

The Pennsylvania State University  
The Graduate School  
College of Health and Human Development

**TYPE OF SOCIAL TIE AS A DETERMINANT OF PEER  
INFLUENCES ON ACADEMIC OUTCOMES**

A Thesis in  
Human Development and Family Studies

by  
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Submitted in partial fulfillment  
of the Requirements for  
the Degree of  
Master of Science

May 2009

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## Abstract

Peers are consistently found to play an important role in children's and adolescents' development, including their academic achievement and the motivational processes that lead to achievement. The present study examines the relative role of three distinct types of peer relationships (reciprocated friendships, frequent interaction, and shared group membership) in influencing fall-to-spring changes in children's achievement motivation processes in 5<sup>th</sup> and 7<sup>th</sup> grade: specifically, academic self-concept and classroom engagement.

In a series of hierarchical linear regression analyses, main effects of friends' effort in 5<sup>th</sup> and 7<sup>th</sup> grade and frequent interaction dyad members' self-concept in 7<sup>th</sup> grade on changes in children's own characteristics suggest socialization. In other words, children's engagement and self-concept became more similar to that of their peers over time. Interactions of children's own skills with those of their friends in 5<sup>th</sup> grade and interaction dyads in 7<sup>th</sup> grade suggest social comparison. Consistent with past research, more robust evidence of influence is found in 7<sup>th</sup> grade than in 5<sup>th</sup> grade, and effects of peers appear stronger on engagement than on self-concept.

Implications are considered in terms of defining and measuring one's most "important" peer relationships, and the unique theoretical influence processes associated with each peer relationship type. Developmental and environmental shifts contributing to differences before versus after the transition to middle school are also discussed.

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## ACKNOWLEDGEMENTS

I would like to thank my adviser, Scott Gest, for his help every step of the way: exploring interests, suggesting and discussing readings, narrowing down the research questions, helping to iron out details, guiding me over the bumps in the road, and providing brilliant feedback to help me integrate theories and clarify my ideas and writing. He has been an excellent mentor throughout this process. I would also like to thank my labmates for both their instrumental and moral support allowing me to complete this thesis. In particular, despite her busy schedule, Kelly Rulison has provided endless amounts of incredibly helpful guidance, advice, and technical assistance. In addition, I thank Nilam Ram for thoughtful feedback in helping to prepare and build confidence for my defense, and Jennifer Maggs for her valuable input on my master's committee.

Lastly, I would very much like to thank my parents, sister, and friends. Their love, support, and confidence in my ability got me to where I am today and helped me to persevere through the challenges of the early years of graduate school and completing a master's thesis.



## Chapter 1

### INTRODUCTION

Peers play a prominent role in children's lives during elementary and middle school, both in terms of time spent together and potential to impact development (Berndt, 1992; Berndt & Murphy, 2002; Brown, 2004; Hartup, 1996; Kindermann & Gest, 2008; Newcomb & Bagwell, 1995; Rubin, Bukowski, & Parker, 2006). There is some evidence of peer influence on a variety of domains, including aggressive and antisocial behavior, values and interests, social skills, and academic achievement (Altermatt & Pomerantz, 2003, 2005; Bagwell, Newcomb, & Bukowski, 1998; Berndt & Keefe, 1995; Dishion, Andrews, & Crosby, 1995; Gest, Rulison, Davidson, Welsh, 2008; Kandel, 1978; Kindermann, 1993, 2007; Mounts & Steinberg, 1995; Newcomb & Bagwell, 1995; Ryan, 2001; Wentzel, McNamara Barry, & Caldwell, 2004; Wentzel & Caldwell, 1997). Peers may also influence the academic beliefs and behaviors that contribute to achievement, which will be the focus of the present study. However, the magnitude of peer influence effects is typically small, and evidence regarding age-related changes in influence effects (e.g., due to developmental shifts within the child or environmental shifts associated with school transitions) is mixed (Berndt & Murphy, 2002). One possible reason for the mixed evidence regarding peer influence effects is that peer influence is a more heterogeneous set of phenomena than is currently appreciated. Most existing studies focus on one specific type of peer relationship (e.g., close friendship) and interpret effects in terms of one theoretical influence process (e.g., social learning processes). In the present study, we aim to extend the current literature by considering multiple types of

social ties connecting peers and multiple influence processes in a longitudinal study of children before and after their transition to middle school.

Peers influence multiple facets of children's academic characteristics, including both internal academic beliefs and perceptions and external academic behaviors (Altermatt & Pomerantz, 2003, 2005; Berndt & Keefe, 1995; Berndt, Laychak, & Park, 1990; Gest, et al., 2008; Guay, Boivin, & Hodges, 1999a, 1999b; Kindermann, 1993, 2007; Ruble, Feldman, & Boggiano, 1976; Ryan, 2001; Sage & Kindermann, 1999; Wentzel, et al., 2004). *Academic self-concept* refers to children's perceptions of their own academic competence, and is believed to develop out of past achievement experiences and evaluative feedback from others (Dweck, 2002; Eccles, Adler, Futterman, Goff, Kaczala, Meece, & Midgley, 1983; Festinger, 1954; Harter, 1998; Wigfield & Eccles, 2000). *Academic engagement* refers to persistence in schoolwork, trying hard, paying attention, and concentration, and is believed to be a behavioral manifestation of children's motivation (Kindermann, 2007; Ryan, 2001). Research on achievement motivation suggests that children's perceptions of competence in part underlie their level of engagement in school, and that both of these constructs contribute to future academic choices, learning, and performance (Bandura, 1986, 1997; Eccles et al, 1983; Schunk & Pajares, 2002; Wigfield & Eccles, 2002).

To understand peer influences on children's academic development, it is necessary to recognize the various ways in which children may be linked to their peers. The most common social tie investigated in the study of peer influence is *friendship*, defined as a mutual liking relationship, typically associated with feelings of closeness and warmth (Newcomb & Bagwell, 1995). Another type of social tie is based on direct

interaction, defined by identifying the peers with whom children interact directly and most frequently (Kindermann, 2007). Lastly, children may share a social tie based on shared membership in a larger social *group*. Theoretically, a social group is a distinct unit with its own identity, and likely includes dyads tied by friendship and frequent interaction, but also includes dyads that are only indirectly linked. The influence processes associated with these different types of social ties can be discussed within the context of two broad categories. *Socialization* refers to multiple processes by which children become more similar to their peers over time. *Social comparison*, in contrast, involves perceptions of one's own skills and attitudes in terms of how they compare to those of their peers, and may result in increased differentiation between peers rather than increased similarity.

Both environmental shifts and developmental shifts within children may affect the salience of academic outcomes or the prominence of peers in children's lives. As children transition from elementary to middle school, they encounter shifts in the school and classroom structure, peer dynamics, teacher expectations, and academic challenges (Connell & Wellborn, 1991; Mac Iver, Young, & Washburn, 2002; Wigfield & Eccles, 2002). In addition, children in this age range are undergoing some important developmental shifts: physically, emotionally, socially, and cognitively (Brown, 2004; Dweck, 2002; Eccles, Midgley, Wigfield, Buchanan, Reuman, Flanagan, & Mac Iver, 1993; Lerner & Galambos, 1998; Steinberg & Morris, 2001; Susman & Rogol, 2004). Therefore, it is especially important to examine characteristics related to academic adjustment during this transition and to understand processes shaping its development.

Next, we provide a more detailed discussion of the two academic outcomes and the three types of social ties, followed by a review of theories and empirical evidence regarding achievement-related peer influence processes for each type of tie.

### *Defining Key Concepts*

#### *Academic Processes*

An extensive literature on achievement motivation provides us with several theoretical frameworks for understanding how achievement develops (Bandura, 1986, 1997; Covington & Dray, 2002; Dweck, 2002; Eccles et al., 1983, 1993; Mac Iver, et al., 2002; Ryan & Deci, 2000; Schunk & Pajares, 2002; Wigfield & Eccles, 2000, 2002). Across these frameworks, a common theme is that youths' achievement motivation is an interaction of cognitive, affective, behavioral, and environmental components. Here we focus on one cognitive and one behavioral component of achievement motivation, highlighting their prominent roles across the various theories. We pay special attention to how the environmental shift accompanying the transition to middle school as well as developmental shifts within children during this age period relate to the formation and interaction of these components.

*Academic self-concept* refers to children's beliefs about their own academic competence. Perceptions of competence are believed to derive from past achievement-related experiences and evaluative feedback from important "others" (such as parents, teachers, or peers). In addition, children assess their competence level in part by observing peers' work. For instance, if similar peers are seen to struggle with an activity, this may lower children's confidence in their own ability to complete that activity. Similarly, individuals tend to assess their own relative ability level by

comparing their own work or progress to that of their peers (Festinger, 1954; Harter, 1998; Schunk & Pajares, 2002; Wigfield & Eccles, 2000).

Middle childhood is when children first become able to use these methods of judging their competence level, and the tendency and capacity to do so is believed to increase through early adolescence (Dweck, 2002). During this time, children begin to view ability level as a relatively stable trait, and develop more accurate perceptions of ability through increased interest in social comparisons and greater sensitivity to evaluative feedback from others. Children place increasingly more weight on these reference sources, feeding into a more developed “meaning system” impacting their self-concept, their expectations for future success, and their motivation (Butler, 1999; Dweck, 2002; Ruble & Frey, 1987; Stipek & Mac Iver, 1989). Research on the development of children’s self-concept has often focused on the role of parents’ and teachers’ evaluative feedback (Guay, Marsh, & Boivin, 2003; Wigfield, Eccles, Yoon, Harold, Arbreton, Freedman-Doan, & Blumenfeld, 1997). However, peers should also play a major role in shaping children’s self-concept during middle childhood and early adolescence, serving as highly relevant comparison targets and important additional sources of feedback.

In addition to these developmental shifts within the child, the transition to middle school typically brings a variety of changes with the potential to impact children’s self-concepts. The new middle school environment brings new academic standards and expectations, as well as increased salience of social comparison through more frequent normative evaluation, more competition for grades, ability grouped classroom assignment, and a larger reference group (Eccles & Midgley, 1989; Schunk & Pajares, 2002; Wigfield & Eccles, 2002). These changes may spur children to re-evaluate

perceptions of their competence that they had previously formed in elementary school (Eccles & Midgley, 1989; Midgley, Feldlaufer, & Eccles, 1989; Wigfield et al., 1997).

Children's perceptions of competence are found to have important implications for their future academic performance. Indeed, direct relations have consistently been found between children's confidence in their ability and subsequent achievement (Anderman, Anderman, & Greisinger, 1999; Byrne & Gavin, 1996; Chapman, Cullen, Boersma, & Maguire, 1981; Flook, Repetti, & Ullman, 2005; Gest, Domitrovich, Welsh, 2005; Guay, et al., 1999a; Guay, et al., 2003; Kurtz-Costes & Schneider, 1994; Marsh, 1990; Marsh & Craven, 2006; Marsh, Trautwein, Ludtke, Koller, & Baumert, 2005; Marsh & Yeung, 1997; Valentine, DuBois, & Cooper, 2004). However, this link between self-concept and achievement is also believed to occur indirectly through the effect of perceived competence on children's motivation to engage in school, as will be discussed below.

*Academic engagement* refers to children's enthusiastic, focused, and positive involvement in academic activities. Engagement is seen as a behavioral indicator of children's school motivation (Kindermann, McCollam, & Gibson, Jr., 1996; Wigfield & Eccles, 2002), manifested as overt, observable behaviors, such as effort and persistence on schoolwork, participation in classes, and time on homework (Ryan, 2000). High levels of academic engagement produce higher quality learning, and are also believed to lead to identification with school, commitment to academic goals, and continued academic participation and achievement (Kindermann, 2007; Wigfield & Eccles, 2002).

Achievement motivation theorists posit that children's and adolescents' effort and persistence, as well as their task choices and future academic pursuits, develop largely

out of their beliefs about their abilities. For instance, Bandura's *self-efficacy theory* (1986, 1997) posits that those who feel efficacious for performance work harder, engage in tasks more willingly, persist longer in the face of difficulties, and ultimately show higher achievement (Schunk & Pajares, 2002). Here, Bandura refers to "self-efficacy", or an individual's sense of whether he or she can accomplish a task. Although this is somewhat more specific than "self-concept", it is reasonable to expect that broader perceptions of academic competence should be similarly linked to engagement in school. Likewise, as predicted by their *expectancy-value theory*, Eccles and colleagues (Eccles, et al., 1983; Wigfield & Eccles, 2000, 2002) find that children's ability beliefs and perceptions of competence in certain domains relative to others predict their expectations for success. Furthermore, individuals tend to value domains in which they perceive themselves as most competent. In turn, these expectations and values are believed to influence the behavioral components of motivation, such as choosing to engage in academic activities (Eccles et al, 1983; Wigfield & Eccles, 2000, 2002; Wigfield et al., 1997:).

Children's engagement in school is also believed to be influenced by characteristics of the school environment. Engagement is best when academic activities are driven by intrinsic motivation and choice, but as children progress from elementary to middle school, competitive grading systems increasingly drive behavior (Ryan & Deci, 2000). *Self-determination theory* (Deci & Ryan, 2008; Ryan & Deci, 2000) as well as the *stage-environmental fit theory* of achievement motivation (Connell & Wellborn, 1991; Eccles, et al, 1993) predict that intrinsically motivated engagement is fostered when basic developmental needs for autonomy, relatedness, and competency are met. In contrast,

middle school environments are often characterized by increased teacher control over academic behaviors and decreased teacher support for learning as well as more frequent negative feedback (Mac Iver, et al., 2002; Wigfield & Eccles, 2002). Once again, this highlights the importance of examining academic adjustment and its contributing factors during this age period.

These frameworks underline the close links between self-concept and engagement, and demonstrate their role in achievement. In addition to highlighting the importance of these constructs, achievement motivation theories make apparent the ways in which children's self-perceptions and choices to positively engage in school may be malleable to changing environmental contexts and peer influences. Evaluative feedback from and social comparison to peers help shape children's perceptions of competence, and the salience of peers in this process is susceptible to change with both developmental and environmental shifts. In turn, changes in self-concept have important implications for children's motivation to engage in school. And, as children's school motivation develops, beliefs and behaviors of peers may further enter into the equation by reinforcing or discouraging enthusiasm about academic activities (Furrer & Skinner, 2003; Kindermann, 2007; Sage & Kindermann, 1999; Wigfield & Eccles, 2000).

### *Types of Social Ties*

#### *Friendships*

Friendships are defined by a mutual bond and feelings of liking between two individuals. Empirical studies have identified several features of the friendship relationship that set it apart from other relationships. Friendships are typically characterized by companionship, prosocial behavior, closeness, warmth, support,



equality, and a relative lack of conflict (Berndt, 1992; Furman, 1996; Hartup, 1996). Compared with other peer relationships, friends demonstrate higher rates of talking, higher levels of positive affect, greater productivity in task-oriented activities, and more equitable conflict resolution (Hartup, 1996; Newcomb & Bagwell, 1995). In general, interactions between friends establish a common ground and are geared toward sustaining the relationship (Newcomb & Bagwell, 1995). Particularly during the early adolescent years, friendships become increasingly characterized by sharing, disclosure, closeness, trust, loyalty, and emotional support (Berndt, 2002; Newcomb & Bagwell, 1995).

Friendships serve a unique role in children's lives, and understanding this distinct role is important to understanding how and why friendships are influential.

Developmental theorists argue that individuals are driven to form and maintain friendship by an innate need to belong (Laursen & Hartup, 2002). The innate need for friendship goes beyond the desire to interact, involving also an exchange of information and meaningful benefits. Humans are predisposed to distinguish different relationship functions, and developmental theorists argue that friendships function to teach children basic principles of social exchange and managing reciprocal relationships with individuals of equivalent status. Within the context of a friendship, children learn to expect and apply reciprocity, both providing and receiving benefits (Laursen & Hartup, 2002).

The functions provided by a friendship could not logically be derived from any other relationships in a child's life. Unlike relationships with parents or siblings which are by nature hierarchical, friendship relations provide a unique opportunity for interactions with functional equals. In addition, friendships are voluntary relationships,

and so their continued survival depends on the behaviors and attitudes of both individuals. Lastly, unlike other peer relationships, friendships are by definition reciprocal and based on *mutual* liking and exchange (Laursen & Hartup, 2002).

Friendships can be measured using teacher or parent reports, direct observation of interactions by researchers, or, most commonly, using child nominations. Children are either asked directly who their friends are or asked to identify which classmates they like. Sociologists believe that anyone a child perceives as a friend is a potentially relevant source of reference for modeling and comparison, and therefore include unidirectional friendship nominations in their operational definition of friends. Developmental researchers argue, however, that mutuality is a fundamental feature of friendships and their developmental significance. Therefore, this tradition of research operationally defines friendships as only those nominations that are reciprocated (Kindermann & Gest, 2008).

#### *Interaction Dyads*

Rather than focusing on qualities of friendship relationships, Kindermann (1993, 2007) proposes that children's most significant peers are simply those with whom they interact most frequently. This argument is based in Bronfenbrenner's ecological perspective, positing that individuals' interactions with their environment are the "engine of [their] development" (Bronfenbrenner & Morris, 1998; Kindermann, 2007). Our evolutionary and biological makeup requires us to engage in interpersonal interactions in order for development to occur. According to this perspective, beginning from birth and continuing throughout the entire lifespan, interactions with significant others that occur on a regular basis and for an extended period of time are the "proximal processes" that

define individuals' development and their ability to reach their innate potential (Bronfenbrenner & Morris, 1998). Within these interactions, children and adolescents learn social skills and develop sets of beliefs, values, and behaviors to be applied across contexts (Bronfenbrenner & Morris, 1998; Dishion, et al., 1995; Dishion, Nelson, Winter, & Bullock, 2004; Kindermann, 2007; Piehler & Dishion, 2007).

Given that frequency of interaction defines this peer type and its relevance, observational methods are typically considered the gold standard of assessment for identifying interaction dyads. Unfortunately, observation methods are costly and not always feasible. In the absence of observations, the *Social Cognitive Map (SCM) procedure* developed by Cairns and colleagues (Cairns, Perrin, & Cairns, 1985) has emerged as a reasonable proxy. Children are asked to list sets of classmates who “hang around together a lot”. These peer reports are then combined in order to identify frequently interacting dyads. This method stems from the assumption that children are expert observers of their peer network because they have more direct and frequent access to social interactions among their peers than do teachers or other outside observers (Cairns et al, 1985; Gest, Farmer, Cairns, & Xie, 2003; Kindermann, 1996). An important strength of this method is that it aggregates across multiple observers (all participating children in the network) which allows for assessment of the level of agreement. In addition, we can obtain a relatively accurate representation of the entire social network even without perfect participation rates.

### *Groups*

Beyond their direct ties to friends and frequent interaction partners, children also tend to affiliate with larger social groups. A social group is believed to have an identity

of its own that is more than just the sum of its individuals, and this identity lasts even if a member leaves or joins. Group membership provides certain rewards to individuals, and a structural perspective assumes that individuals are driven to avoid tension (Heider, 1946; Thibaut & Kelley, 1959). As a result, groups may resist change and be more stable over time than dyadic relationships (Krackhardt & Handcock, 2007). It is this broader identity and aspects of group dynamics and structure that distinguish the theoretical significance of groups from that of friendship or frequent interactions (Thibaut & Kelley, 1959). Given that all members of a social group may contribute to its overall identity and structure, both directly and indirectly tied group members may be relevant to children's development.

Several major sociological theories have been proposed to explain individuals' group affiliation and group selection tendencies. For instance, Festinger (1954) argues that individuals are driven to assess their own abilities and opinions. From this perspective, the tendency for individuals to affiliate in groups and to select those most similar to themselves may be in part motivated by a self-evaluative drive to compare oneself to similar others. Alternatively, Thibaut and Kelley (1959) contend that group membership choices are simply a matter of rewards and costs. Rewards to an individual associated with group membership may include attractiveness of members, status or access to resources and activities achieved by belonging to a group, positive evaluations of the group by non-members, and positive feelings about oneself associated with feeling liked by a group. Yet a third explanation for group formation and stability is Heider's (1946) "balance theory", stating that individuals are motivated to achieve and maintain a state of balance. In a group of three entities, a state of imbalance exists when an

individual has ties to two peers but those two peers are not tied to each other. In this case, there will be a tendency for the two untied individuals to resolve the tension by forming a tie to one another. Individuals will then be motivated to maintain this balanced state over time. Indeed, in a test of Heider's balance theory, Krackhardt and Handcock (2007) found that transitive formation of friendship groups among college students took place substantially more often than would be expected by chance.

Different methods to identify social groups produce moderately concordant group solutions (Gest, Moody, & Rulison, 2006). A graph theoretical approach is typically adopted by social network analysts, in which subgroups are extracted from social network data based on certain algorithms (Wasserman & Faust, 1994). These algorithms may take the form of exact specified features of the graph, such as a set minimum number of connections to other members that each individual must have in order to be included in the group, or a maximum distance between members. Alternatively, subgroups may be identified iteratively, in which algorithms search for highest density clusters of individuals (Gest et al., 2006; Wasserman & Faust, 1994). With large social networks, these algorithm-based approaches to identifying subgroups may be relatively time-consuming.

An alternative approach, more common in developmental research, is to define groups based on similarity in patterns of relationships (Gest, et al., 2006). This approach may be more theoretically grounded: individuals who like "hanging around" with similar sets of peers tend to form groups, and perhaps forge new ties along the way with those introduced into the group by other members (Heider, 1946; Krackhardt & Handcock, 2007; Patterson, Reid, & Dishion, 1992). Typically, this approach applies factor analysis

or principal components analysis to interaction matrices, resulting in identification of distinct group structures (Cairns, et al., 1985). Children with correlated interaction profiles load on the same factor and are assumed to be part of the same group. Variations of this method are most popular among researchers who use the Social Cognitive Mapping approach, in which peer reports of who “hangs around together” are aggregated into co-nomination matrices and are assumed to provide an indication of interaction frequency among pairs and groups of children (Cairns et al, 1985, Cairns, Cairns, Neckerman, Gest, & Garipey, 1988; Gest, Davidson, Rulison, Moody, & Welsh, 2007).

*Empirical support for distinction among social ties*

The limited empirical evidence that exists supports the theoretical distinctions among these different types of social ties (Cairns, Leung, Buchanan, & Cairns, 1995; Gest, 2008; Kindermann, 2007; Urberg, Degirmencioglu, Tolson, & Halliday-Scher, 1995; Urberg, Degirmencioglu, Tolson, & Halliday-Scher, 2000). For instance, Kindermann (2007) found in one study of 6<sup>th</sup> grade children that only 30% of their interaction partners were reciprocated friends, and only slightly over half of children’s reciprocated friends were also interaction partners. Similarly, Cairns and colleagues (1995) found in a study of 4<sup>th</sup> and 7<sup>th</sup> grade students that about 60-80% of group members were also friends. Urberg and colleagues (1995) reported sparse direct friendships nominations among children within the same interaction group in 6<sup>th</sup> through 12<sup>th</sup> grade, and shared group membership with about 50 to 70 percent of children’s friends. While the amount of overlap varies across studies, the conclusion is similar: children’s friends, interaction dyads and groups are often not the same set of peers.

## *Peer Influence Processes*

Most studies of peer influence in childhood and adolescence present evidence of influence in terms of *socialization* and *social comparison* effects. Here, we aim to uncover which types of social ties are the most likely sources of socialization and social comparison, taking into account possible variations across development and across different outcome domains. Taking socialization and social comparison in turn, we first define and present relevant evidence, and then discuss how defining features of each relationship type may lend themselves to influencing peers in these ways.

### *Socialization*

Socialization refers to a broad range of influence processes in which individuals become more similar to their peers over time. A key challenge in studying socialization is choosing a measurement strategy for quantifying the degree of similarity between an individual and her peers. One strategy is to collect children's reports of their peers' characteristics, but self-reports are biased by children's own characteristics: individuals tend to perceive their friends and group members as more similar to them than they are (Jussim & Osgood, 1989). An alternative is to ask an outside observer (such as teachers) to describe a child's peer group, but outside observers may also have biases that lead to inflated estimates of similarity (Gest, 2006). The optimal strategy is to separate the process of identifying relevant peers from the process of describing those peers' characteristics (Gest, 2006). After peers (i.e., friends, interaction dyads, or group members) are identified and characterized, multiple options exist for summarizing this information and testing for socialization effects. The most common option is to average peers' scores on the variable of interest and test whether this "peer profile score" predicts

changes in a child's own score on that same variable over time. Peer profiles can also be computed by applying other functions to peer scores (e.g., proportion, maximum, sum, variance), but there is very little empirical exploration of the implications of these alternative approaches.

A large body of existing research has investigated socialization of behaviors and beliefs across academic and social domains. Children in elementary and middle school become more similar to their peers over time in the domains of academic self-concept (Altermatt & Pomerantz, 2003; Altermatt & Pomerantz, 2005), academic engagement and achievement (Altermatt & Pomerantz, 2005; Berndt & Keefe, 1995; Berndt, et al., 1990; Davidson, Molloy, Gest, & Rulison, under review; Kinderman, 1993; Mounts & Steinberg, 1995; Ryan, 2001), academic and social adjustment (Berndt, 2000; Berndt, Hawkins, & Jiao, 1999; Kandel, 1978; Wentzel & Caldwell, 1997; Wentzel, et al., 2004), and problem behaviors (Dishion, et al., 1995; Dishion, Eddy, Haas, & Spracklen, 1997). Despite this broad range of studies documenting peer socialization, the magnitude of influence, the mechanism of influence, and the developmental period most malleable to peers' influence is less clear.

*Socialization among friends.* Interactions between friends are often centered on establishing a common ground. Because it is based on mutual liking and reciprocity, friendship involves a desire to support and accommodate one another's opinions and resolve conflict in order to maintain the relationship (Hartup, 1996; Newcomb & Bagwell, 1996). Together, these features constitute a "climate of agreement" among friends, which is believed to underlie the potential for friendships to remain stable and for friends to influence each other (Hartup, 1996).



Several defining features of a friendship are believed to lead to a process of mutual influence over time (Berndt, 1992). Because friendships are voluntary relationships, friends are motivated to reach agreement, and influence among friends is rarely coercive. Instead, friends trust each other's judgment and make decisions by consensus. Friends positively reinforce opinions that they agree with, and know they face disapproval if they advocate an opposing opinion. The end result over time, then, should typically be increased similarity among friends that is a compromise between each of the individuals. Although the degree of influence varies across different behaviors and attitudes, a substantial amount of research does indeed show children becoming more similar to their reciprocated friends over time (Altermatt & Pomerantz, 2003, 2005; Berndt, et al., 1990; Berndt & Murphy, 2002; Davidson, et al., under review; Ryan, 2001).

While the "climate of agreement" among friends is believed by many researchers to increase similarity among friends, other researchers argue that the reciprocated friendship serves as a type of attachment relationship, providing a "safe base" that fosters exploration (Hinde, 1997; Kindermann & Gest, 2008). If close friendships are based on mutual support and liking, it may not make sense to assume that friends are motivated to reduce discrepancies in behavior and attitudes and conform to one another over time. Instead, friendships may simply be strong supportive bonds from which children should feel comfortable exploring their autonomy and distinct identity (Furrer & Skinner, 2003; Kindermann & Gest, 2008).

*Socialization among interaction dyads.* In contrast, Kindermann (Kindermann, 2007; Kindermann & Gest, 2008) and others argue that the unique affective-motivational

features of friendships are less relevant than the simple frequency of direct interactions with peers. From Bronfenbrenner's ecological perspective (Bronfenbrenner & Morris, 1998), individuals share activities, acquire competencies, and influence each others' behavior within the context of frequent social interactions. In this view, it is such influence mechanisms as social learning, resource control, discussion, persuasion, and coercion that drive peer influence, all of which take place within the context of direct and frequent interactions (Adler & Adler, 1995; Berndt, et al., 1990; Dishion et al, 1995; Hawley, Little, & Pasupathi, 2002; Kindermann, 2007; Sage & Kindermann, 1999).

The major theoretical rationale underlying potential influence of dyads is the opportunity that frequent interaction provides for social learning. In social learning, children model or imitate behaviors that they have learned will be reinforced by their peers (Bandura, 1986; 1997). Sage and Kindermann (1999) found that elementary school children receive selective reinforcement and punishment for classroom behaviors from their frequent interaction partners more often than from any other classmates. In this study, children who were more engaged had peer groups who were also more engaged, and received direct approval from their frequent interaction partners (such as praise or smiling) for on-task behavior. Less engaged children, on the other hand, were affiliated with social groups who were both less engaged and less likely to show approval for on-task behavior. Only non-tied peers responded to the behaviors of less engaged children, showing disapproval (such as critique or ridicule) for off-task behaviors (Sage & Kindermann, 1999).

These learning contingencies from peers likely contribute to the socialization of engagement found in a later study by Kindermann (2007). Even after controlling for

selection effects and parent and teacher influences, children who started out the year “rich” (i.e., high in academic engagement) got “richer” during the school year, and those who started out “poor” got “poorer”, through interactions with similarly engaged or disengaged group members (Kindermann, 2007). The enthusiasm of highly engaged group members may make participation in school seem more fun and rewarding for children (Furrer & Skinner, 2003). Meanwhile, disengaged peer group members may discourage academic involvement or effort and encourage more value to be placed on *non-academic* activities. Interactions with disengaged group members, then, may distract children and undermine their willingness to show enthusiasm toward schoolwork (Graham, Taylor, & Hudley, 1998).

Another related yet distinct influence mechanism requiring direct interaction is evaluative discourse among peers. Berndt and colleagues (1990) showed experimentally that adolescents who discussed academic decisions with their friends were more likely to converge on their self-reported academic beliefs after the discussion than were friends who discussed non-academic topics. Similarly, in a series of observational studies of conversations among adolescents, Dishion and colleagues found higher rates of antisocial topics during conversations among antisocial adolescents (Dishion, et al., 1995; Dishion, et al., 1997; Piehler & Dishion, 2007; Poulin, Dishion, & Haas, 1999). Antisocial adolescents were more likely than normal adolescents to initiate conversation about antisocial topics, and more likely to react positively (by smiling, laughing, or continuing conversation with a related comment) when their peer brought up an antisocial topic (Dishion et al, 1997; Piehler & Dishion, 2007). Moreover, higher rates of discussion about violence among adolescents were found to predict more violent acts by those

adolescents in the following years (Dishion et al, 1997; Dishion, McCord, & Poulin, 1999; Poulin et al., 1999). It is important to note that in each of these empirical examples, evaluative discourse took place among *friends*, and it is unknown whether these same effects would have been found for discussions among peer-identified frequent interaction dyads. However, these studies do serve to demonstrate the potentially important role of direct interactions among peers as a way of shaping children's outcomes.

*Socialization among group members.* The field of social psychology provides a very different perspective on peer influence, focusing not on affective-motivational ties or frequent interactions, but rather on group dynamics that structure and motivate behavior within larger social groups. From this perspective, peers who are merely indirectly tied through shared membership in a group may still be significant because of their contribution to the group's identity and structure. To understand the potential relevance of indirectly tied group members, we must consider several key sociological theories on group dynamics.

From a sociological perspective, individuals evaluate their group memberships based on whether they exceed a certain theoretical threshold of attractiveness as defined by the rewards and costs of maintaining them (Thibaut & Kelley, 1959). Membership in groups that are highly similar in values and attitudes will be more rewarding than membership in those that are not. Patterson and colleagues (1992) referred to this phenomenon as the "shopping hypothesis" in explaining the tendency for antisocial children to form deviant peer groups. Having peer groups with similar interests, values, and opinions allows for the maximal amount of social reinforcement for minimal social

energy. Similar peers are most likely to encourage existing interests and opinions and will not demand behaviors that are nonexistent in a child's behavioral repertoire (Dishion, Patterson, Stoolmiller, & Skinner, 1991; Thibaut & Kelley, 1959).

Similar others also serve as a needed source of reference for assessing one's own abilities and opinions (Festinger, 1954). A series of experiments consistently found that disagreement in a group led participants to eliminate discrepancy among group members as much as possible by trying to change the behaviors of dissenting group members and adjust their own behaviors accordingly (Festinger, 1954). According to Festinger (1954), these drives to comparatively evaluate oneself and reduce discrepancies will be strongest for opinions and abilities which are most apparent, important, and relevant to either the individual or to the group. For instance, when individuals were led to believe that a task was highly representative of their intelligence, they made significantly more attempts to prevent the highest scorer in the group from scoring points (Festinger, 1954).

Several aspects of group structure and dynamics lend themselves to increasing similarity in attitudes and values. As discussed earlier, Heider (1946) posits that individuals are motivated to achieve and maintain a state of balance. In addition to driving the formation of relations, states of imbalance in individuals' views toward any third entity (for instance, a school activity) may motivate individuals to relieve tension by changing their views toward the third entity (Heider, 1946). Furthermore, group membership provides individuals with certain rewards such as status and access to social activities (Thibaut & Kelley, 1959). Consequently, individuals are highly motivated to learn behaviors and attitudes that earn approval from the group. Favorable feelings toward the rewards of group membership become associated with the group itself and its

behaviors and attitudes. Similarly, individuals may define their identity in terms of their social group and take on certain characteristics as a form of in-group identification and out-group differentiation (Thibaut & Kelley, 1959). Over time, individuals internalize these learned behaviors and attitudes and start to naturally conform to them (Thibaut & Kelley, 1959).

Unlike a friendship or interaction dyad, a group has the potential for a majority opinion, which in turn allows for the development and enforcement of norms of behavior (Krackhardt & Hancock, 2007). Broadly, group norms are stable “rules” about behavior that develop out of group consensus. In fact, in order for their interactions to be predictable and comfortable, groups require some degree of norm-setting (Krackhardt & Hancock, 2007; Thibaut & Kelley, 1959). “Mac Iver and Page (1949) write of norms, ‘Without them, the burden of decision would be intolerable and the vagaries of conduct utterly distracting’ [p. 207]” (Thibaut & Kelley, 1959). Norms bring regularity into group relationships that would otherwise involve conflict and exertion of personal power, both of which are costly to group members. Once again, conformity to norms is most likely for behaviors that are relevant and visible to the group, and for behaviors or rewards that are intrinsically valuable to the individual (Thibaut & Kelley, 1959).

Considered together, a common theme underlying all of these sociological perspectives on peer influence is that basic human drives to reduce tensions and achieve a comfortable and balanced state serve as important factors motivating group members’ behaviors. Each theory assumes that individuals are motivated to affiliate with similar peers and conform to each other on certain sets of attitudes and behaviors. In these ways, groups come to develop an identity of their own and individuals become dependent on

their social groups. Groups become difficult to leave, and develop a certain level of control over the behaviors of their members (Thibaut & Kelley, 1959). While recent evidence on these theories is sparse, especially as applied to children, a rich theoretical background provides a compelling case for why group members, including those who are only indirectly tied, may be an important source of influence worth investigating.

*Summary of socialization among the three types of social ties.* Peer socialization figures prominently in studies of friendships, interaction dyads, and groups, but very different theoretical rationale underlies each type of social tie. A compelling argument can be made for socialization among groups, in terms of group norms and drives to maximize rewards and minimize costs of affiliating with social groups. It may be argued, however, that the influence of indirect ties is in effect so minimal that they are not worth studying (Kindermann & Gest, 2008). Instead, it may be that social learning in the context of frequent peer interactions is the main process through which peers socialize children's behaviors and opinions. But developmental theorists believe that the significance of peers goes beyond just interactions, and instead must be understood in terms of the qualities that define a friendship relationship, such as mutual liking and a desire to support and accommodate one another's opinions. All in all, an interesting question is posed about which mechanisms are really at play when studies consistently find increased similarity among peers.

#### *Social Comparison*

*Definitions and empirical support.* Social comparison is the process by which children form perceptions of their competence that are relative to that of their peers. As noted above, Festinger's (1954) social comparison theory contends that individuals are

innately driven to evaluate their own opinions and abilities. When objective means for assessment are unavailable, people evaluate their skills and opinions by comparing themselves to peers. Because comparison to vastly divergent peers would not provide an accurate assessment of one's own skills, social comparisons are most often made to one's most similar peers. In an experimental session assigning a task to participants and allowing them to observe the progress of others around them, participants reported comparing themselves most often with those whose progress was most similar to their own (Whittemore, 1925). Although similarity in behaviors and opinions serve as the basis for choosing a comparison target, the process of mentally contrasting ones' own abilities with those of comparison targets may make individuals more differentiated in their self-perceptions.

The most common way to assess social comparison effects is by testing whether peers' achievement level moderates the relationship between one's own achievement and self-concept. For instance, Guay et al (1999b) found that children's academic achievement positively predicted their academic self-concept, but that this prediction was weakened when friends' achievement was high and strengthened when friends' achievement was low. In this case, it was inferred that socially comparing themselves to high-achieving friends hindered children's ability to accurately assess their own skill level. Alternatively, a direct negative relationship between peers' achievement and children's self-concept has also been used to infer social comparison, such as in Marsh's tests of the "big-fish-little-pond" effect. In these studies, Marsh and colleagues find consistent support for social comparison among children and adolescents within the context of academic tracking. Students tracked in schools with a relatively higher school-



wide mean achievement level report lower self-concept than those with similar skill levels within lower achieving schools (Marsh & Parker, 1984; Marsh, 1987; Marsh & Hau, 2003; Marsh, Seaton, Trautwein, Ludtke, Hau, O'Mara, & Craven, 2008).

Presumably, these findings suggest that despite their own level of achievement, students feel worse about their competence level when contrasting themselves against higher achieving peers, and feel better about their competence level when relatively lower achieving peers are their reference for comparison.

*Social comparison among friends.* Several studies have focused on social comparison among reciprocated friends. Altermatt and Pomerantz (2005) demonstrated that children with higher-achieving reciprocated friends showed higher levels of achievement over time (suggesting socialization effects) but *lower* levels of self-concept than children with similar initial achievement levels affiliated with lower-achieving friends (suggesting social comparison effects). Similarly, Davidson and colleagues (under review) found a significant interaction between 5<sup>th</sup>-grade children's skill level and their reciprocated friends' skill level in predicting children's change in self-concept, suggesting that low-achieving children with high-achieving friends were engaging in unfavorable social comparisons.

As cited earlier, closeness is a distinguishing feature of reciprocated friendships. Indeed, three studies have specifically considered the closeness of the comparison target as a factor influencing friends' effects on children's self-concept. Huguet, Dumas, Monteil, and Genestoux (2001) asked students to identify two peers with whom they typically compare their exam grades, and to rate their level of closeness to each comparison target. In this case, "closeness" was measured with self-ratings of the "extent

to which they talk to” the peer and the “extent to which they share the same character or temperament”, considered to represent behavioral and cognitive components of closeness. Results showed “closer” peers to have the greater effect on self-concept. Similarly, two studies comparing reciprocated to non-reciprocated friends found significant effects on self-concept only among reciprocated friends (Altermatt & Pomerantz, 2003; Guay, et al., 1999b). These studies provide evidence that reciprocated friends may indeed be a common source of social comparison, although their relative significance compared to interaction dyads or groups has not been directly addressed.

*Social comparison among interaction dyads.* Empirical studies testing interaction dyads as comparison targets are limited, as is research that would implicate interaction dyads as a more likely source of comparison than other peers. However, observational studies of children’s social comparisons to classmates do suggest some ways in which direct interactions are involved in the comparison process. In several studies, observations of children’s interactions in classroom and experimental settings revealed social comparison through glances at other children’s progress, evaluative comments on peers’ work, overt performance comparison comments, and peer progress inquiries (Altermatt, Pomerantz, Ruble, Frey, & Greulich, 2002; Butler, 1989a, 1989b; Frey & Ruble, 1985; Pomerantz, Ruble, Frey, & Greulich, 1995; Ruble, Boggiano, Feldman, & Loebel, 1980). Competitive experimental settings yielded higher rates of glances at peers’ work, leading to sacrifices in mastery performance and task interest in favor of relative ability assessment (Butler, 1989a, 1989b). Furthermore, social comparison verbal exchanges were seen across all age groups studied (both lower and upper elementary school), although overt social comparative comments were replaced by more subtle

techniques and comments as children got older (Altermatt, et al., 2002; Frey & Ruble, 1985; Pomerantz, et al., 1995). It is unknown whether the interactions observed in these studies tended to be among classmates with whom children regularly interacted most frequently as opposed to random peers. But, given that direct interactions are the defining characteristic of dyads, findings from these observational studies provide evidence of ways in which interaction dyads may serve as a plausible context for social comparison.

*Social comparison among groups.* Festinger's (1954) discussion of social comparison focused specifically on groups, arguing that individuals choose to affiliate in groups of similar peers *because* of a drive to self-evaluate through social comparison. Concrete evidence of social comparison to group members influencing individuals' self-perceptions is fairly limited, although Festinger's (1954) original paper provides some useful examples. For instance, in one study, participants perceived their own performance as "good" or "very good" when told that they performed on par with the group average, while confidence in their performance was lower when led to believe it was vastly divergent from the group (Hoppe, 1930). In another study, individuals' self-reported "level of aspiration" on an experimental task was based more consistently on the performance of "others like themselves" than on fluctuations in their own performance (Dreyer, 1953). Similarly, participants in experimental settings doubted their own judgment upon hearing that others in their group disagreed with their opinions (Festinger, Gerard, Hymovitch, Kelley, & Raven, 1952).

These experiments provide important evidence that self-concept can be shaped through social comparison to others, and demonstrate how these dynamics may occur

within group settings. However, it is important to note that the examples of social comparison cited here involved experimentally contrived “groups” as opposed to self-selected groups, and therefore may or may not be applicable to social groups as defined in the present study. Instead, the theoretical potential of naturally-occurring social group members as comparison targets rests more on the significance of similarity as a defining feature organizing and driving group behavior. Similarity seems to be a key component of choosing comparison targets, and all of the group dynamics theories described above assert that similarity among members is a primary basis for the formation and maintenance of social groups (Festinger, 1954; Heider, 1946; Krackhardt & Handcock, 2007; Patterson et al, 1992; Thibaut & Kelley, 1959).

*Summary of social comparison among three types of social ties.* Theory and evidence on social comparison suggests that one’s “most similar peers” are the ideal reference group for comparison, which could implicate all three types of social ties as possible candidates. Indeed, theory and evidence describing the processes involved in social comparisons – such as questioning peers about their work (Frey & Ruble, 1985) or using a group average to assess one’s own abilities (Festinger, 1954) – provide some background from which to infer that any of the three peer types may serve as plausible comparison targets. However, existing empirical evidence is clearly strongest for friendships, documenting changes in children’s self-concept as a result of reciprocated friends’ achievement levels and highlighting the importance of closeness (Altermatt, et al., 2003, 2005; Guay, et al., 1999b, 2003; Huguet, et al., 2001). At this point, research specifically examining self-differentiation dynamics among interaction dyads or group members is scarce, and hypotheses about the role of these peers may be tentatively

inferred from what is known about the process of social comparison, but are primarily speculative.

### *Implications for Peer Influences on Academic Outcomes*

The role that each type of social tie plays in children's development should depend upon the characteristic under study. Careful consideration of the different theoretical perspectives allows us to make some inferences about what to expect in studying peer influences on academic outcomes.

In considering the implications of friendship research, we return once again to its defining features. Friendships are largely based on mutual liking and support. The implications of these features for socialization among friends have been interpreted two different ways. Some researchers argue that if friendships are based on support, then friends need not feel pressured to agree on all issues, and are an unlikely context for reinforcement and punishment of particular behaviors. Instead, friends should feel free to express and explore diverging behaviors and beliefs about school. However, the more common view taken by developmental researchers is that the features of a friendship contribute to a "climate of agreement" among friends, in which they trust each other's judgment and reach agreement by consensus. Based on past empirical literature supporting the latter view, we expect reciprocated friends to play a role in socializing children's academic behaviors, such as engagement.

Given that reciprocated friendships are also defined by intimacy, closeness, and sharing, friendships are likely the context in which we should see influence on more personal beliefs and goals, such as academic self-concept. As friends may share both triumphs and concerns about school with one another, it is likely that children in a

friendship relationship may have unique insight about each other's academic strengths and weaknesses. In this sense, children's reciprocated friends may be an especially accurate and relevant social comparison source for forming their own self-concepts.

Both interaction dyads and indirectly tied peers make up a child's social group. Dyads are the members of a social group with whom children most frequently interact, and their expected mechanisms of influence are focused around modeling, selective reinforcement, and shared activities. Theories of group dynamics suggest that social groups as a whole also operate through reinforcement of conformity, as adoption of norms of behavior is required for groups to function comfortably and be rewarding to their members. Both Festinger (1954) and Thibaut and Kelley (1959) posit that selective reinforcement and conformity to norms are most likely for behaviors that are most visible and relevant to the individual or to his peers. Presumably, level of school engagement would be both highly visible and relevant to a child's classmates (Kindermann, 1993; 2007). Both theory and empirical evidence, then, support socialization of observable behaviors, such as engagement, by dyad members as well as indirectly tied group members.

No studies have yet directly examined social comparison among dyads. However, from observational studies of children glancing at and inquiring about classmates' progress, we may tentatively infer evidence of social comparison operating among interacting dyads. In contrast, without closeness or frequent interaction, indirectly tied group members should be a fairly irrelevant comparison group for accurately assessing one's own skills. Therefore, we should expect directly but not indirectly tied

group members to be a potential source of social comparison impacting children's impressions of their own competence level.

On the other hand, social groups as a whole are thought to serve as a source of identity shaping individuals' views of themselves. In this sense, we might expect individuals to form self-concepts *in line with* the identity of their group. In fact, Thibaut and Kelley (1959) argue that a major role of similarity-based group membership is validation of each other's self-perceptions. In such a case, children's social groups – including both their directly tied interaction dyads and indirectly tied group members – may serve as a source of socialization for their self-concepts.

### *The Present Study*

As discussed earlier, previous research on peer influence has typically chosen one method of assessing social ties and has demonstrated increased similarity or social comparison to that particular type. However, the conceptual and empirical distinctions between the different types of social ties are associated with distinct theoretical reasons for influence. By considering the defining characteristics of each peer type and some longstanding theories of influence among these peers, we may be able to uncover which types of social tie are the more likely sources of socialization or social comparison. If specific social ties emerge as more relevant than another within a particular context, this may provide some insight into the influence mechanisms at play.

In the present study, we expand on previous research by simultaneously exploring the role of reciprocated friends, interaction dyads, and group members in influencing children's academic outcomes before and after their transition to middle school. Specifically, we test whether the academic engagement and self-concept of children's

reciprocated friends, frequent interaction partners, and indirectly tied group members differentially predict fall-to-spring changes in children's own self-concept and engagement in 5<sup>th</sup> and 7<sup>th</sup> grade. Tests are run separately for each academic outcome, each grade level, and each influence process (socialization and social comparison). Increased similarity among children and their peers is used to infer socialization processes, and interactions of children's own skills with the skills of their peers are used to infer social comparison.

In this study, we address two research questions. First, are children's academic outcomes socialized by each peer type, such that the academic engagement and academic self-concept of each peer type in the fall provide unique prediction of children's own academic engagement and self-concept in the spring? For reasons explained above, we expect socialization of academic engagement among children's reciprocated friends, interaction dyad members, and indirectly tied group members. We also expect socialization of academic self-concept by both directly tied interaction dyads and indirectly tied group members. Second, do children socially compare to each subset of peers, such that an interaction of their own academic skills with the skills of each peer type uniquely predicts changes in academic self-concept over the course of a school year? We expect to find evidence of social comparison to reciprocated friends and interaction dyads to influence children's academic self-concept, but do not expect social comparison to indirectly tied group members.



## **Chapter 2**

### **METHODS**

#### *Participants*

Data for this study are drawn from the Middle School Transition Project, a five-year cohort-sequential longitudinal study investigating children's peer networks, social and academic characteristics, and perceptions of school and the school environment as they transition from elementary to middle school. When the longitudinal study began in Fall of 2001, participants were enrolled in grade 3, 4 or 5 in a small, working-class community in central Pennsylvania. Each cohort participated in the Fall and Spring of every school year through the spring of 7<sup>th</sup> grade. Participation rates across all waves were high, ranging from 92-95% of enrolled students. For the present study, data are drawn from all three cohorts when the students were enrolled in fifth and seventh grade only. These time points allow for a direct comparison of elementary to middle school students with data from all three cohorts available at each time point. The 467 students (216 girls, 251 boys; 99% Caucasian) present in both fall and spring of either or both of the targeted grades make up the sample included in the present analyses.

#### *Procedure*

This project originated as a component of a Safe Schools/ Healthy Students grant obtained by the school district. In October and May of each school year, teachers and students completed group-administered surveys lasting 45 minutes, supervised by the researchers. Several weeks prior to each survey date, parents of all children enrolled in the targeted grades received a letter describing the study and were asked to sign and return a form if they did not wish their student to participate in the survey. Students

were also free to decline to participate on the day of the assessment.

### *Measures*

*Reciprocated friends.* Children were provided with a roster of all students in their class (in 5<sup>th</sup> grade) or grade (in 7<sup>th</sup> grade), and were asked to list their friends. Students were allowed to list as many classmates as they wanted. Of the classmates that a student listed as friends, those who also listed that student as a friend were considered “reciprocated friends”. For the purposes of this study, we include only reciprocated (as opposed to uni-directional) friends. Our analyses on friends’ influence are limited, then, to those children who had reciprocated friends in the fall of 5<sup>th</sup> grade (337/381) and 7<sup>th</sup> grade (388/417). Mean number of reciprocated friends in 5<sup>th</sup> grade was 3.70 (SD = 2.11), and mean number of reciprocated friends in 7<sup>th</sup> grade was 3.80 (SD = 2.29).

*Social-Cognitive Maps (SCM) & co-nomination matrices.* Students were also asked to list groups of children who “hang around together a lot”. Children were not required to fill all the space, but were encouraged to think of as many groups as possible. These reports were aggregated across students to construct a symmetrical co-nomination matrix at each time point, in which the rows and columns represented all individuals currently in the network and each cell represented the number of times two students had been named together. The diagonal of the matrix contains the total number of times each student had been named to a social group. Extensive classroom observations have been used to validate this method, finding observed interaction frequency to correlate positively and reliably with the co-nomination matrices (Gest, et al., 2003). (See Cairns and Cairns (1988) and Gest, et al. (2003) for a complete description of the Social Cognitive Mapping procedure and its validity.) These co-nomination matrices were

analyzed to identify frequently interacting dyads and to identify larger peer group structures, as described below.

*Peer-nominated interaction dyads.* Using an approach developed by Kindermann (1993) for identifying frequent interaction dyads, these co-nomination matrices were treated as contingency tables in which each cell has an observed value and an expected value. Expected values were calculated based on the total number of times each of the two individuals was named at all (i.e., marginal totals). Binomial  $z$  tests were then used to determine whether the observed value differed significantly from the expected value. For cells in which the observed value was significantly greater than the expected value at an alpha level of .05, the two corresponding individuals were classified as an “interaction dyad”. For cases in which the probabilities were too small for the  $z$  test, an approximation was calculated using Stirling’s formula (see von Eye, 1990). Our analyses are limited to those children with at least one interaction dyad member in the fall of 5<sup>th</sup> grade (361/381) and 7<sup>th</sup> grade (393/417). The mean number of interaction partners identified per child was 3.36 (SD= 1.87) in 5<sup>th</sup> grade and 4.75 (SD = 2.78) in 7<sup>th</sup> grade.

*Peer-nominated groups.* Each of the co-nomination matrices was analyzed with principal components analysis. Social groups were identified as any principal components with an eigenvalue greater than 1.0 and containing at least three students with factor loadings greater than 0.32 after varimax rotation. This factor loading cutoff was used to ensure that individuals shared at least 10% of the variance in their nominations with their groups. Individuals were then classified as belonging to any groups with whom they had factor loadings above 0.30. In addition, children who did not meet this criteria for any group but who had been named to a group at least twice were

classified with whichever group they loaded on most strongly. The remaining children had been named to a social group less than twice and were classified as isolates. This approach to identifying group members is analogous to that used by Bagwell, Coie, Terry, and Lochman (2000), which follows in a longer line of research that has similarly used factor analytic approaches to identify group structures. Our analyses are limited to those children with at least one group member in the fall of 5<sup>th</sup> grade (368/381) and 7<sup>th</sup> grade (411/417). The mean number of peers sharing group membership with a child was 5.33 (SD = 2.46) in 5<sup>th</sup> grade and 9.30 (SD = 5.32) in 7<sup>th</sup> grade.

*Self-reports.* Academic self-concept was measured with four items drawn from Harter's (1982) Self-Perception Profile for Children. Students chose which of two statements was truer for them, then indicated whether the statement was "sort of true" or "really true". The four statements corresponding to positive *Academic Self-Concept* were: feel very good at school work; feel just as smart as other kids their age; almost always figure out the answers; and do very well in their class work. Across the 5<sup>th</sup> and 7<sup>th</sup> grade assessments included in the present study, these items formed an internally consistent composite scale ( $\alpha = .74$  to  $.85$ , with means ranging from 2.9 to 3.3 on the 1 to 4 scale). Z-scores were computed to standardize scores within classroom in 5<sup>th</sup> grade and within grade in 7<sup>th</sup> grade. Refer to table 1 for means, standard deviations, and correlations of unstandardized fall and spring academic self-concept scores.

*Teacher ratings.* Teachers responded to a series of items drawn from existing, well-validated rating scales, such as the Social Health Profile (CPPRG, 1999). Teachers indicated whether they agreed or disagreed with each of the 32 statements about various aspects of children's adjustment (1 = strongly disagree, 5 = strongly agree). For the

present study, we focus on two of the scales derived from a factor analysis of the 32 items: academic effort and academic skills. *Academic effort* was computed as the mean of four items: works hard at school, shows poor effort [reversed], does best s/he can at schoolwork, does not try hard at schoolwork [reversed]. Across the fall and spring of 5<sup>th</sup> and 7<sup>th</sup> grade, teacher-rated academic effort items formed an internally consistent composite scale ( $\alpha = .93$  to  $.95$ , with mean ratings ranging from 3.30 to 4.20 on the 1 to 5 scale). *Academic skills* were also computed as the mean of four items: good at reading, good at math, good at writing, and good at science. Across the fall and spring of 5<sup>th</sup> and 7<sup>th</sup> grade, teacher-rated academic skill items formed an internally consistent composite scale ( $\alpha = .87$  to  $.92$ , with mean ratings ranging from 3.10 to 3.60 on the 1 to 5 scale). Once again, z-scores were computed to standardize scores within classroom in 5<sup>th</sup> grade and within grade in 7<sup>th</sup> grade. Refer to table 1 for means, standard deviations, and correlations among unstandardized fall and spring academic effort and skills scores.

*Peer Profile Scores.* We computed scores to represent the academic characteristics of each subset of children's peer network. The standardized scores of children's reciprocated friends, interaction dyads, and group members were each averaged separately to compute *academic self-concept* scores, *academic effort* scores, and *academic skills* scores for each type of social tie (e.g., friends' self-concept; interaction dyads' self-concept; group members' self-concept). These scores were used to test for similarity between children and their peers as well as the influence of each social tie type.

#### *Data Analysis Plan*

As a first step, we compute the correlations between children's own scores and the mean scores of those peers with whom they shared each type of social tie (Tables 2,

3, and 4). These correlations provide us a sense of the concurrent similarity between children and their peers, as well as the degree of similarity among the different peer types. To the extent that correlations among the social tie types are not perfect, we see support for our assertion that children's reciprocated friends, interaction dyads, and group members are somewhat non-overlapping subsets of their peer network. To ensure that correlations among predictor variables did not yield problems of multicollinearity, tolerance and variance inflation factors were also computed with each regression analysis.

To examine each type of peer influence process (socialization and social comparison), we ran a series of five linear regression models, separately for 5<sup>th</sup> grade and 7<sup>th</sup> grade and for each outcome. Within each regression equation, children's spring academic outcome scores were predicted from their own fall scores as well as the corresponding peer profile scores. Children's own fall scores were included in the equations so that prediction of children's spring scores from fall peer profile scores could be interpreted as *changes* in children's academic characteristics as a function of peers' characteristics. In Models 1, 2 and 3, the predictive value of each peer type was tested separately; and in Model 4 all three peer scores are included simultaneously as predictors to provide the strictest test of each peer type's independent contribution. Because interaction dyads and groups were based on the same measurement operation (peer-nominated groups) and therefore have especially highly correlated peer profile scores, it may be hard for either of these two predictors to emerge as unique when included together in the model (in other words, the test of unique influence may be too strict). Consequently, to avoid an error of inference about the independent effects of each, a fifth

“trimmed” model is run that included only dyadic-level relationships (reciprocated friends versus interaction dyads).

Socialization will be examined by conducting a series of linear regression analyses in which children’s spring scores on academic self-concept and academic effort are predicted by their own fall scores and the corresponding peer profile scores. The equation for the final combined model predicting children’s spring academic self-concept from children’s own fall academic self-concept as well as academic self-concept of each peer type in the fall will be:

$$\begin{aligned} \text{Spring Academic Self-Concept}_i = & \beta_0 + \beta_1 (\text{Fall Academic Self-Concept}_i) + \beta_2 \\ & (\text{Reciprocated Friends' Self-Concept}_i) + \beta_3 (\text{Interaction Dyads' Self-Concept}_i) + \\ & \beta_4 (\text{Group Members' Self-Concept}_i) + \varepsilon_i \end{aligned}$$

In this equation,  $\beta_0$  represents the constant or intercept, and  $\beta_{1-4}$  are the standardized regression weights representing the relative contribution of each of the independent predictor variables (children’s fall self-concept score and peer profile scores for self-concept) in accounting for variance in children’s academic self-concept in the spring, and  $\varepsilon_i$  represents the error variance that is unexplained by the regression equation.

Similarly, the equation for the final model predicting children’s spring teacher-rated academic effort from children’s own fall teacher-rated academic effort as well as each peer types’ academic effort in the fall will be:

$$\begin{aligned} \text{Spring Academic Effort}_i = & \beta_0 + \beta_1 (\text{Fall Academic Effort}_i) + \beta_2 (\text{Reciprocated Friends' Effort}_i) + \beta_3 \\ & (\text{Interaction Dyads' Effort}_i) + \beta_4 (\text{Group Members' Effort}_i) + \varepsilon_i \end{aligned}$$

Significant regression weights for any of the peer profile variables in either equation are interpreted as socialization effects of that particular peer type influencing within-year changes in children's academic characteristics.

Social comparison will also be examined by conducting a series of hierarchical linear regression analyses. For these analyses, children's academic self-concept in the spring serves as the dependent variable. Students' individual fall score for *academic skill* will be entered at step 1, fall peer scores for *academic skills* will be entered at step 2, and interactions between children's skills and their peers' skills for each of the three peer categories will be entered at step 3. Once again, these analyses will be run separately for the 5<sup>th</sup> and 7<sup>th</sup> grade. The equation for the final combined model predicting children's spring academic self-concept from children's own fall skills, peers' fall skills, and interactions between children's own and peers' fall skills will be:

$$\begin{aligned} \text{Spring Academic Self-Concept}_i = & \beta_0 + \beta_1 (\text{Fall Academic Skills}_i) + \beta_2 (\text{Reciprocated} \\ & \text{Friends' Skills}_i) + \beta_3 (\text{Interaction Dyads' Skills}_i) + \beta_4 (\text{Group Members' Skills}_i) + \beta_6 - \\ & (\text{Academic Skills}_i * \text{Reciprocated Friends' Skills}_i) + \beta_7 (\text{Academic Skills}_i * \text{Interaction} \\ & \text{Dyads' Skills}_i) + \beta_8 (\text{Academic Skills}_i * \text{Group Members' Skills}_i) + \varepsilon_i. \end{aligned}$$

In this equation, the interaction terms are used to test social comparison processes, such that significant interaction terms will be interpreted as social comparison effects and investigated further using graphs of the interaction.



## Chapter 3

### RESULTS

#### *Preliminary Analyses: Correlations and Tests of Multicollinearity*

*Correlations.* To assess the degree of similarity between children and their peers, as well as among the different social tie types, we began by computing correlations among the peer profile scores. These correlations were run for academic self-concept, skill, and effort for both 5<sup>th</sup> and 7<sup>th</sup> grade.

Results suggested that similarity in academic domains among children and their reciprocated friends, dyad members, and group members varied considerably across academic domain, grade in school, and type of social tie (see vertical and horizontal boxes in Tables 2, 3 and 4) Similarity to socially tied peers was more common in the domains of academic skill (median  $r = .31$ , ranging from .06 to .59) and academic effort (median  $r = .24$ , ranging from .06 to .42) than academic self-concept (median  $r = .12$ , ranging from -.11 to .18). Similarity to peers was also more common among children in 7<sup>th</sup> grade (median  $r = .37$ , ranging from .13 to .59) than 5<sup>th</sup> grade (median  $r = .09$ , ranging from -.11 to .16), and equally strong with reciprocated friends, interaction dyads, and group members (median  $r = .145, .145, .155$ , respectively).

Results also reveal moderate to strong correlations among the different peer types. The median correlation in academic characteristics among children's reciprocated friends, interaction dyads, and group members was about .66 (median  $r = .52$  in 5<sup>th</sup> grade and  $r = .69$  in 7<sup>th</sup> grade), ranging from .46 to .85. Highlighting the usefulness of the 5<sup>th</sup> "trimmed" regression model, interaction dyads and group members were most similar to each other (median  $r = .72$ ), while correlations between friends and interaction dyads

(median  $r = .56$ ) or between friends and group (.51) are relatively weaker. Median correlations were similar across the three outcomes: academic self-concept, academic skills, and academic effort (median  $r = .56, .69, .66$ , respectively). See tables 2, 3, and 4 for a complete list of correlations. Simultaneously entering all three highly correlated peer types into the regression analyses provide strict tests of the unique influence of each peer type.

*Tests of multicollinearity.* The moderate to strong correlations among the peer type scores run the risk of masking noteworthy peer effects due to large portions of shared variance when all three peer predictors are entered simultaneously into the model. However, based on established diagnostic cutoff values (multicollinear if tolerance is less than .10 or if variance inflation factor is greater than 10; Kutner, Nachtsheim, Neter, & Wasserman, 2004), none of these predictors are multicollinear. Tolerance values ranged from .207 to .995, well above the cutoff of .10, and VIF statistics ranged from 1.021 to 4.838, well below the cutoff of 10.

Separate tests of each independent variable, as well as trimmed regression analyses in which social group members are removed from the equation, provide further insight into the predictive value of each peer type.

#### *Peer influence*

*Socialization.* As predicted, results indicated some modest evidence of within-year socialization processes influencing academic self-concept (Table 5). Among 7<sup>th</sup> graders, the academic self-concept scores of reciprocated friends (Model 1 standardized  $\beta = .108, p < .01$ ) and interaction dyadic partners (Model 2  $\beta = .093, p < .05$ ) each significantly predicted changes in children's own self-concept, and the academic self-

concept of children's group members approached significance ( $\beta = .066, p < .10$ ). However, when all peer profile scores were entered simultaneously, interaction dyads' profile score emerged as significant ( $\beta = .117, p < .05$ ). The "trimmed" model comparing friends to interaction dyads also showed a trend toward socialization by interaction dyads ( $\beta = .080, p < .10$ ). Among 5<sup>th</sup> graders, there was no evidence of self-concept socialization effects in either the separate or combined tests.

Results provide more robust evidence of within-year socialization processes influencing children's academic effort (Table 6). Results are clearest for 7<sup>th</sup> graders. When tested separately for 7<sup>th</sup> graders, significant effects emerged for each of the three peer profile scores predicting changes in children's effort ( $\beta = .161, p < .001$  for reciprocated friends,  $\beta = .142, p < .001$  for interaction dyads, and  $\beta = .136, p < .001$  for group members). When all three peer types were entered simultaneously into the model, only the unique influence of children's reciprocated friends on changes in children's academic effort emerged as statistically significant ( $\beta = .114, p < .05$ ). Trimming group members from the equation in model 5 yields the same results ( $\beta = .108, p < .05$  for reciprocated friends).

Results from the 5<sup>th</sup>-grade effort models appear to be a weaker prelude to the same pattern of results found for 7<sup>th</sup> graders. In the separate tests by peer type, reciprocated friends' effort significantly predicted children's 5<sup>th</sup> grade effort (Model 1  $\beta = .075, p < .05$ ), while interaction dyads' and group members' effort each only approach significance ( $\beta = .063, .059$ , respectively,  $p < .10$ ). Although none of the peers' effort scores significantly predict children's spring effort in the combined 5<sup>th</sup> grade models,

reciprocated friends continue to make the largest contribution of approximately the same magnitude seen in the separate test.

*Social Comparison.* When tested individually, analyses revealed a statistically significant interaction term for reciprocated friends in 5<sup>th</sup> grade ( $\beta = .136, p < .05$ ), which may be interpreted as a social comparison effect of these peers on children's academic self-concept (Table 7). When all three peer types are tested together in Model 4, once again, only reciprocated friends approach significance ( $\beta = .116, p < .10$ ). Including just the two dyadic level relationships together in the "trimmed" Model 5, the same results emerge ( $\beta = .108, p < .10$  for interaction of skills with reciprocated friends' skills).

The 7<sup>th</sup> grade models yield a different pattern of results. In the separate tests by peer type, the only significant interaction term suggesting social comparison effects was that of interaction dyads ( $\beta = .114, p < .05$ ). No significant interaction terms emerge in either of the combined tests (models 4 or 5). However, the interaction term for interaction dyads again provides the largest contribution to the model, of a similar weight to that seen in the individual model for interaction dyads (model 2).

To interpret the interactions, we used a common approach recommended by Cohen, Cohen, West, and Aiken (1983) in which changes in children's academic self-concept were plotted as a function of peers' skill level, dichotomized into relatively low (-1 SD) and highly (+1 SD) skilled peers. Separate lines for low versus highly skilled children demonstrate how the influence of peers' skill levels on children's self-concept varies depending on children's own skill level. Figure 1 depicts the interaction of children's skills with the skills of their reciprocated friends in 5<sup>th</sup> grade. Figure 2 represents the interaction of children's academic skills with those of their interaction

partners in 7<sup>th</sup> grade. In both cases, high-achieving children consistently have a higher self-concept than low achieving children, with the self-concept of high-achieving children always falling above zero and that of low-achieving children always below zero. However, the difference in self-concept between low- and high-achieving children appears to be most pronounced when children have high-achieving peers. High-achieving children have an even higher self-concept when their peers are also high-achieving, suggesting that peers' skill level simply determine how much children's self-concept will improve. The already low self-concept of low-achieving children, on the other hand, suffers most when their peers are high-achieving.

## Chapter 4

### DISCUSSION

Results demonstrate that changes in children's academic self-concept and effort may be predicted by their peer relationships in both 5<sup>th</sup> and 7<sup>th</sup> grade, and provide some evidence for both socialization and social comparison processes. However, findings also support our hypothesis that the relevance of these influence processes vary by age group, outcome, and type of social tie under investigation. Broadly, in support of views taken by most developmental researchers, the characteristics of children's direct dyadic ties (reciprocated friends and interaction dyads) emerged as more significant predictors of change than did their indirectly tied group members. This was true for tests of both socialization and social comparison. Interestingly, which dyadic tie mattered most varied across influence process, outcome, and grade level, suggesting potentially unique roles of both reciprocated friends and interaction dyads. In addition, findings suggest stronger influence of peers in 7<sup>th</sup> grade than in 5<sup>th</sup>, and greater peer influence on effort than on self-concept.

#### *Socialization*

Consistent with past research, results demonstrate that children in 5<sup>th</sup> and 7<sup>th</sup> grade become more similar to their peers over time, both in academic self-concept and engagement in school. More specifically, there is evidence to suggest that each of the three peer types may be involved in socializing academic outcomes, but the relative importance of each peer type varies by outcome and grade in school.

*Self-Concept.* Consistent with our hypothesis, interaction dyads emerged as the most relevant source for socializing children's self-concept during 7<sup>th</sup> grade. This finding

was consistent across both the individual prediction by interaction dyads' self-concept and the combined prediction by all three peer types. It is further reinforced by findings that children's self-concept is also predicted in 7<sup>th</sup> grade by the *skill* level of their interaction dyads. Past research and theory suggest that social groups may serve as an important source of children's identity (Thibaut & Kelley, 1959), implicating both interaction dyads and group members as potentially relevant for socializing self-concept. More likely, as indicated by our present findings, it is specifically the group members with whom children directly and most frequently interact that impact how children feel about themselves.

In general, more robust findings in 7<sup>th</sup> grade suggest that children's self-concept may be more malleable to peer influence after the transition to middle school than before. Significant self-concept socialization effects emerged only in 7<sup>th</sup> grade, by interaction dyads in the combined tests and by both interaction dyads and reciprocated friends in the individual tests. This is consistent with past research suggesting that early adolescents are primed to re-evaluate their self-views upon entering middle school, perhaps due to changes in the environment and developmental shifts. The new environment brings with it new expectations and more evaluative feedback from teachers (Dweck, 2002; Mac Iver, et al., 2002; Wigfield & Eccles, 2002). Meanwhile, early adolescents are becoming increasingly aware of their peers' academic characteristics and more sensitive to feedback (Dweck, 2002). In such a case, children's self-views may be more open to influence than they were during elementary school, and their closest peers serve as a likely source of such influence.

*Effort.* Tests of socialization of effort provide support for the traditional developmental view that early adolescents' reciprocated friends are most important for socializing behaviors (Berndt, 1992; Hartup, 1996; Laursen & Hartup, 2002; Ryan, 2001). Reciprocated friends were the most significant predictor of change in effort in 7<sup>th</sup> grade and the only significant peer type in 5<sup>th</sup> grade. When included in the combined tests, reciprocated friends' contribution became the only significant predictor of 7<sup>th</sup> grade effort. Although their contribution dropped to non-significance in the 5<sup>th</sup> grade combined tests, friends still remained the largest predictor, as they did in 7<sup>th</sup> grade.

In addition to consistent evidence of effort socialization by reciprocated friends, interaction dyads and group members also emerged as significant predictors of effort in 7<sup>th</sup> grade and marginally significant in 5<sup>th</sup> grade when each relationship type was tested separately. In contrast to the "internal" domain of self-concept, the "external" domain of effort may be more open to influence from multiple types of peers. Academic engagement is an overt, observable behavior, making it a more visible group norm (Festinger, 1954; Thibaut & Kelley, 1959), more susceptible to reinforcement and punishment by frequently interacting peers (Kindermann, 2007; Piehler & Dishion, 2007; Sage & Kindermann, 1999), and a more likely topic of agreement relevant to the selection and maintenance of friendships (Berndt, et al., 1990; Patterson, et al., 1992).

Once again, we find a more robust predictive value of peers in 7<sup>th</sup> grade than in 5<sup>th</sup> for academic effort, consistent with some past research indicating that peers' influence may increase as children move from middle childhood to early adolescence (Covington & Dray, 2002; Steinberg & Morris, 2001). This may be explained in part by changing cognitive capacities and reasoning skills, which make children more aware, interested,



and accurate in their knowledge of peers' academic behaviors and more sensitive to peer feedback (Dweck, 2002; Eccles & Wigfield, 2002). In addition, some past research suggests a decrease in teacher support and an increase in peer support during early adolescence (Covington & Dray, 2002). Together, these features may account for the more substantial peer influence during early adolescence seen in the present study.

### *Social Comparison*

Also consistent with our hypothesis, we found evidence that children's self-evaluative social comparisons to both reciprocated friends and interaction dyads may have implications for their self-concept. Specifically, interactions of children's academic skills with their reciprocated friends' skills in 5<sup>th</sup> grade and interaction dyads' skills in 7<sup>th</sup> grade each reliably predicted changes in children's self-concept in their respective individual tests. Although reciprocated friends drop to marginal significance in 5<sup>th</sup> grade and interaction dyads drop to non-significance in 7<sup>th</sup> grade in the combined tests, they both remain the most substantial predictors in these models.

In both cases, graphs of these interactions suggest that a difference in self-concept between high and low achieving children is most pronounced for children with high-achieving peers. High-achieving children's self-concept appears to be highest when their peers are also high achieving, supporting the "reflected glory hypothesis" developed by Marsh and colleagues (Marsh, Kong, & Hau, 2000; Trautwein, Ludtke, Marsh, Koller, & Baumert, 2006). Specifically, it is hypothesized that high-achieving children with high-achieving peers "bask in the glory" of their peers' success, and feel better about themselves when their affiliated peers are succeeding. In contrast, low-achieving children appear to be partaking in unfavorable social comparison processes, such that

their perceptions of their own competence are lowest when high-achieving peers are their reference for comparison (Altermatt & Pomerantz, 2003; 2005; Guay, et al., 1999a; Marsh, et al., 2000; Trautwein, et al., 2006).

While evidence for these processes is apparent both before and after the transition to middle school, the peers serving as the comparison target differ across the two grade levels. Based on the present findings, it seems that children compare themselves to their reciprocated friends to gauge their own skill level in elementary school, while in middle school they socially compare to the peers with whom they interact most frequently. The relevance of reciprocated friends as a reference group in 5<sup>th</sup> grade is consistent with past research: closeness to comparison target was found to increase the relevance of a target for impacting self-concept (Altermatt & Pomerantz, 2003; Davidson, et al., under review; Guay, et al., 1999; Huguet, et al., 2001). Furthermore, with sharing, disclosure, and closeness as defining features of friendships, it seems likely that reciprocated friends should have accurate knowledge of one another's academic strengths and weaknesses (Berndt, 2002; Newcomb & Bagwell, 1995). On the other hand, the importance of interaction dyads for shaping children's self-perceptions during middle school is consistent with the findings reported above suggesting self-concept socialization by interaction dyads. It is possible that these findings represent a developmental shift in how peer relationships help define children's self-perceptions. However, more research would be needed to substantiate this trend and investigate how or why this shift occurs.

#### *Implications for Understanding the Roles of Distinct Peer Relationships*

Past theory and research have suggested multiple mechanisms by which peers may shape children's academic outcomes, which have rarely been teased apart in the

literature. However, when considering the properties of the different peer relationships, certain forms of influence may be theoretically linked to each type of social tie.

Reciprocated friendships are defined by mutual liking and are typically characterized by trust, companionship, closeness, support, and a relative lack of conflict (Berndt, 1992; Furman, 1996; Hartup, 1996; Laursen & Hartup, 2002; Newcomb & Bagwell, 1995). As such, trust in each other's judgment, a tendency to make decisions by consensus, and a motivation to maintain the friendship relationship through minimal conflict and a supportive "climate of agreement" among friends is expected to underlie the potential for friends' influence (Hartup, 1996). In this study, we found reciprocated friends to be more influential than other peers in shaping children's effort in both elementary and middle school. It may be tentatively inferred, then, that these friendship characteristics described above are the strongest peer processes contributing to the ways that children choose to engage in school. Furthermore, results suggest that reciprocated friends may serve as the primary reference for social comparison in 5<sup>th</sup> grade. In other words, friends' relative skill level showed the greatest implications for elementary school children attempting to gauge their own academic competence, perhaps due to characteristics such as closeness and intimacy that are unique to the friendship relationship (Laursen & Hartup, 2002; Newcomb & Bagwell, 1995).

Interaction dyads, in contrast, are defined by frequent contact (Kindermann, 1993; 2007). Therefore, discussions among peers as well as social learning processes are expected to drive the potential for these peers to influence each others' outcomes (Berndt, et al., 1990; Dishion, et al., 1991, 1995, 1997, 1999; Peihler & Dishion, 2007; Furrer & Skinner, 2003; Graham, et al., 1998; Kindermann, 1993; 2007; Kindermann, et al., 1996;

Sage & Kindermann, 1999). In the present study, interaction dyads emerged as most relevant for influencing self-concept through both socialization and social comparison processes, but only among early adolescents after their transition to middle school. Perhaps this peer relationship type increases in importance during middle school, with children increasingly defining their perceptions of themselves in terms of the children they “hang around with”. Similarly, it may be that developmental changes make these particular processes of influence (such as evaluative discourse and social learning) more prominent during early adolescence than they were in elementary school. Children’s discussions of values and beliefs likely become more sophisticated with age. Furthermore, as noted earlier, children become more interested in and capable of observing others’ competence levels, and more sensitive both to evaluative feedback and comparative observations (Dweck, 2002; Wigfield & Eccles, 2002). Taken together, the findings from the present study may be indicative of developmental shifts in how children perceive themselves and peers’ roles in these self-perceptions.

Lastly, past research posited group members to exert their influence through processes of group dynamics. Specifically, drives to relieve tension and to maintain access to resources were expected to motivate individuals to conform to group consensus (Heider, 1946; Krackhardt & Handcock, 2007; Thibaut & Kelley, 1959). Furthermore, social groups were hypothesized to serve as an important source of identity for individuals (Thibaut & Kelley, 1959). Because a group consensus and identity may be defined by all members of a group, it was expected that both directly and indirectly tied group members may shape individuals’ outcomes. However, the present study found minimal influence of group members on children’s outcomes. Evidence of significant

group influence emerged only in separate tests, but not in combined tests of peer influence, and dyadic social ties consistently emerged as more significant. These findings support the view held by most developmental researchers that the influence of group dynamics may be relatively trivial, and is mostly overshadowed by processes taking place more directly within dyadic peer relationships (Kindermann & Gest, 2008).

#### *Strengths, Limitations, and Future Directions*

This study has several strengths that contribute to the literature on peer relationships and academic development. One important strength is its longitudinal design with low attrition, which allowed us to examine differences before versus after the transition to middle school. The shift from elementary to middle school is accompanied by shifts in teacher expectations, level of challenges, classroom structure, and peer dynamics (Connell & Wellborn, 1991; Mac Iver, et al., 2002; Wigfield & Eccles, 2002). In addition, children in this age range are undergoing developmental changes that may impact their behaviors, self-perceptions, and relationships (Brown, 2004; Dweck, 2002; Eccles, et al., 1993; Lerner & Galambos, 1998; Steinberg & Morris, 2001; Susman & Rogol, 2004). Some research suggests that developmental needs accompanying these shifts are not met by the new school environment, and failure to meet these needs may have negative implications for children's academic and social development (Connell & Wellborn, 2001; Eccles, et al., 1993; Mac Iver, et al., 2002; Ryan & Deci, 2000). The present study provides some insight into the implications of these transitions for peer and academic processes.

The multiple methods of measurement (self-reports for identifying reciprocated friendships and self-concept, peer reports for identifying interaction dyads and social

groups, and teacher reports of academic effort and academic skills) serve as another important strength of the study. This variety in measurement methods help rule out the possibility of method variance accounting for significant associations. And, while past literature has investigated peer relationships and academic development among these and other age groups, most prior studies use one method for identifying children's "important peers", and one particular theoretical perspective to explain "peer influence" findings. By simultaneously investigating the relative influence of different types of peer relationships, we gain unique insight about which peers are most relevant for particular processes. In turn, these findings have important implications for understanding the specific influence mechanisms at play.

In comparing the relative influence of multiple types of social ties, the inclusion of social groups identified with principal components analysis serves as both a strength and limitation of this study. Within developmental literature, peer influence has typically been examined among reciprocated friends or interaction dyads. This study is among the first to add shared group membership to the equation, providing a new opportunity to consider how social psychological theories of group dynamics may be applied to research on childhood social groups.

However, the lack of previous research validating the unique features of childhood social groups identified with principal components analysis or associated psychological processes also serves as a drawback. Friendships and interaction dyads are known to be demonstrably distinct from other peer relationships. Observational studies report higher rates of talking, warmth, disclosure, support, and agreement among reciprocated friends (Berndt & Murphy, 2002; Hartup, 1996; Newcomb & Bagwell,

1995). And interaction dyads by definition are the peers with whom children interact most frequently (Kindermann, 1993). Furthermore, some of the influence processes considered in this study have been shown empirically to occur within these relationships. For instance, studies have identified higher rates of selective reinforcement of classroom behaviors by interaction dyads, and discussions among reciprocated friends resulting in higher levels of agreement (Berndt, et al., 1990; Sage & Kindermann, 1999). The nature of interactions and influence among members of the same PCA-identified social group, on the other hand, has not yet been sufficiently investigated. In the present study, we conceptualize the potential significance of social groups in terms of longstanding theories of social psychology, such as those of balance, innate drives, costs and benefits, group norms, and identification (Festinger, 1954; Heider, 1946; Thibaut & Kelley, 1959). However, these theories have received minimal attention in recent literature, and their relevance to the developmental impact of early adolescent social groups will need to be further investigated in future research.

A major limitation of the present study is that the timeframe over which peer influence processes unfold is, at this point, largely unknown within the field. In this study, our first assessment date of each school year was in late October and our second assessment in May. In terms of knowledge about peer processes, these time points are somewhat arbitrary. For instance, it may be that peers have already exerted much of their influence before the first assessment date. Similarly, we do not take into account the pre-existing length of each peer relationship. Once again, some of children's identified "reciprocated friends", "interaction dyads", or "group members" may have already exerted their influence in a previous year. Building a better understanding of the

timescale of these peer and academic processes should undoubtedly be a goal of future research.

Similarly, with no strong theoretical reason to expect these peer influence processes to vary by gender, we did not explore gender differences in the present study. Once again, this is partly representative of a general lack of knowledge about gender differences in the field of peer influence. Findings of gender differences in peer relationships have been mixed, with some contradicting and some null results on gender differences in the organization, size, and structure of girls' and boys' peer networks (Gest, et al., 2007). But within the existing literature on peer influence more specifically, gender differences have rarely been investigated. Given the prevalence of gender segregation in children's peer relationships (Maccoby, 1990, 1998), yet another important next step for the field will be greater attention to ways in which gender may moderate the strength and nature of these influence processes.

Another limitation involves challenges in the identification of distinct peer relationships and the ability to make inferences about the roles of these different relationships. While the peers who make up a child's "reciprocated friends", "interaction dyads", and "group members" are not completely overlapping subsets of the peer network, they are also not completely distinct sets of peers. A substantial portion of the peers identified as a child's "reciprocated friends" are also "interaction dyads" or "group members", and vice versa. This overlap may mask the actual significance of influence processes associated with each relationship type. Moreover, it may be that peers who would be categorized as *both* a friend and an interaction dyad carry more weight than those who are *only* friends or *only* interaction dyads, and so on. In the present analyses,



we do not distinguish peers who fall into only one social tie category from those who share multiple types of social ties. However, the inclusion of all three peer types in the final regression analyses help with the interpretation of each relationship's unique influence.

The generalizability of our findings is also somewhat limited by the rural, racially homogeneous setting for this study. Although about one-third of children attend school in similar communities to this one (Johnson & Strange, 2007), those attending much larger schools or schools with a different racial composition may have different peer experiences. Furthermore, the developmental course of academic perceptions and behaviors likely varies by school and neighborhood environment.

While findings provided support for our hypotheses overall, a couple of the results lacked the significance to draw definitive conclusions. One likely reason for this are the constraints faced in a between-person design used to investigate these research questions. Given the restrictions of our sample size and correlated predictor variables, a much larger sample size would have been needed to reliably detect significant unique influence effects within a realistic range. More specifically, a post-hoc power analysis reveals that in a linear regression with four predictors, a variance inflation factor of approximately 1.02 (at the low end of VIF statistics in our final models), and a sample size of 300, .164 is the smallest beta detectable with a commonly accepted power level of 80% (Cohen, 1988). When the variance inflation factor reaches as high as 4.84 (the highest VIF statistic encountered in our final models), the smallest detectable beta increases to .357, much higher than is reasonable to expect of peer influence effects. Considered another way, some of our marginally significant and non-significant beta

weights ranged from .08 to .231. Such values are consistent with examples cited in our literature review of similar studies of peer influence on academic outcomes, which have identified statistically significant beta coefficients ranging from .09 to .29 (Altermatt & Pomerantz, 2005; Berndt & Keefe, 1995; Kindermann, 1993, 2007; Ryan, 2001). Within the constraints of our sample size and correlated predictors, the power we have to detect statistical significance among such beta weights given an average VIF statistic of 2.19 ranges from .18 to .71, and would require a sample size of between 400 and 2000 to boost the power to 80%. Likely, previous studies that have found weak or inconsistent peer influence effects faced similar issues.

A challenge for future research, then, will be figuring out how to reliably yet realistically obtain clearer answers to the research questions investigated in the present study and achieve a more nuanced understanding of peer influence processes in general. One promising direction may be shifting to a within-person framework, involving smaller sample sizes but many more occasions of measurement. Such approaches have the potential for investigation of more micro-level processes of influence and academic development, and have the potential to provide needed insight into the timescale during which such processes truly unfold. These methods would also require careful reconstruction of measures used to assess such changes within children on a day-to-day or week-to-week basis. Clearly, some obstacles will need to be overcome before the field can move forward into this new territory. However, such gaps in our current understanding of these processes and the inconsistency of results in existing studies reveal the need for new, more sophisticated approaches to peer influence and achievement motivation research than those typically used.

Whether in the context of person-specific methodology or not, a logical next step for understanding the role of these different relationship types may be more targeted measurement techniques. For instance, more observational studies of classroom behavior among these age groups would be useful for corroborating the presence and influence of specific socialization processes, such as discussions, modeling, and selective reinforcement (Altermatt, et al., 2002; Berndt, et al., 1990; Kindermann, 2007; Sage & Kindermann, 1999). As another example, children's own reports of their comparison targets may allow more direct investigation of which peers children are selecting (friends, interaction dyads, or group members), as well as a more direct test of how social comparison processes influence children's self-concept (Huguet, et al., 2001).

Results of this study suggest differences before versus after the transition to middle school. However, it is unknown whether changes in academic development or changes in peer processes are at the root of these differences. Furthermore, these differences may emerge out of shifts external to the child (such as aspects of the new school environment) or developmental shifts within the child (such as increased cognitive capacity). In either case, it is likely that the small differences found here are representative of changing academic and social processes extending from early childhood through late adolescence. Future studies that include younger and older children, compare the impact of different school structures on the course of children's academic development, and continue to identify other ways in which peer relationships change throughout development, could help clarify our findings.

## *Conclusions*

Within the framework of two broad theories of peer influence (socialization and social comparison), we find three types of social ties differentially impacting children's academic beliefs and behaviors. In fact, socialization and social comparison are just two of several different processes of influence that may be shaping children's academic outcomes. For instance, recent research has demonstrated that children's reputations among their peers also have implications for their self-perceptions and engagement (Gest, et al., 2005; Gest, et al., 2008). In addition, the present study demonstrates that multiple distinct types of peer relationships are worth investigating. As future research continues to investigate other peer influence processes and developmental outcomes, the distinct roles of these different peer relationships should be kept in mind. This study builds upon a growing body of evidence that children's peer relationships play a key role in shaping their development. In doing so, it reveals how much remains unknown about peer relationships and academic development, and highlights the importance of gaining a deeper and more nuanced understanding of the nature of these processes.

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## APPENDIX

### Tables and Figures

Table 1  
*Correlations, Means and Standard Deviations for Academic Self-Concept, Teacher-Rated Academic Skills, and Teacher-Rated Academic Effort in the Fall and Spring of 5<sup>th</sup> and 7<sup>th</sup> grade*

	Academic Self-Concept		Teacher-Rated Academic Skill		Teacher-Rated Academic Effort	
	Fall	Spring	Fall	Spring	Fall	Spring
Academic Self-Concept						
Fall	--	.62	.37	.38	.36	.31
Spring	.69	--	.38	.39	.37	.32
Academic Skills						
Fall	.41	.39	--	.82	.69	.57
Spring	.39	.41	.74	--	.61	.63
Academic Effort						
Fall	.35	.28	.61	.56	--	.79
Spring	.33	.37	.56	.68	.66	--
Means (SD)						
5 <sup>th</sup> Grade	3.11 (.74)	3.17 (.73)	3.47 (.92)	3.48 (.92)	3.94 (.92)	3.90 (.95)
7 <sup>th</sup> Grade	3.12 (.73)	3.04 (.77)	3.26 (.70)	3.30 (.83)	3.85 (.91)	3.66 (1.00)

*Note.* Inter-correlations are above the diagonal for 5<sup>th</sup> graders and below the diagonal for 7<sup>th</sup> graders. Means are based on unstandardized scores, with child-reported academic self-concept on a 1 to 4 scale, and teacher-reported academic skills and effort on a 1 to 5 scale.

Table 2

*Academic Self-Concept: Similarity between Children and their Reciprocated Friends, Interaction Dyad Members, and Group Members in 5<sup>th</sup> and 7<sup>th</sup> Grade.*

	Academic Self-Concept		Reciprocated Friends' Self-Concept	Interaction Dyads' Self-Concept	Group members' Self-Concept
	Fall	Spring	Fall	Fall	Fall
Academic Self-Concept					
Fall	--	.43**	.11*	-.11*	-.02
Spring	.69**	--	.03	-.03	.02
Reciprocated Friends' Self-Concept					
Fall	.18**	.24**	--	.52**	.46*
Interaction Dyads' Self-Concept					
Fall	.13*	.18**	.59**	--	.69**
Group Members' Self-Concept					
Fall	.17**	.18**	.49**	.75**	--

*Note.* Inter-correlations are above the diagonal for 5<sup>th</sup> graders and below the diagonal for 7<sup>th</sup> graders.

Table 3  
*Academic Skills: Similarity between Children's and Their Reciprocated Friends, Interaction Dyad Members, and Group Members in 5<sup>th</sup> and 7<sup>th</sup> Grade.*

	Academic Skills		Reciprocated Friends' Skills	Interaction Dyads' Skills	Group Members' Skills
	Fall	Spring	Fall	Fall	Fall
Academic Skills					
Fall	--	.75**	.06	.12*	.09
Spring	.74**	--	.16**	.18**	.13*
Reciprocated Friends' Skills					
Fall	.52**	.48**	--	.52**	.47**
Interaction Dyads' Skills					
Fall	.59**	.57**	.77**	--	.69**
Group Members' Skills					
Fall	.50**	.50**	.68**	.85**	--

*Note.* Inter-correlations are above the diagonal for 5<sup>th</sup> graders and below the diagonal for 7<sup>th</sup> graders.



Table 4

*Academic Effort: Similarity between Children and Their Reciprocated Friends, Interaction Dyad Members, and Group Members in 5<sup>th</sup> and 7<sup>th</sup> Grade.*

	Academic Effort		Reciprocated Friends' Effort	Interaction Dyads' Effort	Group Members' Effort
	Fall	Spring	Fall	Fall	Fall
Academic Effort					
Fall	--	.77**	.06	.16**	.14**
Spring	.66**	--	.11*	.17**	.13*
Reciprocated Friends' Effort					
Fall	.31**	.35**	--	.52**	.53**
Interaction Dyads' Effort					
Fall	.42**	.40**	.69**	--	.68**
Group Members' Effort					
Fall	.37**	.36**	.64**	.77**	--

*Note.* Inter-correlations are above the diagonal for 5<sup>th</sup> graders and below the diagonal for 7<sup>th</sup> graders.

Table 5

*Hierarchical multiple regression models predicting Fall-to-Spring changes in academic self-concept from peer scores: Socialization effects*

Independent Variables	5 <sup>th</sup> Grade					7 <sup>th</sup> Grade				
	Model 1 Recip Friends Only	Model 2 Interact Dyads Only	Model 3 Group Members Only	Model 4 All peer types	Model 5 Friends and Dyads	Model 1 Recip Friends Only	Model 2 Interact Dyads Only	Model 3 Group Members Only	Model 4 All peer types	Model 5 Friends and Dyads
1. DV: Spring Academic Self-concept										
Academic Self-Concept (Fall)	.406***	.394***	.426***	.374***	.378***	.689***	.682***	.689***	.696***	.691***
Reciprocated Friends' Self-Concept (Fall)	.002			-.011	.015	.108**			.065	.058
Interaction Dyads' Self-Concept (Fall)		-.023		-.108	-.023		.093*		.117*	.080+
Group Members' Self-Concept (Fall)			.042	.139+			.066+		-.042	

*Note.* N = 284 for 5<sup>th</sup> grade and N = 359 for 7<sup>th</sup> grade.

Table 6

*Hierarchical multiple regression models predicting Fall-to-Spring changes in children's academic effort: Socialization effects*

Independent Variables	5 <sup>th</sup> Grade					7 <sup>th</sup> Grade				
	Model 1 Recip Friends Only	Model 2 Interact Dyads Only	Model 3 Group Members Only	Model 4 All peer types	Model 5 Friends and Dyads	Model 1 Recip Friends Only	Model 2 Interact Dyads Only	Model 3 Group Members Only	Model 4 All peer types	Model 5 Friends and Dyads
1. DV: Spring Academic Effort										
Academic Effort (Fall)	.753***	.754***	.757***	.749***	.749***	.613***	.595***	.612***	.593***	.605***
Reciprocated Friends' Effort (Fall)	.075*			.069	.061	.161***			.114*	.108*
Interaction Dyads' Effort (Fall)		.063+		.039	.028		.142***		.075	.070
Group Members' Effort (Fall)			.059+	-.020				.136***	.010	

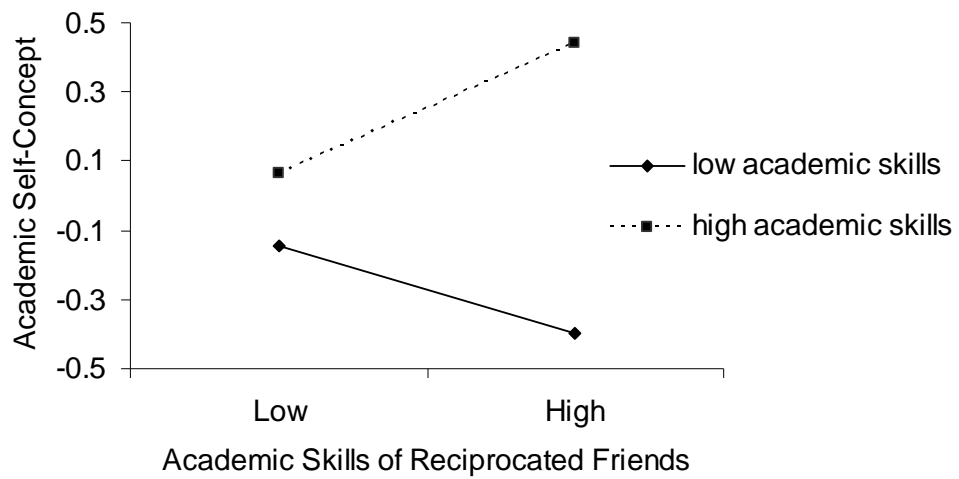
*Note.* N = 308 for 5<sup>th</sup> grade and N = 347 for 7<sup>th</sup> grade.

Table 7

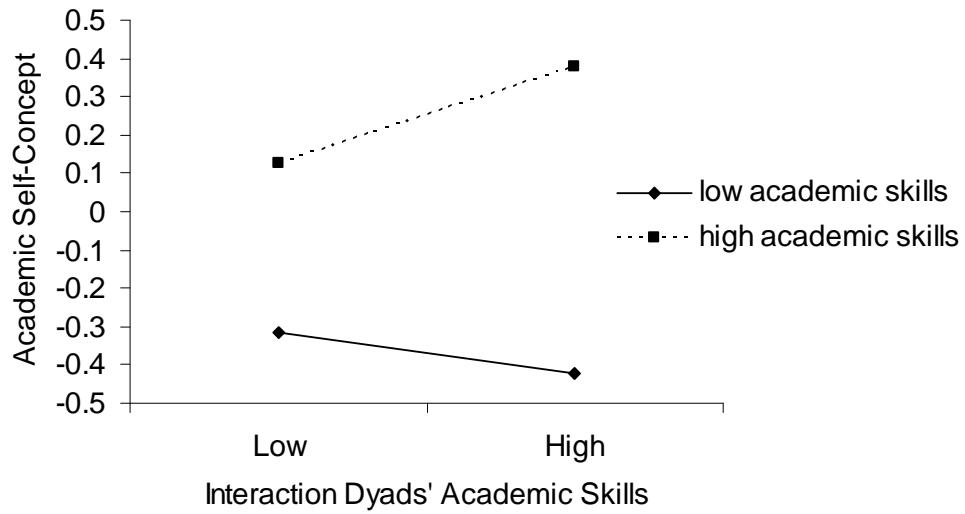
*Hierarchical multiple regression models predicting Fall-to-Spring changes in children's academic self-concept: Social comparison effects*

Independent Variables	5 <sup>th</sup> Grade					7 <sup>th</sup> Grade				
	Model 1 Recip Friends Only	Model 2 Interact Dyads Only	Model 3 Group Members Only	Model 4 All peer types	Model 5 Friends and Dyads	Model 1 Recip Friends Only	Model 2 Interact Dyads Only	Model 3 Group Members Only	Model 4 All peer types	Model 5 Friends and Dyads
<u>1. DV: Spring Self-Concept</u>										
Academic Skills (Fall)	.268***	.264***	.269***	.237***	.240***	.376***	.321***	.367***	.352***	.337***
Reciprocated Friends' Skills (Fall)	.029			.040	.017	.056**			-.060	-.077
Interaction Dyads' Skills (Fall)		.064		-.012	.028		.123+		.231+	.183*
Group Members' Skills (Fall)			.066	.036				.064	-.071	
Skill X Recip Friends' Skill	.136*			.116+	.108+	.023			-.059	-.069
Skill X Interact Dyads' Skill		.027		.005	.046		.114*		.150	.126
Skill X Groups' Skill			.063	.046				.079	-.029	

*Note.* N = 288 for 5<sup>th</sup> grade and N = 328 for 7<sup>th</sup> grade.



*Figure 1.* Academic self-concept as predicted by the interaction of children's teacher-rated academic skills and the academic skills of their reciprocated friends.



*Figure 2.* Academic self-concept as predicted by the interaction of children's teacher-rated academic skills and the academic skills of their interaction dyad members.