. Aca2 → Aca3	.63**	.02	9. Aca3 → Aca4	.60**	.03
10. Pro1 → Exc2	-.07*	.03	11. Pro2 → Exc3	-.02	.03	12. Pro3 → Exc4	-.09**	.03
13. Aca1 → Pro2	.06*	.03	14. Aca2 → Pro3	.09**	.03	15. Aca3 → Pro4	.06*	.03
16. Pro1 → Aca2	.08**	.03	17. Pro2 → Aca3	.14**	.03	18. Pro3 → Aca4	.17**	.03
19. Exc1 → Pro2	-.03	.03	20. Exc2 → Pro3	-.08**	.02	21. Exc3 → Pro4	-.03	.02
22. Exc1 → Aca2	-.03	.03	23. Exc2 → Aca3	-.05	.03	24.Exc3 → Aca4	.03	.03

Note. Numbers denote time point of data collection. Pro=prosocial behavior; Exc=peer exclusion; Aca= academic competence. * $p < .05$, ** $p < .01$.

Table 5. Fit Statistic for Hierarchically Nested Structural Equation Models of Study 1

Model	Cross-Domain paths	*df*	χ^2	Model Comparison	$\Delta\chi^2$	Δdf	BIC SS Adj.
1	0	45	622.39				54451.93
2	3	42	605.92	2 vs.1	16.47**	3	54442.96
3	6	39	600.33	3 vs. 2	5.59	3	54449.57
4	9	36	524.59	4 vs. 2	81.33**	6	54370.41
5	12	33	508.39	5 vs. 4	16.2**	3	54368.62
6	15	30	501.89	6 vs. 5	6.5	3	54373.80

Note. BIC SS Adj., Bayesian information criterion, sample size adjusted. ** $p < .01$

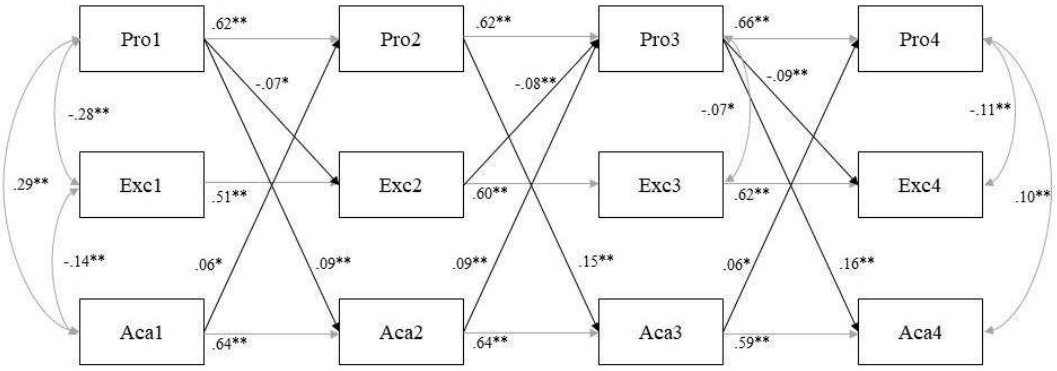

Figure 2. Standardized path coefficients for significant paths of Model 5 in Study 1. Single-headed arrows indicate the standardized path coefficients, and double-headed arrows indicate standardized covariance estimates. Numbers denote time point of data collection. Pro= prosocial behavior; Exc=peer exclusion; Aca=academic competence. * $p < .05$, ** $p < .01$.

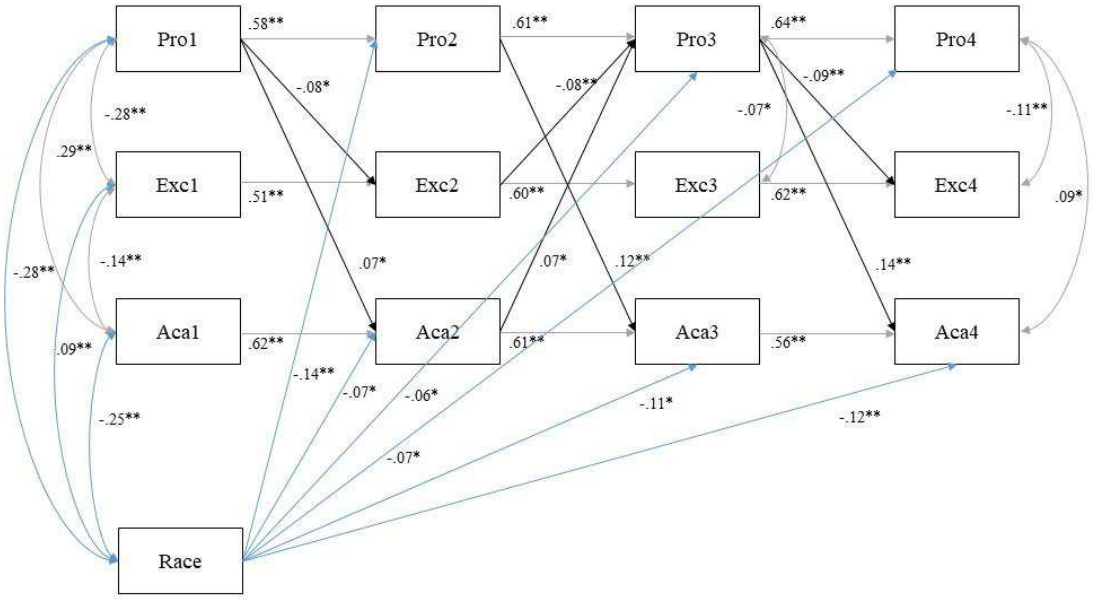

Figure 3. Standardized path coefficients for significant paths of Model 5 with Race as the control variable in Study 1. Single-headed arrows indicate the standardized path coefficients, and double-headed arrows indicate standardized covariance estimates. Numbers denote time point of data collection. Pro=prosocial behavior; Exc=peer exclusion; Aca=academic competence. * $p < .05$, ** $p < .01$.

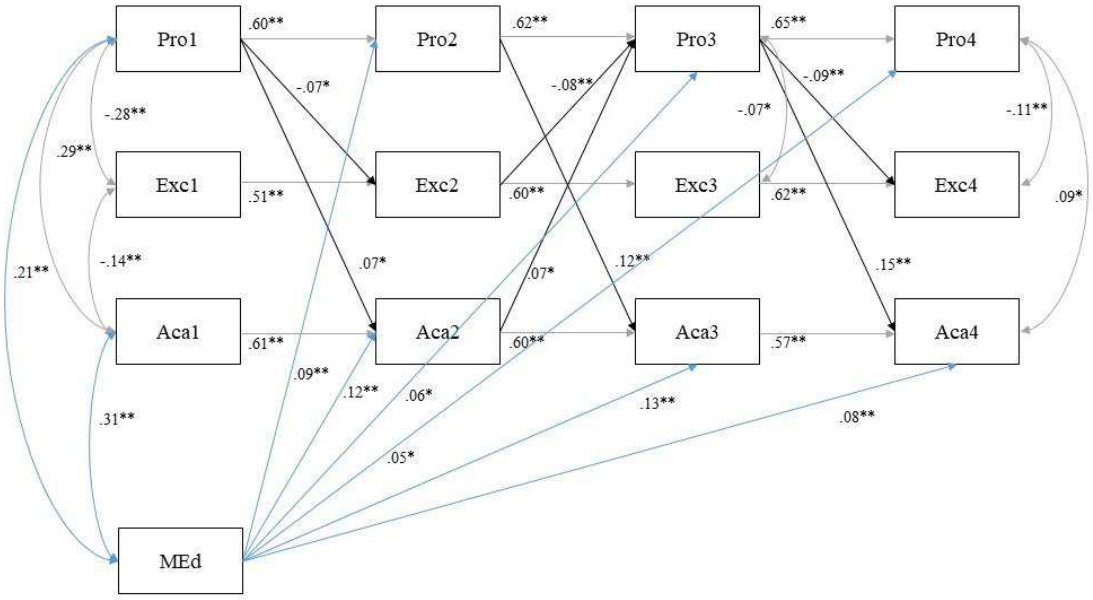

Figure 4. Standardized path coefficients for significant paths of Model 5 with Mother's education as the control variable in Study 1. Single-headed arrows indicate the standardized path coefficients, and double-headed arrows indicate standardized covariance estimates. Numbers denote time point of data collection. Pro = prosocial behavior; Exc= peer exclusion; Aca= academic competence, Med= mother's education.
* $p < .05$, ** $p < .01$.

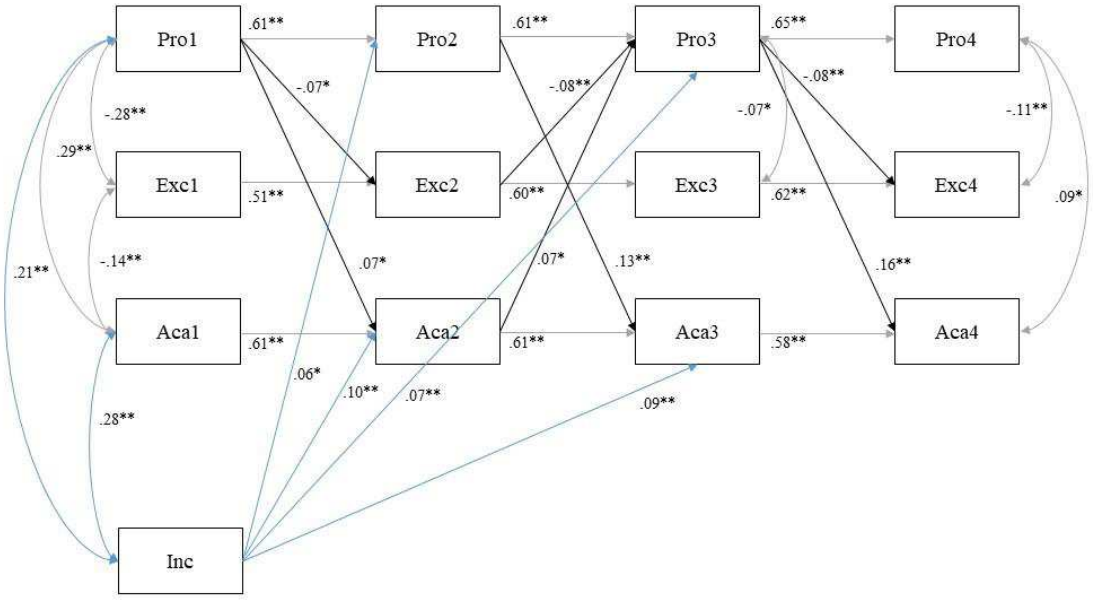

Figure 5. Standardized path coefficients for significant paths of Model 5 with family income-to-needs ratio as the control variable in Study 1. Single-headed arrows indicate the standardized path coefficients, and double-headed arrows indicate standardized covariance estimates. Numbers denote time point of data collection. Pro=prosocial behavior; Exc=peer exclusion; Aca=academic competence; Inc=Family income-to-needs ratio.

* $p < .05$, ** $p < .01$.

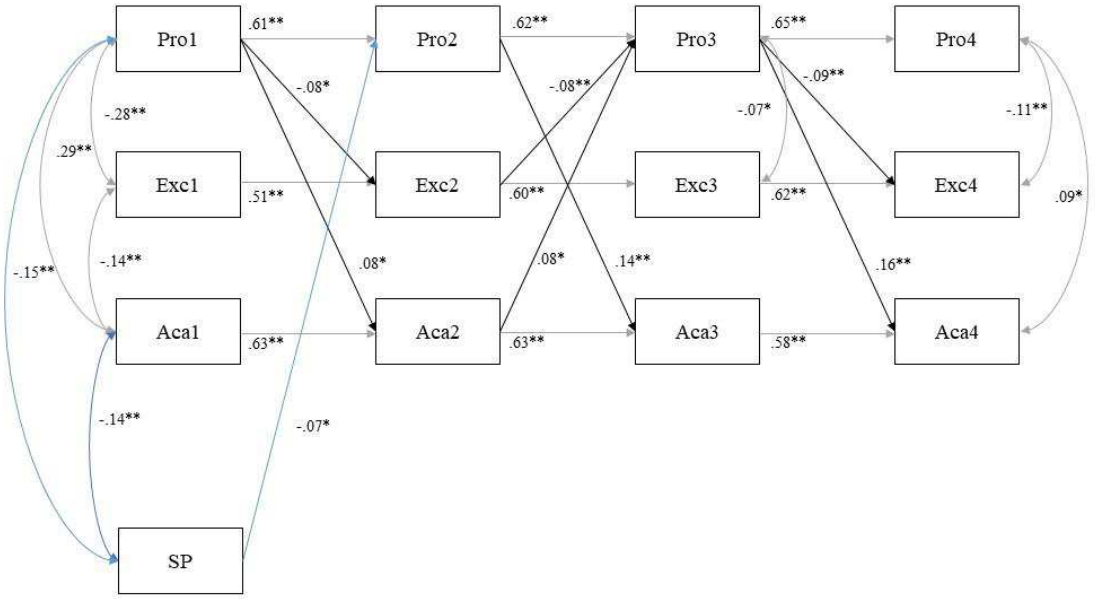

Figure 6. Standardized path coefficients for significant paths of Model 5 with school problem as the control variable in Study 1. Single-headed arrows indicate the standardized path coefficients, and double-headed arrows indicate standardized covariance estimates. Numbers denote time point of data collection. Pro=prosocial behavior; Exc= peer exclusion; Aca= academic competence; SP= school problem.
* $p < .05$, ** $p < .01$.

Table 6. Hypothesized and Alternative Cascade Models of Study 2.

T1 to T2 cascade path	T2 to T3 cascade path	T3 to T4 cascade path	T4 to T5 cascade path
Model 1—Continuity model (included in all subsequent models)			
Pro1 → Pro2	Pro2 → Pro3	Pro3 → Pro4	Pro4 → Dep5
Exc1 → Exc2	Exc2 → Exc3	Exc3 → Exc4	Exc4 → Dep5
Aca1 → Aca2	Aca2 → Aca3	Aca3 → Aca4	Aca4 → Dep5
Model 2—Adding paths from prosocial behavior to peer exclusion			
Pro1 → Exc2	Pro2 → Exc3	Pro3 → Exc4	
Model 3—Adding paths from academic competence to peer exclusion			
Pro1 → Exc2	Pro2 → Exc3	Pro3 → Exc4	
Aca1 → Exc2	Aca2 → Exc3	Aca3 → Exc4	
Model 4—Adding transactional links between prosocial and academic competence			
Pro1 → Exc2	Pro2 → Exc3	Pro3 → Exc4	
Aca1 → Exc2	Aca2 → Exc3	Aca3 → Exc4	
Aca1 → Pro2	Aca2 → Pro3	Aca3 → Pro4	
Pro1 → Aca2	Pro2 → Aca3	Pro3 → Aca4	
Model 5—Adding paths from peer exclusion to prosocial behavior			
Pro1 → Exc2	Pro2 → Exc3	Pro3 → Exc4	
Aca1 → Exc2	Aca2 → Exc3	Aca3 → Exc4	
Aca1 → Pro2	Aca2 → Pro3	Aca3 → Pro4	
Pro1 → Aca2	Pro2 → Aca3	Pro3 → Aca4	
Exc1 → Pro2	Exc2 → Pro3	Exc3 → Pro4	
Model 6—Adding paths from peer exclusion to academic competence			
Pro1 → Exc2	Pro2 → Exc3	Pro3 → Exc4	
Aca1 → Exc2	Aca2 → Exc3	Aca3 → Exc4	
Aca1 → Pro2	Aca2 → Pro3	Aca3 → Pro4	
Pro1 → Aca2	Pro2 → Aca3	Pro3 → Aca4	
Exc1 → Pro2	Exc2 → Pro3	Exc3 → Pro4	
Exc1 → Aca2	Exc2 → Aca3	Exc3 → Aca4	

Note. Within-time correlations among constructs are included in all cascade models. Numbers denote time point of data collection. Pro=prosocial behavior; Exc=peer exclusion; Aca=academic competence; Dep=depression.

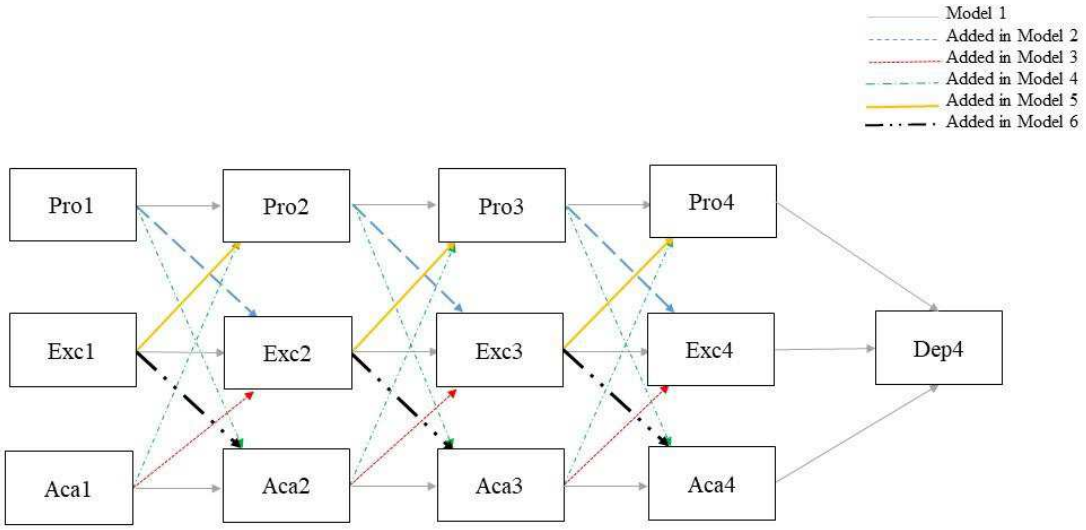

Figure 7. Conceptual presentation of hypothesized nested models in Study 2. Within-time correlations among constructs are included but not shown. Numbers denote time point of data collection. Pro=prosocial behavior; Exc=peer exclusion; Aca=academic competence; Dep=depression.

Table 7. Hypothesized Nested Structural Equation Modeling Models Tested in the Cascade Analysis of Study 2

	β(S.E)		β(S.E)		β(S.E)		β(S.E)
T1 to T2		T2 to T3		T3 to T4		T4 to T5	
Model 1 Baseline							
1. Pro1 → Pro2	.64**(.03)	4. Pro2 → Pro3	.65**(.03)	7. Pro3 → Pro4	.66**(.02)	10. Pro4 → Dep5	-.01(.04)
2. Exc1 → Exc2	.53**(.03)	5. Exc2 → Exc3	.60**(.03)	8. Exc3 → Exc4	.63**(.03)	11.Exc4 → Dep5	.13** (.04)
3. Aca1 → Aca2	.66**(.02)	6. Aca2 → Aca3	.66**(.02)	9. Aca3 → Aca4	.63**(.03)	12. Aca4→ Dep5	.06(.03)
Model 2							
1. Pro1 → Pro2	.64**(.03)	4. Pro2 → Pro3	.65**(.03)	7. Pro3 → Pro4	.67**(.02)	13. Pro4 → Dep5	-.01(.04)
2. Exc1 → Exc2	.51**(.03)	5. Exc2 → Exc3	.60**(.03)	8. Exc3 → Exc4	.62**(.03)	14.Exc4 → Dep5	.13** (.04)
3. Aca1 → Aca2	.66**(.02)	6. Aca2 → Aca3	.66**(.02)	9. Aca3 → Aca4	.63**(.03)	15. Aca4→ Dep5	.06(.03)
10. Pro1 → Exc2	-.07*(.03)	11. Pro2 → Exc3	-.03(.03)	12. Pro3 → Exc4	-.09**(.03)		
Model 3							
1. Pro1 → Pro2	.64**(.03)	4. Pro2 → Pro3	.65**(.03)	7. Pro3 → Pro4	.67**(.02)	16. Pro4 → Dep5	-.01(.04)
2. Exc1 → Exc2	.51**(.03)	5. Exc2 → Exc3	.59**(.03)	8. Exc3 → Exc4	.61**(.03)	17.Exc4 → Dep5	.13** (.04)
3. Aca1 → Aca2	.66**(.02)	6. Aca2 → Aca3	.66**(.02)	9. Aca3 → Aca4	.63**(.03)	18. Aca4→ Dep5	.06(.03)
10. Pro1 → Exc2	-.06(.03)	11. Pro2 → Exc3	-.03(.03)	12. Pro3 → Exc4	-.08**(.03)		
13. Aca1 → Exc2	-.05(.03)	14. Aca2 → Exc3	-.03(.03)	15. Aca3 → Exc4	-.02(.03)		
Model 4							
1. Pro1 → Pro2	.62**(.03)	4. Pro2 → Pro3	.64**(.03)	7. Pro3 → Pro4	.66**(.02)	19. Pro4 → Dep5	-.02(.04)
2. Exc1 → Exc2	.51**(.03)	5. Exc2 → Exc3	.60**(.03)	8. Exc3 → Exc4	.62**(.03)	20.Exc4 → Dep5	.13** (.04)
3. Aca1 → Aca2	.64**(.03)	6. Aca2 → Aca3	.64**(.02)	9. Aca3 → Aca4	.59**(.03)	21. Aca4→ Dep5	.06(.03)
10. Pro1 → Exc2	-.07*(.03)	11. Pro2 → Exc3	-.03(.03)	12. Pro3 → Exc4	-.09**(.03)		
13. Aca1 → Pro2	.07*(.03)	14. Aca2 → Pro3	.09**(.03)	15. Aca3 → Pro4	.06*(.03)		
16. Pro1 → Aca2	.09**(.03)	17. Pro2 → Aca3	.15**(.03)	18. Pro3 → Aca4	.16**(.03)		
Model 5							
1. Pro1 → Pro2	.62**(.03)	4. Pro2 → Pro3	.63**(.03)	7. P ro3 → Pro4	.66**(.02)	22. Pro4 → Dep5	-.02(.04)
2. Exc1 → Exc2	.51**(.03)	5. Exc2 → Exc3	.60**(.03)	8. Exc3 → Exc4	.62**(.03)	23.Exc4 → Dep5	.13** (.04)
3. Aca1 → Aca2	.64**(.03)	6. Aca2 → Aca3	.64**(.02)	9. Aca3 → Aca4	.59**(.03)	24. Aca4→ Dep5	.06(.03)
10. Pro1 → Exc2	-.07*(.03)	11. Pro2 → Exc3	-.03(.03)	12. Pro3 → Exc4	-.09**(.03)		
13. Aca1 → Pro2	.06*(.03)	14. Aca2 → Pro3	.09**(.03)	15. Aca3 → Pro4	.06*(.03)		
16. Pro1 → Aca2	.09**(.03)	17. Pro2 → Aca3	.15**(.03)	18. Pro3 → Aca4	.16*(.03)*		
19. Exc1 → Pro2	-.03(.03)	20. Exc2 → Pro3	-.08**(.02)	21. Exc3 → Pro4	-.03(.02)		
Model 6							
1. Pro1 → Pro2	.62**(.03)	4. Pro2 → Pro3	.62**(.03)	7. Pro3 → Pro4	.66**(.02)	25. Pro4 → Dep5	-.02(.04)
2. Exc1 → Exc2	.51**(.03)	5. Exc2 → Exc3	.60**(.03)	8. Exc3 → Exc4	.62**(.03)	26.Exc4 → Dep5	.13** (.04)
3. Aca1 → Aca2	.63**(.03)	6. Aca2 → Aca3	.63**(.02)	9. Aca3 → Aca4	.60**(.03)	27. Aca4→ Dep5	.06(.03)
10. Pro1 → Exc2	-.07*(.03)	11. Pro2 → Exc3	-.03(.03)	12. Pro3 → Exc4	-.09**(.03)		
13. Aca1 → Pro2	.06*(.03)	14. Aca2 → Pro3	.09**(.03)	15. Aca3 → Pro4	.06*(.03)		
16. Pro1 → Aca2	.08**(.03)	17. Pro2 → Aca3	.14**(.03)	18. Pro3 → Aca4	.17**(.03)		
19. Exc1 → Pro2	-.03(.03)	20. Exc2 → Pro3	-.08**(.02)	21. Exc3 → Pro4	-.03(.02)		
22. Exc1 → Aca2	-.03(.03)	23. Exc2 → Aca3	-.05(.03)	24.Exc3 → Aca4	.03(.03)		

Note. Numbers denote time point of data collection. Pro = prosocial behavior; Exc=peer exclusion; Aca=academic competence; Dep=depression. * p< .05, ** p < .01.

Table 8. Fit Statistic for Hierarchically Nested Structural Equation Models of Study 2

Model	Cross-Domain paths	*df*	χ^2	Model Comparison	$\Delta\chi^2$	Δdf	BIC SS Adj.
1	3	54	642.39				59022.93
2	6	51	626.33	2 vs.1	16.06**	3	59014.13
3	9	48	621.49	3 vs. 2	4.84	3	59020.71
4	12	45	545.26	4 vs. 2	81.07**	6	58941.87
5	15	42	530.40	5 vs. 4	14.86**	3	58940.07
6	18	39	524.93	6 vs. 5	5.47	3	58945.22

Note. BIC SS Adj., Bayesian information criterion, sample size adjusted. ** $p < .01$

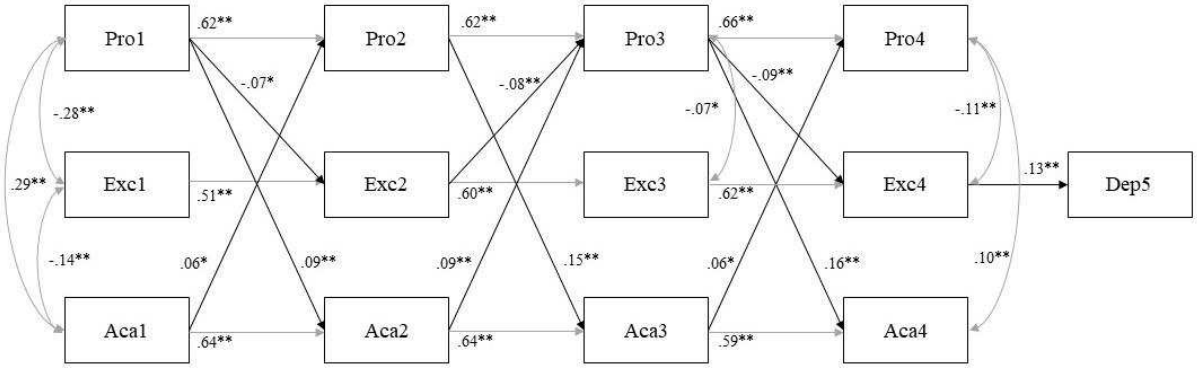

Figure 8. Standardized path coefficients for significant paths of Model 5 in Study 2. Single-headed arrows indicate the standardized path coefficients, and double-headed arrows indicate standardized covariance estimates. Numbers denote time point of data collection. Pro=prosocial behavior; Exc=peer exclusion; Aca=academic competence. * $p < .05$, ** $p < .01$.

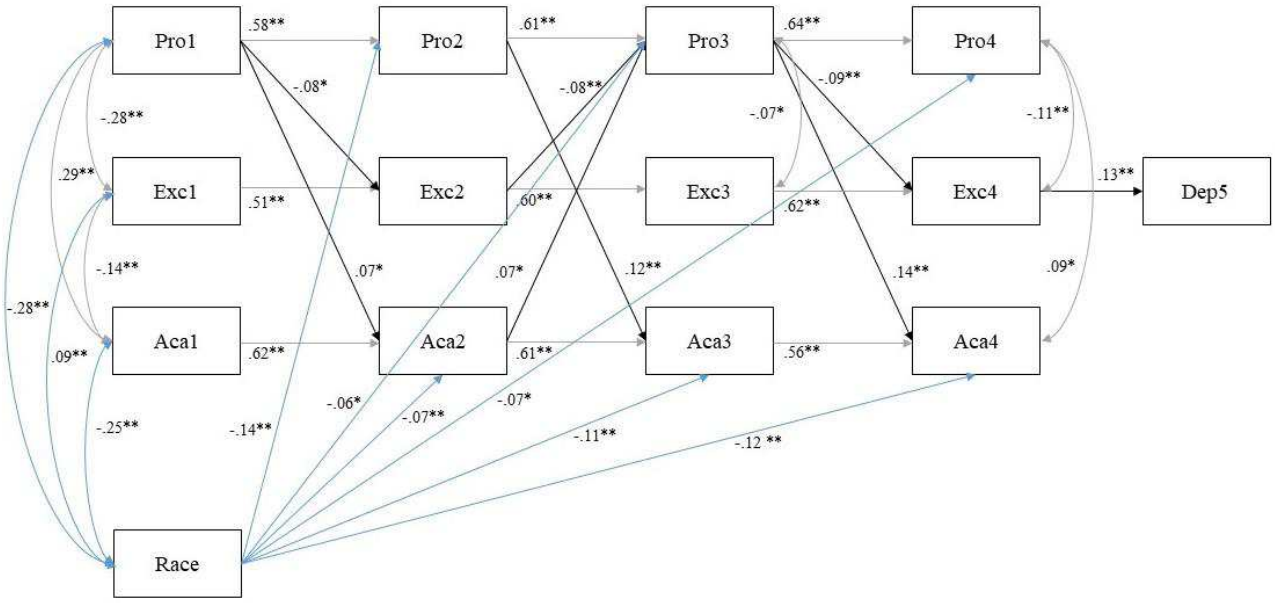

Figure 9. Standardized path coefficients for significant paths of Model 5 with race as the control variable in Study 2. Single-headed arrows indicate the standardized path coefficients, and double-headed arrows indicate standardized covariance estimates. Numbers denote time point of data collection. Pro=prosocial behavior; Exc=peer exclusion; Aca=academic competence; Dep=depression.

* $p < .05$, ** $p < .01$.

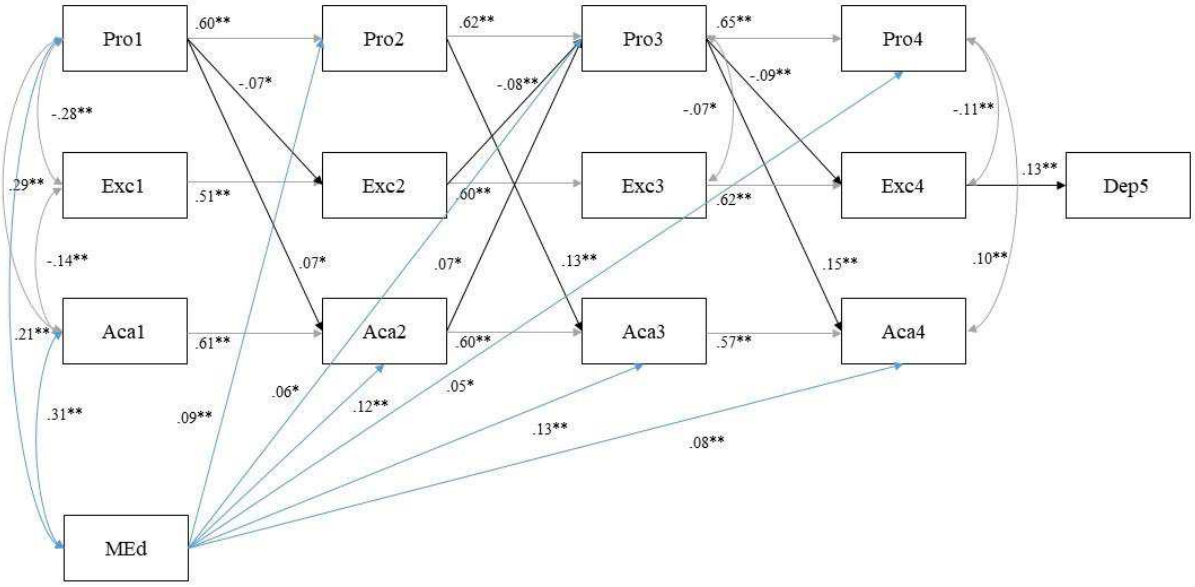

Figure 10. Standardized path coefficients for significant paths of Model 5 with Mother's education as the control variable in Study 2. Single-headed arrows indicate the standardized path coefficients, and double-headed arrows indicate standardized covariance estimates. Numbers denote time point of data collection. Pro = prosocial behavior; Exc=peer exclusion; Aca=academic competence; Dep=depression; Med= mother's education.

* $p < .05$, ** $p < .01$.

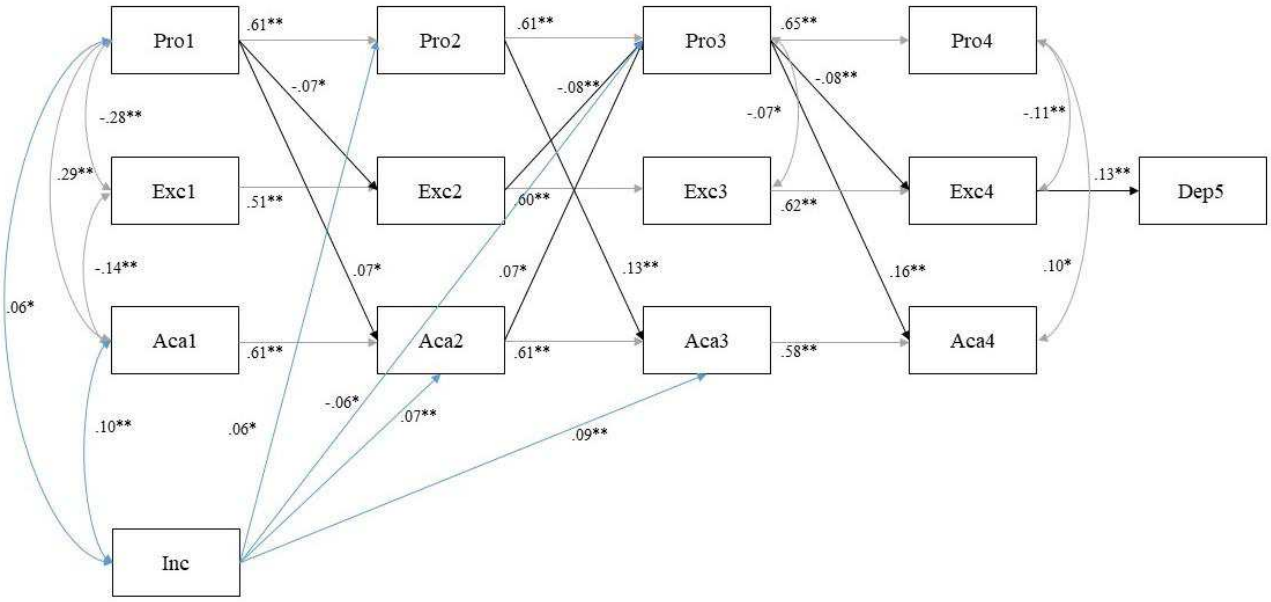

Figure 11. Standardized path coefficients for significant paths of Model 5 with family income-to-needs ratio as the control variable in Study 2. Single-headed arrows indicate the standardized path coefficients, and double-headed arrows indicate standardized covariance estimates. Numbers denote time point of data collection. Pro=prosocial behavior; Exc=peer exclusion; Aca=academic competence; Dep=depression; Inc=Family income-to-needs ratio.

* $p < .05$, ** $p < .01$.

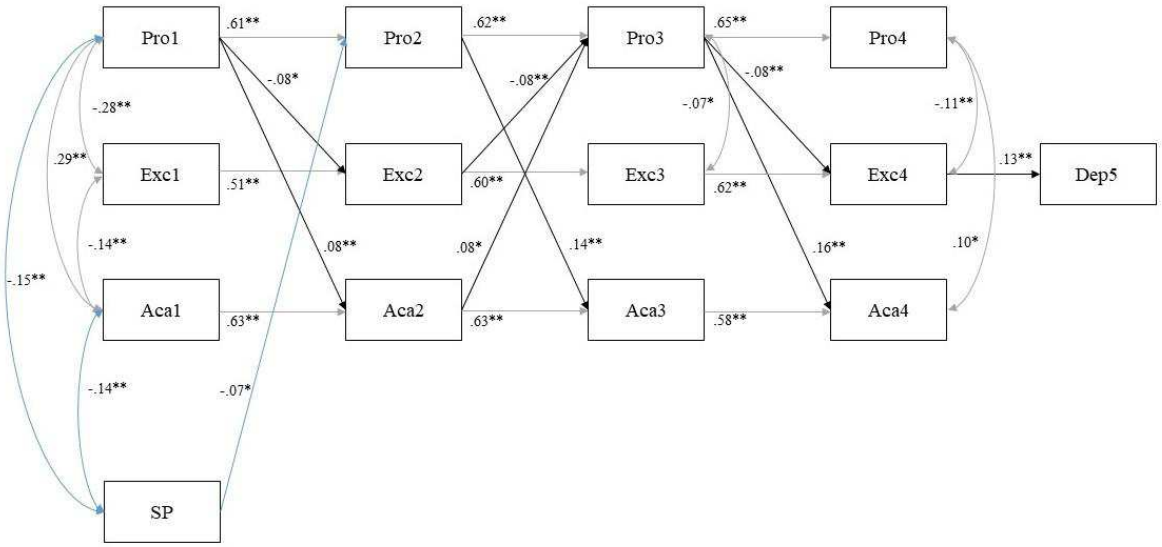

Figure 12. Standardized path coefficients for significant paths of Model 5 with school problem as the control variable in Study 2. Single-headed arrows indicate the standardized path coefficients, and double-headed arrows indicate standardized covariance estimates. Numbers denote time point of data collection. Pro=prosocial behavior; Exc=peer exclusion; Aca=academic competence; Dep=depression; SP=school problem.

* $p < .05$, ** $p < .01$.