

Promoting Early Adolescents' Achievement and Peer Relationships: The Effects of Cooperative, Competitive, and Individualistic Goal Structures

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Emphasizing the developmental need for positive peer relationships, in this study the authors tested a social-contextual view of the mechanisms and processes by which early adolescents' achievement and peer relationships may be promoted simultaneously. Meta-analysis was used to review 148 independent studies comparing the relative effectiveness of cooperative, competitive, and individualistic goal structures in promoting early adolescents' achievement and positive peer relationships. These studies represented over 8 decades of research on over 17,000 early adolescents from 11 countries and 4 multinational samples. As predicted by social interdependence theory, results indicate that higher achievement and more positive peer relationships were associated with cooperative rather than competitive or individualistic goal structures. Also as predicted, results show that cooperative goal structures were associated with a positive relation between achievement and positive peer relationships. Implications for theory and application are discussed.

Keywords: goal structures, middle school, achievement, relationships, cooperation

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The effects of social relationships on individual behavior and development have gained considerable attention during the past 2 decades (e.g., Baumeister & Leary, 1995; Juvonen & Wentzel, 1996; Reis, Collins, & Berscheid, 2000). This is particularly true in classrooms and schools, where researchers have increasingly recognized that academic achievement may be affected by social concerns (Juvonen, 2006; Juvonen & Wentzel, 1996; Urdan & Maehr, 1995). In fact, research shows that students' peer relationships may be associated with adaptive school outcomes, especially during periods of distress, such as transitioning to a new school (Berndt, Hawkins, & Jiao, 1999; Connell & Wellborn, 1991; Juvonen, 2006; Juvonen & Wentzel, 1996; Ladd, 1990; Wentzel, Barry, & Caldwell, 2004). What this literature does not make clear, however, is *when* and *why* some peer relationships promote achievement, whereas others encourage disinterest and, in some cases, obstruct optimal achievement (Blumenfeld, 1992; Dweck, 1996; Graham, 1996; Graham, Taylor, & Hudley, 1998; Juvonen, 2006; Juvonen & Cadigan, 2002; Juvonen, Graham, & Schuster, 2003). In this article, we strive to clarify this issue by testing a social-contextual view of the mechanisms and processes by which

early adolescents' achievement and peer relationships affect each other.

Early adolescence (ages 12–15 years) is an ideal age to study the relation between achievement and peer relationships. At a time of rapid pubertal change, early adolescents also experience increasing desire for autonomy (e.g., Steinberg, 1990), increasing focus on peers and social acceptance (Brown, 1990; Eccles, Midgley, & Adler, 1984; Juvonen & Weiner, 1993; Petersen, 1988; Wigfield, Byrnes, & Eccles, 2006) and increasing self-consciousness (Erikson, 1968; Simmons & Blyth, 1987). Although not all early adolescents have difficulty during this period (Dryfoos, 1990), for many these changes create distress, anxiety, depression, alienation from peers and school, and engagement in antisocial and high-risk behaviors (Roeser, Eccles, & Sameroff, 2000; Steinberg, Brown, & Dornbusch, 1996). Disconnected and alienated students are at particular risk of negative outcomes (Becker & Luthar, 2002; Berndt et al., 1999; Finn, 1989, 1993; Furman & Robbins, 1985; Hymel, Comfort, Schonert-Reichl, & McDougall, 1996; Ladd, 1990; McDougall & Hymel, 1998; Parker & Asher, 1987; Wentzel et al., 2004). Indeed, the protective and adaptive functions of positive peer relationships have been shown across many areas of psychology (Juvonen, 2006; see also Baumeister & Leary, 1995; Bolger, Zuckerman, & Kessler, 2000; Cohen & Wills, 1985; Diener & Seligman, 2002; Park, Peterson, & Seligman, 2004; Reis & Collins, 2004). Taken as a whole, this impressive body of literature suggests that, both theoretically and practically, there may be much to gain by clarifying how enhancing students' peer relationships may also promote academic achievement (Juvonen, 2006; Juvonen & Wentzel, 1996).

The basic premise of this study is that whether early adolescents' peer relationships are positively or negatively associated with achievement depends on the way peers' achievement goals are linked (or structured). Following social interdependence theory

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(Deutsch, 1949, 1962; D. W. Johnson & Johnson, 1989, 2005), the argument is made that cooperative and competitive goal structures differentially affect the relation between achievement and peer relationship, the former creating the conditions under which one enhances the other, the latter creating the conditions under which one obstructs the other. The argument is also made that only social interdependence theory predicts these divergent outcomes utilizing a mechanism (goal structures) subject to operational alternatives. Thus, this study offers both theorists and practitioners alike important insights about how and why some peer relationships may enhance achievement, whereas others do not.

This problem section is divided into four parts. In Part 1, we define terms and, in particular, clarify our use of the term “goal structures.” In Part 2, we introduce social interdependence theory and its account of how and why goal structures affect achievement, peer relationships, and the way these outcomes relate to each other. In Part 3, we review other theories’ accounts of the relation between achievement and peer relationships, with those postulating a complementary relation presented first, and those postulating a conflicting relation presented second. Finally, in Part 4 we introduce the use of meta-analysis to test this study’s three major hypotheses.

Definitions and Distinctions

To understand the differential effects of cooperative, competitive, and individualistic goal structures on achievement and peer relationships, it is first necessary to clarify the way terms are being conceptualized. To this end, we stress that this study emphasizes similarities rather than differences among researchers’ views of goals, achievement, and positive peer relationships. More precisely, this study assumes a macro- rather than micro-level view of these constructs (Cronbach, 1971). The benefit of a macro-level approach to definition is that construct validity is maximized (Cronbach, 1971). The cost, of course, is the potential loss of information about subcomponents of each construct, the way subcomponents relate to each other, and the different ways in which subcomponents may relate to outcome measures. For excellent reviews of micro-level dimensions of goals, we refer readers to E. M. Anderman and Wolters (2006) and J. Austin and Vancouver (1996).

Goals, Achievement Goals, and Social Goals

Historically speaking, goals have increasingly subsumed other motivational constructs—such as “needs” (e.g., Maslow, 1970; Murray, 1938) and “motives”—because, at a general level, they are all concerned with desired outcomes that individuals seek to attain (E. M. Anderman & Wolters, 2006). However, as discussed by E. M. Anderman and Wolters (2006), it should also be noted that motives and needs remain important components of some theoretical perspectives (e.g., self-determination theory; see Deci & Ryan, 2000). It should also be noted that researchers have contrasted various dimensions of goals, including goal orientations (e.g., Ames & Ames, 1984; Dweck, 1996; Dweck & Leggett, 1988; Nicholls, 1984), expectations (e.g., Abramson, Seligman, & Teasdale, 1978; Bandura, 1986), origins (Dweck, 1991; Eccles, 1993; Maehr, 1984; Nicholls, 1989), and content (Ford, 1992; Ford & Nichols, 1991; Wentzel, 1989). These and other dimensions

“describe the multifaceted nature of goals in psychology” (E. M. Anderman & Wolters, 2006, p. 370).

Emphasizing similarities among goal constructs, and following Wentzel (1999), this article defines goals in terms of content, where *goals* are defined broadly in terms of desired outcomes toward which people are working (D. W. Johnson & Johnson, 2006). Examples of school-related *achievement goals* include mastering subject matter or meeting an achievement standard, such as earning an “A,” a 100% on a test, or striving for a 4.0 GPA (cf. Urdan & Maehr, 1995). Examples of school-related *social goals* include gaining approval from others, making personal relationships with peers, belonging (i.e., feeling included, liked, respected, accepted, and supported), and being dependable and responsible (Goodenow, 1993; Urdan & Maehr, 1995; Wentzel, 1993, 1994, 1999). Thus, following Ford and Nichols (1991), this study focuses on *integrative* social relationship goals (e.g., belongingness, social responsibility, caring) and excludes *self-assertive* social relationship goals (e.g., individuality, superiority, resource acquisition). This focus is consistent with the study’s primary concerns, namely how to enhance early adolescents’ positive relationships and increase achievement.

Relationships

Following Hinde (1976), we define *relationships* in terms of patterns of behavioral interaction occurring over time. Importantly, this definition emphasizes a *history* of behavioral interaction without making distinctions about the quality of those interactions or resulting relationships. Thus, friendship may be considered one of many types of positive relationships, but not all positive relationships need be defined as friends (Hartup, 1996).

Goal Structures

Goal structures have been defined two ways in the school achievement literature: (a) as a contextual variable and (b) as a relational variable. As a *contextual* variable, *classroom goal structures* have been defined as “goal-related messages that are made salient in the achievement setting (i.e., the laboratory, classrooms, schools) that are related to, and most likely influence, the personal goals that individuals pursue in those settings” (Kaplan, Middleton, Urdan, & Midgley, 2002, p. 24). Using similar rationale, researchers have also generalized goal-related messages to *school-level goal structures* (e.g., Maehr & Anderman, 1993; Maehr & Midgley, 1991).

In this study, goal structures are defined in relational terms, thus emphasizing proximal links between students’ goals rather than more distal classroom or school characteristics. As a *relational* variable, goal structures exist between students rather than within (e.g., goal orientations; Ames, 1992) or in context (e.g., classroom goal structures; Ames & Archer, 1988; Kaplan et al., 2002). From the relational perspective, goal structures define the type of social interdependence linking students’ goals to each other—thus, D. W. Johnson and Johnson (1974, p. 214) define a *cooperative goal structure* “as one where the goals of the separate individuals are so linked together that there is a positive correlation between their goal attainments.” A relational view of goal structures is also consistent with Deutsch’s (1949, 1962) original formulations of social interdependence theory, the topic we turn to next.

Social Interdependence Theory

Social interdependence exists when individuals share common goals and each individual's goal attainment is affected by the actions of the others (Deutsch, 1949, 1962; D. W. Johnson & Johnson, 1989, 2005). Social interdependence may be differentiated from *social dependence*, where one individual's goal attainment is affected by the actions of another individual but not vice versa (D. W. Johnson & Johnson, 2006).

There are three ways that social interdependence may be structured. *Positive interdependence* (i.e. cooperative goal structures) exists when individuals perceive that they can reach their goals if and only if the other individuals with whom they are cooperatively linked also reach their goals. When goals are structured cooperatively, individuals tend to seek outcomes that are beneficial to all those with whom they are cooperatively linked. *Negative interdependence* (i.e., competitive goal structures) exists when individuals perceive that they can obtain their goals if and only if the other individuals with whom they are competitively linked fail to obtain their goals. When goals are structured competitively, individuals tend to seek outcomes that are personally beneficial but detrimental to others' goal attainment. *No interdependence* (i.e., individualistic goal structures) exists when individuals perceive that they can reach their goal regardless of whether other individuals attain or do not attain their goals. When goals are structured individualistically, individuals tend to seek outcomes that are personally beneficial without concern for others' efforts to achieve their goals.

The basic premise of social interdependence theory is that the way in which interdependence is structured determines how individuals interact—which, in turn, determines outcomes. Thus, when individuals' goals are structured cooperatively (positive interdependence), their actions will tend to promote the success of others (e.g., mutual help and assistance, sharing resources and information, and acting in trustworthy and trusting ways). Competitive goal structures in contrast result in oppositional interaction patterns (e.g., obstructing others' goal achievement efforts, hiding

resources and information from each other, and acting in distrustful and distrusting ways). Finally, the absence of goal structures results in the absence of interaction. Table 1 summarizes social interdependence theory and the predicted interaction patterns and outcomes.

Promoting Achievement

Social interdependence theory predicts that cooperative goal structures will result in higher achievement than will competitive or individualistic goal structures. Because cooperative goal structures tend to result in promotive interaction (thus providing the assistance, information, and resources needed to achieve their mutual goals), whereas competitive and individualistic goal structures result in oppositional or no interaction, respectively, it may be expected that cooperative goal structures will result in higher achievement than will competitive or individualistic. Although results of previous meta-analyses have supported this hypothesis (D. W. Johnson & Johnson, 1989; D. W. Johnson, Maruyama, Johnson, Nelson, & Skon, 1981), they are outdated, and most of the studies did not concentrate on early adolescents. As well, previous meta-analyses did not use modern meta-analytic methods, such as online database search engines and hierarchical linear modeling (HLM). In this study, we address these limitations by using modern meta-analytic methods to test the hypothesis that among early adolescents, higher levels of achievement will be associated with cooperative rather than competitive or individualistic goal structures.

Promoting Positive Peer Relationships

Social interdependence theory also predicts that cooperative goal structures will promote more positive social relationships than competitive or individualistic goal structures. According to Deutsch's (1949, 1962) original theorizing, when individual goals are structured cooperatively, success in achieving one's goals will result in a positive cathexis (i.e., emotional investment) toward

Table 1
Social Interdependence Theory: Predicted Interaction Patterns and Outcomes

Goal structure	Interaction patterns	Outcomes ^a	
		Achievement	Social relationships
Cooperative	Promotive Mutual help, sharing resources and information, and acting in trustworthy and trusting ways.	Higher ^b	More positive ^b
Competitive	Oppositional Obstructing goal attainment, withholding and/or hiding resources and information from each other, and acting in distrustful and distrusting ways.	Lower ^c	Less positive ^c
Individualistic	None Indifference to others' goals, efforts, and outcomes.	Lower ^d	None ^d

^a Outcomes refer to relative outcomes as tested by this meta-analysis. ^b Cooperative versus competitive and individualistic goal structures. ^c Competitive versus cooperative goal structures. ^d Individualistic versus cooperative goal structures.

others' actions that promoted one's success. This positive cathexis is then transferred to others as individuals, which results in more positive relationships. There is additional evidence that the *expectation* that the other will cooperate creates liking (D. W. Johnson & Johnson, 1972; S. Johnson & Johnson, 1972) and that perceiving group members as *trying* to promote one's success (even if they fail) also creates liking (Tjosvold, Johnson, & Johnson, 1981).

In contrast to cooperative goal structures, social interdependence theory predicts that competitive goal structures will promote interaction patterns that obstruct individuals' goal attainments. Failure to achieve one's goals will result in a negative cathexis toward others' actions, which is then transferred to others as individuals, resulting in dislike and rejection. When goals are structures individualistically, the feelings generated by success or failure to achieve one's goals tend not to transfer to other individuals. Thus, social interdependence theory predicts that more positive social relationships will result from cooperative goal structures than competitive or individualistic. Although the results of previous meta-analyses support this hypothesis (D. W. Johnson & Johnson, 1989; D. W. Johnson, Johnson, & Maruyama, 1983), they are outdated. Furthermore, these studies did not concentrate on early adolescents and did not have access to modern meta-analytic methods. In this study, we address these limitations by using modern meta-analytic methods to test the hypothesis that among early adolescents, more positive peer relationships will be associated with cooperative rather than competitive or individualistic goal structures.

Relating Achievement and Social Relationships

What is not specified in the original formulation of social interdependence theory is the way that social relationships may be related to achievement goals. Deutsch (1985) proposed the *crude law of social relations*, which states that the characteristic processes (e.g., interaction patterns) and effects (e.g., goal attainment) elicited by a given type of social relationship also tend to elicit that type of social relationship. Thus, cooperative interactions both induce and are induced by positive social relationships, and competitive interactions both induce and are induced by oppositional, negative social relationships.

More precisely, Deutsch's crude law of social relations posits that cooperative goal structures will result in promotive interaction among group members (i.e., they will help, assist, share resources and information, encourage each other's efforts), which in turn will ensure that group members achieve. The successful accomplishment of group members' goals results in a positive cathexis that is generalized to each other, resulting in more positive social relationships. A benign spiral results in which positive social relationships increase promotive interaction, which increases achievement, which increases positive cathexis, which increases positive social relationships even more, and so forth. The key to this benign spiral is a positive correlation between achievement and positive social relationships. In Deutsch's (1962) own words,

Thus, it may be said that while a mutual interest in each other's welfare is not a necessary condition for cooperative relations, such mutual interest may arise as a consequence of cooperation and may, then provide a basis for continuing cooperation. (p. 283)

Despite Deutsch's theorizing, there is little or no evidence demonstrating that positive social relationships will result in sub-

sequent cooperation and the associated processes of promotive interaction, goal attainment, and more positive peer relationships. Nor is there evidence demonstrating that negative, oppositional social relationships will result in subsequent competition and the associated processes of obstructing others' goal attainment, acting in distrustful ways, and having more oppositional, negative social relationships. In this study, we strive to clarify these issues by testing whether cooperative goal structures (compared with competitive and individualistic goal structures) are associated with a positive relation between achievement and positive peer relationships.

Summary

To summarize, social interdependence theory posits that cooperative and competitive goal structures differentially affect achievement and peer relationship outcomes, with cooperative goal structures hypothesized to promote greater achievement and more positive peer relationships compared with competitive or individualistic goal structures. Further, the crude law of social relations predicts that cooperative goal structures (compared with competitive and individualistic goal structures) will be associated with a *positive* relation between achievement and positive peer relationships. Figure 1 summarizes the basic model proposed by social interdependence theory and the crude law of social relations.

Social interdependence theory is not alone in predicting a relation between achievement and social goals. Thus, in the next part of this review we introduce other theories' accounts of this relation. Theories postulating a complementary relation are presented first, and theories postulating a conflicting relation are presented second. The argument is made that only social interdependence theory predicts these divergent outcomes utilizing a mechanism (goal structures) subject to operational alternatives.

Theories Suggesting a Complementary Relation

At least two theories support the view that peer relationships may enhance achievement goals: hierarchy of needs theory and belongingness theory.

Hierarchy of Needs Theory

Maslow's (1970) hierarchy of needs theory states that belonging (i.e., the need to obtain love and acceptance from family and peers) is a deficiency need that *must* be met, whereas intellectual achievement (i.e., the need to know and understand) and other growth needs shape behavior only when deficiency needs are sufficiently satisfied. From this perspective, the fulfillment of students' need for belonging (i.e., deficiency needs) should enable achievement goals (i.e., growth needs) to become more salient.

Belongingness Theory

Closely related to Maslow's (1970) theory, belongingness theory (Baumeister & Leary, 1995, p. 497) posits that humans have a "pervasive drive to form and maintain at least a minimum of lasting, positive, and significant interpersonal relationships" (for related views, see Bowlby, 1969, 1973; Freud, 1963; Fromm, 1955, 1956; Horney, 1937; Sullivan, 1953). As applied to school achievement, the basic premise of belongingness theory is that

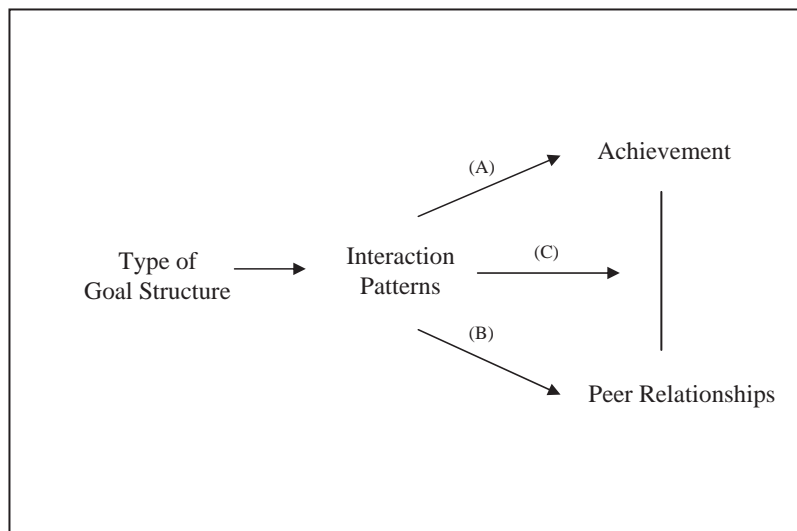


Figure 1. Social interdependence theory and the crude law of social relations.

“caring and supportive relationships facilitate student engagement and other adaptive school behaviors” (Juvonen, 2006, p. 656; see also Brand, Felner, Shim, Seitsinger, & Dumas, 2003; Felner & Felner, 1989). Unlike Maslow’s theory, belongingness theory does not include a hierarchical classification of needs. However, as pointed out by Juvonen (2006, p. 655), “recent experimental studies suggest that threats to belonging impede cognitive performance” (Baumeister & DeWall, 2005; Baumeister, Twenge, & Nuss, 2002). Thus, it is reasonable to expect that those students experiencing positive peer relationships would achieve more in school than those who are socially disconnected or alienated (Juvonen, 2006).

Hierarchy of needs theory and belongingness make similar predictions about how enhancing early adolescents’ peer relationships (i.e., fulfilling their need for belonging, relatedness, and positive peer relationships) may also promote achievement. These theories make a strong case that some goals may be prioritized over others (e.g., belonging goals before achievement goals) and that the attainment of belonging goals (i.e., positive peer relationships) may facilitate achievement goals.

An impressive body of research supports the complementary view of achievement and positive peer relationships. For example, within the academic achievement domain, research on school climate shows that students’ feelings of support and connection with others covary positively with student engagement (Becker & Luthar, 2002; Brand et al., 2003; Eccles et al., 1993; Felner & Felner, 1989; Finn, 1989, 1993; Goodenow, 1993; Midgley & Feldlaufer, 1987; Wentzel et al., 2004). As well, positive student–student relationships are also associated with school competence (Cauce, 1986), classroom grades (Hatzichristou & Hopf, 1996; Wentzel, 1991; Wentzel & Caldwell, 1997), standardized test scores (A. Austin & Draper, 1984), IQ (Wentzel, 1991), involvement in the classroom (Berndt & Keefe, 1995; Marks, 2000), prosocial behavior (Wentzel, 1994, 1998), self-esteem (Barrera, Chassin, & Rogosch, 1993; S. Harter, 1994), and lower levels of negative behaviors—such as violence, drug use, and teenage pregnancy (Buhrmester, 1990; Resnick et al., 1997). *Rejection* by

peers, in contrast, is linked to lower levels of academic engagement (S. Harter, 1981; Juvonen, 1996; Marks, 2000; Wentzel, 1991), increased absenteeism (DeRosier, Kupersmidt, & Patterson, 1994; Kupersmidt & Coie, 1990), grade retention (Coie, Lochman, Terry, & Hyman, 1992), dropping out of school (Epstein & McPartland, 1976; Kupersmidt & Coie, 1990), greater frequency of behavioral problems (DeRosier et al., 1994; Parker & Asher, 1987), and increased risk of depression (Feldman, Rubenstein, & Rubin, 1988).

What is not made clear by this research is whether simply meeting students’ belonging goals will *always* enhance achievement (Juvonen, 2006; Juvonen & Wentzel, 1996; Urdan & Maehr, 1995). To the contrary, research clearly shows that, as achievement goes, not all peer relationships are equal. In fact, some peer relationships actually obstruct optimal achievement levels (Juvonen, 2006; see also Clasen & Brown, 1985; Coleman, 1961; Fordham & Ogbu, 1986; McClelland, 1961; Ogbu, 1991, 1997; Steinberg et al., 1996). These findings underlie theories postulating a *conflicting* relation between achievement and peer relationships.

Theories Suggesting a Conflicting Relation

At least two theories support the view that peer relationships actually obstruct achievement: distraction/conflict theory and group cohesion theory.

Distraction/Conflict Theories

Theories of distraction/conflict (e.g., Baron, Moore, & Sanders, 1978; Coleman, 1961; Crandall, Crandall, & Katkovsky, 1965; McClelland, 1961; Sanders, Baron, & Moore, 1978) argue that school-related academic and social goals are likely to conflict and inhibit optimal performance. Peers are viewed as “attentional temptations” at best and “social impairments” at worst, distracting students and placing them in a conflict between attending to social pursuits and achievement tasks.

Group Cohesion Theories

Social-psychological theories of group cohesion (e.g., D. W. Johnson & Johnson, 2006) offer yet another account of positive peer relationships and achievement. *Group cohesion* is defined as the mutual attraction among members of a group and the resulting desire to remain in the group. Highly cohesive groups are characterized by greater ease in setting goals (Festinger, Schachter, & Back, 1950), greater likelihood in achieving those goals (Seashore, 1954; Wolfe & Box, 1988), and greater susceptibility to being influenced by groupmates (Schachter, Ellertson, McBride, & Gregory, 1951). Thus, the more positive the relationships among group members, the more members will strive to conform to group norms. If a group is achievement oriented, then the more members of a cohesive group will tend to achieve academically. If a group is *not* achievement oriented, then the more members of a cohesive group will tend not to achieve academically.

Theories of distraction/conflict and group cohesion raise important questions about the relation between peer relationships and achievement. Specifically, theories of distraction/conflict hypothesize that more positive peer relationships may be associated with greater attentional temptation and, therefore, lower student achievement (especially for those students unable to balance multiple goals). Cohesion theory suggests that whether positive peer relationships promote or obstruct achievement depends on peer group norms.

Empirical results provide some support for a conflicting relation between achievement and peer relationships. For example, the peer relations literature has long reported that whether peer relationships promote school engagement and achievement depends on the values and behaviors of the peers with whom individuals affiliate (Berndt, 1999, 2002; Clasen & Brown, 1985; Dishion, Spracklen, Andrews, & Patterson, 1996; Epstein, 1983; Feldman & Wentzel, 1990; Fordham & Ogbu, 1986; Juvonen, 2006; Mounts & Steinberg, 1995; Ogbu, 1991, 1997; Rubin, Bukowski, & Parker, 1998; Steinberg et al., 1996). Likewise, research on peer networks (e.g., Cairns, Cairns, & Neckerman, 1989; Kindermann, 1993; Kindermann, McCollam, & Gibson, 1996) shows that student's individual school engagement scores improve when they are members of groups with high average engagement scores, whereas individual scores *decrease* when students are members of groups with low average engagement scores.

It follows from this research that both cohesion and social interdependence theories predict divergent relations between peer relationships and achievement. Only social interdependence theory, however, specifies an operational mechanism (i.e., goal structures) that those concerned with maximizing achievement and social outcomes may influence. Indeed, the practical utility of social interdependence theory has been demonstrated in education, the work place, family, therapy, leisure, and other social settings (D. W. Johnson & Johnson, 1989, 2005).

The next and final part of this review introduces the use of meta-analysis in this study.

Use of Meta-Analysis

Methodological Strengths and Weaknesses

Meta-analysis involves the statistical integration and analysis of related findings from independent studies (Glass, 1976). Thus,

meta-analysis differs both substantively and procedurally from conventional narrative reviews by providing an objective, scientific method of summarizing research findings (H. M. Cooper & Hedges, 1994). An obvious benefit of this methodology is that readers gain specific, objective criteria for evaluating the validity of a literature review's procedures, evidence, and conclusions. Another advantage is that meta-analysis allows for generalization across sample characteristics, operational definitions of variables, and specific measurement tools. In this way, meta-analysis actually gains strength from the limitations defining primary research methods (H. M. Cooper & Hedges, 1994), as variability among primary studies allows for the precise examination of how study findings may relate to study features (Lipsey & Wilson, 2001). These attributes make meta-analysis an ideal choice for studying conceptually broad topics in which a large number of primary studies have been conducted (H. M. Cooper & Hedges, 1994). For these reasons, the literature on goal structures and early adolescents' achievement and peer relationships has much to gain from meta-analytic techniques.

Conclusions from a meta-analysis are inherently limited by (a) the quality of primary studies included in the analysis (H. M. Cooper & Hedges, 1994) and (b) meta-analysts' decisions about which studies to include in the analysis (Harwell & Maeda, 2005). The validity of meta-analytic conclusions may be protected, however, by paying "exhaustive" attention to primary study details (H. M. Cooper, 1982, p. 294), thus ensuring that variance associated with methodological variables is not misattributed to other factors of interest (Lipsey & Wilson, 2001). Meta-analytic validity may also be protected by accessing as many sources of primary studies as possible, thus increasing the likelihood that nontheoretical differences are distributed randomly across the sample. Both of these protective strategies were employed in this review.

Using Meta-Analysis for Theory Development

Meta-analysis may contribute to theory development by assessing the validity of the hypothesized relation between variables (i.e., does a relation exist, and is it nonartifactual?; N. Miller & Pollock, 1994). The existence of a relation is determined by obtaining a mean effect size (ES) and by providing evidence that it differs from zero. Whether the relation is nonartifactual is determined by examining whether individual study outcomes vary as a function of nontheoretical or methodological factors. Both of these tests were performed in this study.

Meta-analysis may also contribute to theory development by examining whether theoretically relevant variables represent sources of variability among the outcomes of the individual studies (N. Miller & Pollock, 1994). In this meta-analysis, two tests of theory were conducted: (a) the relative impact of cooperative, competitive, and individualistic goal structures on achievement and positive peer relationships; and (b) the extent to which positive peer relationships (i.e., the attainment of social goals) are positively associated with achievement.

Summary

To summarize, the effects of social relationships on individual behavior and development have gained considerable attention across diverse areas of psychology. What remains unclear is *when*

and *why* some social relationships promote achievement, whereas others obstruct optimal achievement levels. Focusing on early adolescents, this study uses meta-analysis to help clarify these issues. Specifically, this study examines (a) the differential effect of cooperative, competitive, and individualistic goal structures on achievement; (b) the differential effect of cooperative, competitive, and individualistic goal structures on peer relationships; and (c) the extent to which cooperative goal structures (compared with competitive and individualistic goal structures) are associated with a positive relation between achievement and positive peer relationships. Clarifying these issues may refine social interdependence theory as well as other theoretical accounts of the relation between achievement and social goals. Clarifying these issues may also inform educational practice by specifying how cooperative goal structures provide a mechanism by which practitioners may facilitate early adolescents' attainment of achievement and social goals.

Method

Studies, Participants, and Treatments

All available studies comparing the impact of cooperative, competitive, and individualistic goal structures on achievement and social relationships among early adolescents were included in this meta-analysis. The population of studies included published and unpublished studies in journals, books, dissertations, theses, and technical reports, as well as conference papers. The participants in the included studies were early adolescents, ages 12–15 years (i.e., Grades 6–9), regardless of gender, nationality, academic or physical abilities, or other characteristics. The population of treatments was defined as all appropriate operationalizations of cooperative, competitive, and individualistic goal structures.

Independent Variable

The independent variable was cooperative, competitive, and individualistic goal structures. The nature of cooperative, competitive, or individualistic goal structures was defined by the author(s) of each article. If the author stated that the method used was cooperative or competitive or individualistic, it was noted as such. *Cooperative* goal structures were defined by the presence of positive interdependence. Examples include positive goal interdependence (mutual goals), positive reward interdependence (joint rewards), positive resource interdependence (each group member has different resources that must be combined to complete the assignment), and positive role interdependence (each group member is assigned a specific role). Studies that included intergroup competition as part of operationalizing cooperation were included in the cooperative studies. It should be noted that procedures for implementing cooperative goal structures have been developed by a variety of social scientists and educators (for a review, see O'Donnell, 2006).

Competitive goal structures were operationally defined as the presence of negative interdependence. Examples include negative goal interdependence (winning vs. losing) and negative reward interdependence (e.g., one reward, winner takes all). Under competitive goal structures, participants work alone or with a minimum of interaction, and rewards are given on a norm-referenced basis or

by ranking participants from best to worst. All studies in this analysis focused on competition among group members and not competition between groups. *Individualistic* goal structures were operationally defined as the lack of interdependence between participants. Participants work alone or with a minimum of interaction, and rewards are given according to set criteria so there is little opportunity for social comparison. When the control condition was labeled as *traditional instruction*, the condition was coded as either competitive or individualistic depending on the author's description of the condition.

Dependent Variables

The two dependent variables were achievement and positive peer relationships. *Achievement* was defined as performance on a task, with measures including comprehension, quality and accuracy of answers on tests, quality and accuracy of problem solving, frequency and quantity of desired outcome, time or rate to solutions, time on task, higher level reasoning and critical thinking, creativity, recall and retention, and transfer of tasks. *Positive peer relationships* were operationally defined as liking and/or support for others, thus broadly including group cohesiveness, esprit de corps, social support, and friendly and caring interaction. Measures included Likert rating scales, sociometric choice of classmates, nominations of classmates as friends, rating of classmates according to degree of liking, observations of interactions during free time, listing adjectives to describe classmates, number of dimensions used to describe classmates, and forced choice between pairs of classmates as to who was more liked.

Sampling Procedures

Work on this meta-analysis began in 1977, which means that the "accessible population" of studies (H. M. Cooper, 1982, p. 294) has been searched and collected for approximately 30 years. In addition, our most recent search of the literature was intentionally overinclusive, as every effort was made to locate all relevant studies. We searched PsycINFO and ERIC online databases using the following keywords: *cooperative learning*, *peer teaching*, *peer tutoring*, *small group learning*, and *collaborative learning*. We also searched other sources of studies, including existing bibliographies, conference papers, dissertations, and unpublished manuscripts. Relevant organizations and researchers were also contacted for possible unpublished studies.

Actual Sampling and Inclusion Criteria

The sampling procedures described above yielded 12,865 manuscripts from ERIC and 2,510 from PsycINFO. Pairing key words with *English language*, *human population*, *middle school*, and *junior high* limited the sample to 1,413 manuscripts. To be included in the meta-analysis, research studies were evaluated against the following criteria: (a) Participants were middle school-age children, (b) the study specifically dealt with the effect of social interdependence on the dependent variable, (c) the study contained quantitative measures of the dependent variable, including sufficient information to calculate an ES, (d) the study reported sufficient information to make conclusions about the relative effectiveness of social interdependencies compared with a control

group (studies comparing two operationalization of cooperative goal structures with another were excluded, as were [following Lipsey & Wilson, 2001] studies that used pre- and posttest measures), (e) the targeted subject matter was academic, and (f) studies were written or summarized in English. In all, 129 manuscripts met the criteria to be included in this meta-analysis, yielding 593 ESs from 148 independent studies (see references for listing of studies included in the meta-analysis).

Coding Study Characteristics

Descriptive variables coded in the meta-analysis included the following: (a) publication mode; (b) sample characteristics, such as age and gender; (c) group composition, including group size, ethnicity (homogeneous, heterogeneous), and cognitive ability (high, low); and (d) study characteristics, including treatment duration, academic subject area, and whether the cooperative condition was pure or mixed (combination of cooperative and competitive or cooperative and individualistic).

Studies were also coded for methodological quality, as methodological shortcomings of primary studies may have reduced the validity of their conclusions. Five criteria for methodological quality were used: (a) a 4-point scale for level of randomization used to assign subjects to conditions, (b) a 3-point scale for the clarity of the control condition (i.e., clearly competitive or individualistic), (c) a 3-point scale for control for experimenter or teacher effects across conditions, (d) a 3-point scale for control for curriculum effects across conditions, and (e) a 3-point scale for verification of adequate implementation of experimental and control conditions. Each study was given a rating based on these five design characteristics, with scores ranging from 5 to 16 depending on overall methodological quality. Studies were classified as being low quality if they had a score of 9 or less, medium quality if they had a score of 10 to 12, and high quality if they had a score of 13 to 16.

We also coded sufficient information to calculate ESs for each achievement outcome variable (e.g., means and standard deviations from treatment and control conditions). Coded variables tended to be categorical in nature, with the exception of obvious continuous variables (e.g., sample size, group size, means, and standard deviations). Variables such as academic subject and group composition included several levels, whereas variables such as random assignment were dichotomous. Multilevel scaling was not used for any coded variables. Appendix I in the supplemental materials provides a complete list of coded variables within each category.

Protecting Reliability and Validity

Since January of 2003, the primary evaluators working on this meta-analysis included Cary J. Roseth, David W. Johnson, Roger T. Johnson, F. Fang, and S. Gokmen. To ensure valid coding, evaluators met once a week to review coding issues, answer questions, and in some cases modify the coding systems. Differences in coding decisions were resolved by consensus or adjudicated by David W. Johnson. Student evaluators completed a training regimen lasting approximately 3 months and involving double-coding (i.e., two evaluators independently coding the same study) until the percentage of intercoder agreement exceeded 90%. One

researcher (Cary J. Roseth) also conducted random evaluations of coded studies to ensure consistent coding.

Calculating ESs

In every study in which sufficient data were reported, ESs (i.e., standardized mean differences between treatment and comparison conditions) were calculated. Following Rosenthal (1994), we computed ESs using Hedges's unbiased estimator g^U , given by

$$g^U = c(m)g, \quad (1)$$

where g is the difference between treatment and comparison group scores divided by the pooled standard deviation of the two groups, and $c(m)$ is given approximately by

$$c(m) \approx 1 - \frac{3}{4m - 1}, \quad (2)$$

where m is the degrees of freedom computed from both the experimental and control groups (or $n_1 + n_2 - 2$). Hedges's g^U provides less biased ES estimates by correcting for the slight overestimation of the population ES for small samples.

ESs were calculated so that a positive ES indicated a favorable outcome for the treatment-intervention group. When necessary, ESs were calculated from statistics, such as t and F , according to formulas provided by Lipsey and Wilson (2001). To ensure the independence of ESs and to avoid giving advantage to studies with larger numbers of outcome variables, we combined ESs for each study. We also weighted each ES by the inverse of its variance, following recommended practice suggesting that studies with large samples provide more reliable estimates of the population ES (H. M. Cooper & Hedges, 1994). Following Shadish and Haddock (1994), conditional variance v_i of Hedges's g^U was estimated by

$$v_i = \frac{n_{1i} + n_{2i}}{n_{1i}n_{2i}} + \frac{g_i^2}{2(n_{1i} + n_{2i})}, \quad (3)$$

where n_{1i} and n_{2i} represent the respective within-study treatment and comparison group sample sizes in the i th study.

Following ES calculations, we conducted descriptive analyses to guard against ES outliers and inadequate power for analysis of moderator variables. We then conducted homogeneity tests to determine whether there was more variability among the ES calculations than would be expected by chance (i.e., testing whether the obtained mean ES differs from zero). For ES analyses, we used HLM (Raudenbush & Bryk, 2002) to explore between-studies variation and to construct explanatory models using both theoretical and nontheoretical (e.g., methodological quality) variables. The next section provides a brief explanation of using HLM for meta-analysis.

HLM for Meta-Analysis

Following Raudenbush and Bryk (2002), HLM for meta-analysis assumes that ESs are nested with studies and then uses between-studies features to try and explain variation among ESs. The models fitted in HLM in meta-analysis have the general form

$$g_i^U = \gamma_i + \varepsilon_i \quad (\text{Level 1}) \quad (4)$$

$$v_i = \beta_0 + \sum_{t=1}^{\tau} \beta_t X_{ti} + \mu_i, \quad (\text{Level 2}) \quad (5)$$

where γ_i is a population ES for the i th study, g_i^U is the i th Hedges' g^U ES, β_0 is an intercept, β_t is the slope capturing the effect of the t th ($t = 1, 2, \dots, T$) Level 2 predictor X_{ti} on ES, μ_i is the unique effect of each study that is assumed to be normally distributed with a mean of zero and a variance component of τ , and ϵ_i is a within-study error term. Combining Equations 4 and 5,

$$g_i^U = \beta_0 + \sum_{t=1}^{\tau} \beta_t X_{ti} + \mu_i + \epsilon_i. \quad (6)$$

For meta-analysis, the first step of using HLM is to estimate τ , the between-studies variance among ESs. If the test of $H_0: \tau = 0$ is rejected, then the next step is constructing an explanatory model that accounts for variation in ES.

Results

The findings are presented in two sections. Section 1 provides a descriptive profile of the studies included in the meta-analysis. Section 2 presents ES analyses.

Descriptive Profile

Student sample characteristics. Table 2 summarizes the descriptive results for student demographics. This middle school sample included 148 independent studies and over 17,000 early adolescent participants from 11 countries and 4 multinational samples. The majority of studies were based in the United States (73%, $n = 108$), followed by Canada, Greece, and Israel (all with $n = 6$). For socioeconomic status, 9% ($n = 14$) of reporting studies involved student samples with mixed economic profiles (i.e., of working, middle, and upper class), whereas 18% ($n = 26$) used homogenous middle and/or upper class samples. Only 10% ($n = 15$) of studies focused exclusively on working class samples, with 63% ($n = 111$) not reporting any socioeconomic status information. For ethnicity, 25% ($n = 37$) of reporting studies used samples with some ethnic heterogeneity (i.e., White, Black, Asian, and Hispanic), whereas 18% ($n = 26$) used homogenous ethnic samples. Surprisingly, 57% ($n = 66$) of studies failed to report any information on ethnicity. For ability composition, 50% ($n = 74$) of the studies included heterogeneous ability groups, and 18% ($n = 26$) used homogenous ability groups. For gender composition, 75% ($n = 111$) of studies used mixed-gender groups, whereas 19% ($n = 29$) used same-gender groups ($n = 11$ homogenous by group, $n = 18$ homogenous sample). These numbers suggest that, for gender and ability, the majority of studies employed heterogeneous grouping strategies, as recommended in the literature (e.g., D. W. Johnson, Johnson, & Holubec, 1998).

Study characteristics. Table 3 summarizes the descriptive results for study characteristics. The early adolescent sample included 8 decades of research, with the majority of studies (45%, $n = 67$) reported during the 1980s, 22% ($n = 33$) during the 1990s, 18% ($n = 27$) during the 1970s, 9% ($n = 14$) during the 2000s, and 4% ($n = 6$) during the 1960s or before. Many of the most recent studies were excluded because they did not compare cooperative

Table 2
Descriptive Results: Student Demographics

Characteristic	Coop vs. Comp	Coop vs. Ind	Comp vs. Ind	Total	%
Total studies	51	85	12	148	100
Country					
Australia	1	1	0	2	<1
Canada	0	5	1	6	4
England	0	1	0	1	<1
Greece	2	2	2	6	4
India	0	1	0	1	<1
Israel	4	2	0	6	4
Jamaica	1	0	0	1	<1
Netherlands	0	2	0	2	<1
Nigeria	3	0	0	3	2
Taiwan	0	1	0	1	<1
United States	36	65	7	108	73
Multiple countries	1	2	0	3	2
Economic status					
Lower	6	8	1	15	10
Middle/upper	8	14	4	26	18
Mixed	5	9	0	14	9
Ethnic composition					
Heterogeneous	19	16	2	37	25
Homogeneous	8	17	1	26	18
Ability composition					
Heterogeneous	22	45	7	74	50
Homogeneous	6	19	1	26	18
Gender					
Homogeneous by group	2	7	2	11	7
Female	1	4	0	5	3
Male	3	8	2	13	9
Mixed	42	61	8	111	75

Note. Coop = cooperative goal structures; Comp = competitive goal structures; Ind = individualistic goal structures; % = percentage of 148 independent studies included in the meta-analysis.

with competitive or individualistic goal structures. Instead, many of the recent studies tested aspects of cooperative goal structures against each other. This finding suggests that, during the past 2 decades, researchers may have turned their attention to unraveling the "black box" of cooperation rather than testing it against other forms of interdependence.

For treatment duration, the largest percentage of primary studies (30%, $n = 44$) compared treatments for 1 month or longer (i.e., 30–60 days), whereas roughly equal numbers (18%–19%) lasted for 1–4 weeks. In terms of research settings, the majority of primary studies (54%, $n = 80$) used intact classrooms, followed by academic settings (36%, $n = 54$) and laboratory settings (9%, $n = 14$). "Intact classrooms" implies that conditions were assigned to preexisting classroom groups, which does not control for dependence among students within the same classroom and thus may threaten the validity of a primary study's findings (Raudenbush & Bryk, 2002). Of the studies, 70% did not structure intergroup relations as part of the operationalization of cooperation. Furthermore, only 21% of the studies used a group size of five or more. Looking at academic subject areas, studies focused on language arts (23%, $n = 34$), social studies (13%, $n = 19$), math (19%, $n = 28$), and science (16%, $n = 24$). A large percentage of studies incorporated multiple academic subjects in their designs (23%, $n = 34$). Of the studies, 87% ($n = 129$) used individuals as the unit of analysis.

Table 3
Descriptive Results: Study Characteristics

Characteristic	Coop vs. Comp	Coop vs. Ind	Comp vs. Ind	Total	%
Total studies	51	85	12	148	100
Decade					
≤1960s	3	3	0	6	4
1970s	18	9	0	27	18
1980s	24	32	11	67	45
1990s	5	27	1	33	22
2000s	1	13	0	14	9
Duration (days)					
≤5	5	16	4	25	17
6–14	11	13	4	28	19
15–29	8	17	1	26	18
30–60	15	26	3	44	30
61–120	10	8	0	18	12
>120	2	4	0	6	4
Group setting					
Academic	15	26	5	46	31
Intact classes	32	45	3	80	54
Laboratory	4	6	4	14	9
Intergroup structure					
Competition	23	21	0	44	30
No intergroup structure	25	35	12	72	49
Size of group					
2	3	26	0	29	20
3	4	8	3	15	10
4	19	22	4	45	30
5	11	7	2	20	14
≥6	6	2	1	9	6
Subject area					
Computer	0	2	0	2	<1
Industrial arts	0	1	0	1	<1
Language arts	9	25	0	34	23
Math	11	16	1	28	19
Multiple subjects	14	17	3	34	23
Physical education	2	1	3	6	4
Science	8	13	3	24	16
Social studies	7	10	2	19	13
Unit of analysis					
As a group	8	8	2	18	12
Individually	42	77	10	129	87

Note. Coop = cooperative goal structures; Comp = competitive goal structures; Ind = individualistic goal structures; % = percentage of 148 independent studies included in the meta-analysis.

Publication and research quality. Of the 148 studies in this sample, 78% ($n = 115$) were found in peer-reviewed journals, 10% ($n = 15$) in technical reports, 7% ($n = 11$) in doctoral dissertations, and less than 4% in books ($n = 2$) and unpublished manuscripts ($n = 5$). Primary studies' sample sizes varied from less than 15 to 1,080, with approximately 77% ($n = 114$) using samples greater than or equal to 30 students ($n = 13$ not reporting).

Looking at indicators of methodological quality, 91% ($n = 134$) of studies reported using the same curriculum across treatment and control conditions. However, only 45% ($n = 66$) of studies used a control condition that was purely distinct from the treatment, a potential confound of treatment effects. Also of concern was the following: only 56% ($n = 83$) of studies reported checking that treatment conditions were implemented appropriately (44% did not report whether they checked the conditions), 62% ($n = 92$) reported some form of random assignment, and 53% ($n = 79$)

reported using the same experimenter (or teacher) across experimental and control conditions. Using a trichotomous index of primary studies' quality, we found 33% ($n = 49$) low quality, 40% ($n = 59$) moderate quality, and 27% ($n = 40$) high validity quality. Table 4 summarizes the descriptive results for publication and research quality.

ES Analyses

Overall effect of social interdependence. Following Hedges and Olkin (1985), we began ES analysis by evaluating the distributions of unweighted and weighted ES for normality and potential outliers. With the exception of those data sets with few primary studies (e.g., $n \leq 6$; see the competitive vs. individualistic comparisons), the weighted ES distributions fulfilled the normality assumption.

Achievement. HLM was used to estimate the overall weighted mean ES for both achievement and positive peer relationships. As

Table 4
Descriptive Statistics: Publication and Research Quality Information

Characteristic	Coop vs. Comp	Coop vs. Ind	Comp. vs. Ind	Total	%
Total studies	51	85	12	148	100
Source of study					
Book	2	0	0	2	<1
Journal	36	69	10	115	78
Doctoral dissertation	4	6	1	11	7
Technical report	8	6	1	15	10
Unpublished	1	4	0	5	3
Validity index					
High validity	9	24	7	40	27
Moderate validity	25	30	4	59	40
Low validity	17	31	1	49	33
Treatment fidelity					
Yes	23	49	11	83	56
Not mentioned	28	36	1	65	44
Curriculum					
Same	45	77	12	134	91
Different	6	8	0	14	9
Purity of control					
Mixed	38	42	1	81	55
Pure	13	42	11	66	45
Random assignment					
Random	31	53	8	92	62
Not random	20	32	4	56	38
Experimenter effect					
Experimenters same	24	46	9	79	53
Experimenters differed	27	39	3	69	47
Sample size					
≤15	2	1	3	6	4
16–30	6	11	1	18	12
31–60	10	27	4	41	28
61–99	6	11	0	17	11
100–199	7	13	0	20	14
200–299	6	3	0	9	6
300–499	2	3	3	8	5
500–899	2	2	1	5	3
≥900	1	0	0	1	<1

Note. Coop = cooperative goal structures; Comp = competitive goal structures; Ind = individualistic goal structures; % = percentage of 148 independent studies included in the meta-analysis.

predicted, the estimated weighted mean ESs for cooperative versus competitive goal structures and cooperative versus individualistic goal structures were significantly different from zero. Specifically, cooperation (cooperative goal structures) was associated with a 0.46 standard deviation increase in achievement over competition (competitive goal structures). Cooperation was also associated with a 0.55 standard deviation increase in achievement over individualistic (no interdependent goal structures). The overlap in confidence intervals (see Figure 2) suggested that any difference between cooperation–competition and cooperation–individualistic comparisons was not statistically significant.

As for the differential effect of competitive and individualistic goal structures on achievement, the estimated weighted mean ES was positive but nonsignificant (i.e., the ES was not statistically different from zero). Table 5 and Figure 2 summarize results for achievement across comparison groups (see also Appendix II in the supplemental materials for original HLM output, including random effects estimates). Table 5 also shows that, when low-quality studies were excluded from the analysis, cooperation was associated with a 0.57 standard deviation increase in achievement over competition and a 0.65 standard deviation increase in achievement over individualistic efforts. This finding suggests that low-quality studies may have lowered overall ES estimates.

Positive peer relationships. Results also supported hypotheses regarding the impact of social interdependence on positive peer

relationships. Specifically, cooperative goal structures were associated with 0.48 standard deviation increase in positive peer relationships over competitive goal structures. Cooperative goal structures were also associated with 0.42 standard deviation increase in positive peer relationships over individualistic goal structures. Again, the overlap in confidence intervals (see Figure 3) suggested that any difference between cooperation–competition and cooperation–individualistic comparisons was not statistically significant.

As for the differential effect of competitive and individualistic goal structures on positive peer relationships, the estimated weighted mean ES was positive (.03) but nonsignificant. Table 5 and Figure 3 summarize results for positive peer relationships across comparison groups (see also Appendix III in the supplemental materials for original HLM output, including random effects estimates). Table 5 also shows that, when the low-quality studies were excluded from the analysis, cooperation was associated with a 0.48 standard deviation increase in positive peer relationships over competition and a 0.56 standard deviation increase in positive peer relationships over individualistic. As with achievement, this finding suggests that low-quality studies may have lowered overall ES estimates.

Moderator variables. HLM analyses (see Appendixes II and III in the supplemental materials) showed that the variance component, τ , was significant for both achievement and positive peer

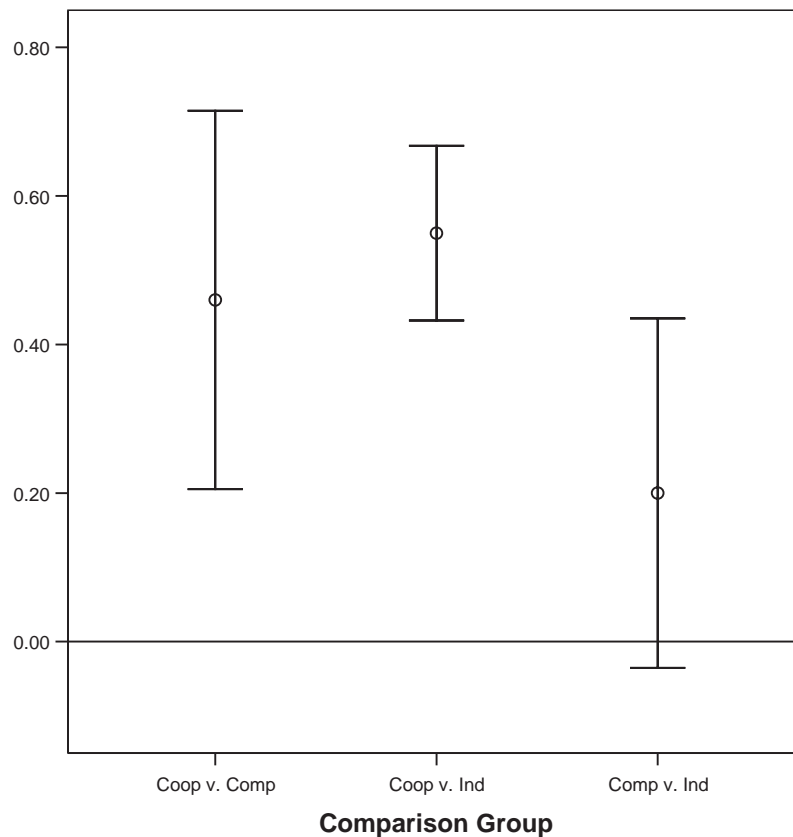


Figure 2. Achievement: 95% confidence intervals for hierarchical linear modeling weighted mean effect sizes. Points represent the weighted effect size estimates for each comparison group; vertical lines depict standard errors of the means (see Table 5). Coop = cooperative goal structures; Comp = competitive goal structures; Ind = individualistic goal structures.

Table 5
Hierarchical Linear Modeling Weighted Mean Effect Sizes for Achievement and Positive Peer Relationships

Dependent variable	Goal structure	Effects summary			SE (γ^U)	n	χ^2 p value
	Comparison groups	Average ES (γ^U)	CI high	CI low			
Achievement	Coop vs. Comp	.46 (.57)	1.00	.13	.22	23 (13)	.02
	Coop vs. Ind	.55 (.65)	.81	.48	.08	55 (40)	<.01
	Comp vs. Ind	.20 (.12)	.43	-.03	.08	29 (10)	.18
Positive peer relationships	Coop vs. Comp	.48 (.48)	.69	.26	.11	18 (13)	<.01
	Coop vs. Ind	.42 (.56)	.83	.28	.14	11 (6)	.01
	Comp vs. Ind	.03 (.03)	.91	-.86	.45	2 (2)	na

Note. Numbers in parentheses represent values excluding low-quality studies. ES = effect size; CI = 95% confidence interval; Coop = cooperative goal structures; Comp = competitive goal structures; Ind = individualistic goal structures.

relationships. Thus, as a final step, potential moderators were tested (results not presented), including indicators of methodological quality (*quality index, curriculum, purity of control, treatment fidelity, random assignment, and experimenter effect*) and other factors (*study duration, subject area, and source of study—e.g., journal, book, etc.*). The goal here was to determine whether study features may moderate or account for variability among primary studies (Lipsey & Wilson, 2001). Given the nonsignificant difference between cooperation–competition and cooperation–individualistic comparison groups, ESs were aggregated across both the competitive and individualistic goal structures. Thus, the

sample used for moderator analysis included ESs associated with both cooperation–competition and cooperation–individualistic comparisons. This step served to increase the sample size (and therefore power) for HLM analysis.

Of the potential moderators, only *treatment fidelity* yielded a better fitting model compared with the unconditional case. Specifically, the significant slope ($\beta_1 = .30, p = .02$) reduced variation among cooperation–other achievement ESs by 6.4%. Table 6 reports results for the unconditional and conditional models.

Relating achievement and positive peer relationships. Next, the relation between achievement and positive peer relationships

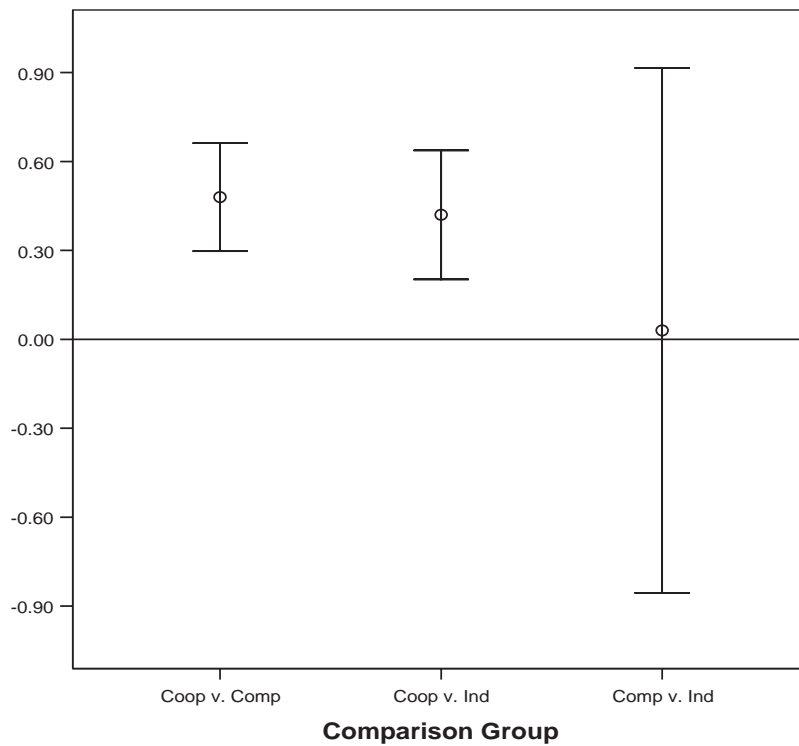


Figure 3. Positive peer relationships: 95% confidence intervals for hierarchical linear modeling weighted mean effect sizes. Points represent the weighted effect size estimates for each comparison group; vertical lines depict standard errors of the means (see Table 7). Coop = cooperative goal structures; Comp = competitive goal structures; Ind = individualistic goal structures.

Table 6
Hierarchical Linear Modeling Analysis for Treatment Fidelity Predicting Achievement

Model type	Effect type	Coefficient	SE	T ratio	df	p
Unconditional model	Fixed effect, β_0	.53	.06	0.14	76	<.001
		<i>SD</i>	Variance, τ	χ^2		
	Random effect, μ_i	.52	.27	>999	76	<.001
Conditional model		Coefficient	SE	T ratio		
	Fixed effect, β_0	.36	.09	3.73	75	.001
	Treatment fidelity, β_1	.30	.13	2.30	75	.02
		<i>SD</i>	Variance	χ^2		
	Random effect, μ_i	.50	.25	>999	75	<.001

was examined. Specifically, to evaluate the extent to which positive peer relationships predict achievement (or vice versa), we regressed the estimated mean ES for achievement on the estimated mean ES for positive peer relationships. Given the nonsignificant difference between cooperation–competition and cooperation–individualistic comparison groups, we again aggregated ESs across both the competition and individualistic comparison goal structures. This step increased the sample size (and therefore power), as the regression analysis required that a primary study provide ESs for both achievement and positive peer relationships. In all, our sample included 17 different studies reporting ESs for both dependent variables.

As shown in Table 7, results showed a strong, positive correlation between positive peer relationship ESs and achievement ESs, $\beta = .57$, $F(1, 16) = 7.48$, $p = .01$. Here, the standardized coefficient ($\beta = .57$) indicated that a one unit increase in positive peer relationship ES was associated with an average increase of .57 units of achievement ES. $R^2 = .33$ indicated that, in this sample, 33% of the variation in achievement ESs was accounted for by positive peer relationships. Figure 4 shows the regression model and scatterplot for positive peer relationships predicting achievement. Regression diagnostics and sensitivity analyses are presented in Appendix IV in the supplemental materials.

Next, analyses were conducted to check whether the correlation between achievement and positive peer relationships was influenced by the quality of studies included in the sample. Of the 17 studies in the sample, 5 were rated as high quality, 6 as medium quality, and 6 as low quality. After removing the 6 low-quality studies (leaving a subsample of 11 studies), results showed that the positive correlation between positive peer relationships ES and achievement ES actually became stronger, $\beta = .63$, $F(1, 10) = 6.91$, $p = .02$. The standardized coefficient ($\beta = .63$) indicated that a one unit increase in positive peer relationships ES was associated

with an average increase of .63 units of achievement ES. $R^2 = .40$ indicated that, in this sample, 40% of the variation in achievement was accounted for by positive peer relationships.

Figure 5 provides a visual summary of the ES estimates and the estimated correlation between positive peer relationships and achievement.

Discussion

The effects of social relationships on individual behavior and development have gained considerable attention within the academic achievement domain and across diverse areas of psychology. What this literature does not make clear, however, is *when* and *why* some social relationships promote achievement, whereas others obstruct optimal achievement levels. Focusing on early adolescents, in this study we intended to clarify this issue by examining divergent accounts of the ways that achievement and social goals affect each other.

Summary of Findings

Three issues were investigated in this meta-analysis: (a) the relative effect of cooperative, competitive, and individualistic goal structures on achievement; (b) the relative effect of cooperative, competitive, and individualistic goal structures on positive peer relationships; and (c) the extent to which cooperative goal structures (compared with competitive and individualistic goal structures) were associated with a positive relation between achievement and positive peer relationships. Clarifying these issues has implications for social interdependence theory as well as other accounts of the relation between achievement and peer relationships. Clarification also has applied implications for educational practice by showing that cooperative goal structures provide a

Table 7
Regression Analysis for Positive Peer Relationships Predicting Achievement

Variable	B	SE B	β	n	p
Positive peer relationships	0.83 (0.84)	0.30 (0.32)	.57 (.63)	17 (11)	.01 (.02)

Note. Numbers in parentheses represent values excluding low-quality studies. $R^2 = .33$ (.40).

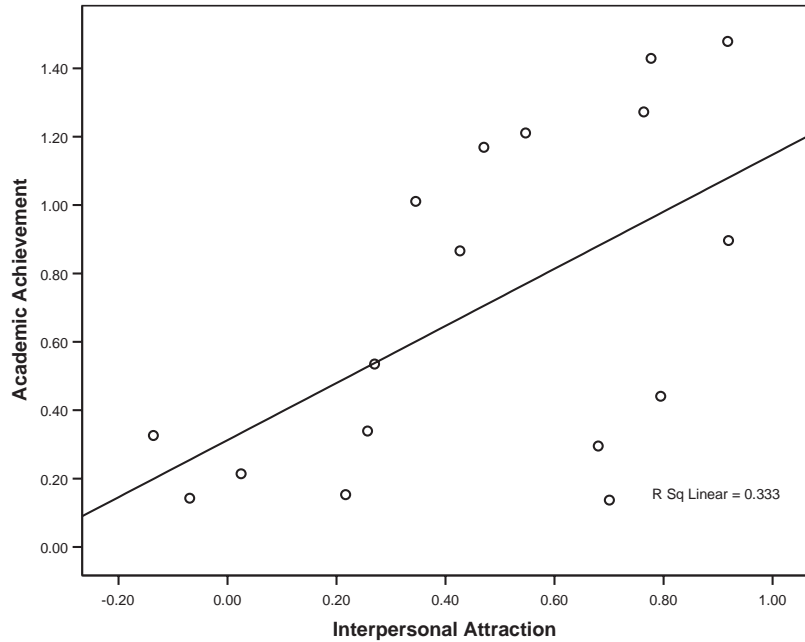


Figure 4. Positive peer relationships predicting achievement. Points show the relation between two weighted effect size estimates within each study reporting data on both interpersonal attraction and academic achievement. The diagonal line depicts the least-squares regression equation (see Table 6).

mechanism by which practitioners may *simultaneously* promote early adolescents' achievement and positive peer relationships.

Promoting achievement. The first hypothesis tested was whether higher levels of achievement were associated with cooperative rather than competitive or individualistic goal structures

(see Table 5 and Figure 5A). From the school's perspective, academic achievement may be its most important objective. Middle school is a fresh start for early adolescents, providing the opportunity for them to engage academically and to begin to build the knowledge and the record of performance necessary to do well

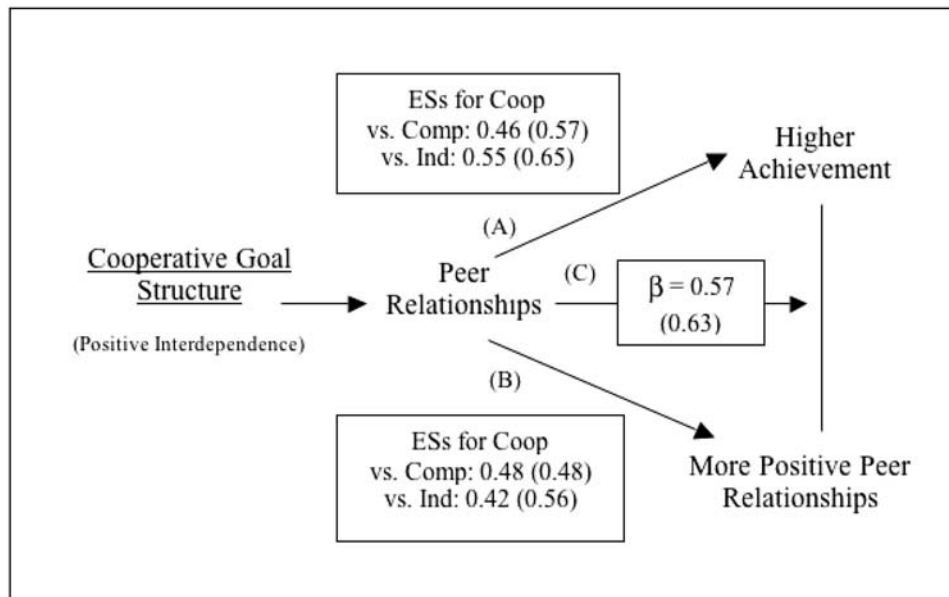


Figure 5. Summary of results for cooperative goal structure. ESs = estimated effect sizes; Coop = cooperative goal structures; Comp = competitive goal structures; Ind = individualistic goal structures; β = standardized correlation coefficient. See Tables 5 and 7 for complete statistics.

in high school, take advanced courses, be admitted to the university of their choice, and eventually to have the career opportunities they desire. A primary responsibility of teachers is to ensure that students are academically engaged in their classes and sufficiently integrated into the academic programs of the middle school. Students who do not achieve academically are at risk for dropping out or being relegated to special programs that limit future educational and career opportunities.

As predicted, in this study we found that for early adolescents, cooperative goal structures were associated with higher levels of achievement than were competitive or individualistic goal structures. This finding further validates social interdependence theory and corroborates the results of previous meta-analyses (D. W. Johnson & Johnson, 1989; D. W. Johnson et al., 1981). More about the implications for social interdependence theory is discussed below.

The differential effect of goal structures on achievement also corroborates research on achievement goal theory, where goal orientations are broadly defined "in terms of the purposes that individuals have for engaging in specific behaviors" (E. M. Anderman & Wolters, 2006, p. 371; see also Pintrich & Schunk, 2002; Urdan, 1997). In general, research on achievement goal theory suggests that mastery orientations (i.e., focused on self-improvement) are associated with adaptive outcomes, whereas performance orientations (i.e., focused on comparing one's competence with others) are associated with maladaptive outcomes (for reviews, see E. M. Anderman & Maehr, 1994; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Midgley, Kaplan, & Middleton, 2001; Pintrich, 2000a, 2000b; Urdan, 1997). Similarly, research on classroom goal structures (defined contextually rather than individualistically or relationally) generally shows the same mastery-adaptive, performance-maladaptive relations. Thus, to the extent that this study's focus on cooperative and competitive goal structures overlaps with the mastery and performance constructs, the adaptive effects of cooperation–mastery over competition–performance are corroborated.

This finding may also shed light on apparent inconsistencies within this literature on the effect of *classroom* goal structures on academic achievement. Specifically, E. M. Anderman and Wolters (2006) have pointed out that although most studies indicate that performance-oriented classroom goal structures are *negatively* related to grades (e.g., E. M. Anderman & Midgley, 1997; L. H. Anderman & Anderman, 1999; Urdan, Midgley, & Anderman, 1998), they also show that mastery-oriented classroom goal structures are generally *unrelated* to students' grades (though see Midgley & Urdan, 2001). Simply put, it is not yet clear why mastery-oriented classroom goal structures are not positively related to grades.

It is provocative to compare this study's robust, meta-analytic finding of the positive effect of cooperative goal structures on achievement with the inconsistencies highlighted above. It may be, for example, that *relational* goal structures are more proximal predictors of achievement than either individual goal orientations or contextual measures of classroom goal structures. Indeed, just as students' perceptions of classroom- and school-level goal structures may influence students' personal goal orientations (e.g., Ames & Ames, 1984; Wolters, 2004), so it may be that relational goal structures moderate the hypothesized effects of both individual- and classroom-level goals. An experimental design in

which relational goal structures are manipulated in the context of consistent individual- and classroom-level goal orientations may test this prediction.

Promoting positive peer relationships. The second hypothesis tested was whether higher levels of positive peer relationships were associated with cooperative rather than competitive or individualistic goal structures (see Table 5 and Figure 5B). From the early adolescent perspective, positive peer relationships may be the most important aspect of middle school. Fitting in with the other students, being well liked, and making friends are all of great concern to most early adolescents making the transition from elementary to middle school. Indeed, healthy adolescent development depends on students' development of positive, constructive relationships (e.g., Baumeister & Leary, 1995; Erikson, 1963, 1968; Maslow, 1970; Roeser et al., 2000), with research showing that positive peer relationships tend to be related to appropriate behavior in schools (e.g., academic competence, involvement, self-esteem) and lower levels of negative behavioral patterns (e.g., violence, drug abuse, teenage pregnancy, depression; Barrera et al., 1993; Berndt & Keefe, 1995; Buhrmester, 1990; Cauce, 1986; DeRosier et al., 1994; Feldman et al., 1988; Goodenow, 1993; S. Harter, 1994; Marks, 2000; Parker & Asher, 1987; Resnick et al., 1997; Wentzel, 1994, 1998; Wentzel et al., 2004).

It is not only during early adolescence that relationships are important, however. From infancy to old age, having friends and relating successfully to other people is associated with desirable outcomes in virtually all human domains: school, work, parenthood, adaptation during life transitions, coping with negative events, and maintaining self-worth and emotional well-being (Hartup & Stevens, 1997). In addition, positive relationships are associated with recovery from illness, functioning of the immune systems, reactions to stress, mortality rates, psychological health, and life satisfaction (Reis & Collins, 2004), as well as happiness and well being (Diener & Seligman, 2002; Park et al., 2004).

As predicted, in this study we found that for early adolescents, cooperative goal structures were associated with higher levels of positive peer relationships than were competitive or individualistic goal structures. This finding further validates social interdependence theory and also corroborates the results of previous meta-analyses (D. W. Johnson & Johnson, 1989; D. W. Johnson et al., 1983).

Relating achievement and positive peer relationships. The third hypothesis tested was that cooperative goal structures (compared with competitive and individualistic goal structures), would be associated with a positive relation between achievement and positive peer relationships. The results support this prediction (see Table 7 and Figure 1C), indicating that there was a strong positive relation between early adolescents' achievement and positive peer relationships. This finding is consistent with previous work suggesting that achievement may be closely related to social concerns (Juvonen, 2006; Juvonen & Wentzel, 1996; Urdan & Maehr, 1995). It is also consistent with previous work linking peer learning methods to social outcomes (Ginsburg-Block, Rohrbeck, & Fantuzzo, 2006).

Implications for Theory

This study contributes uniquely to the literature by testing contrasting theoretical predictions regarding the relation between

achievement and positive peer relationships. Further, this study combines state-of-the-art methods in meta-analysis and statistics with sampling procedures continuously implemented for over 30 years. Thus, the results of this study have considerable generalizability in terms of the comprehensive sampling procedure and the robustness of results across a wide variety of participant characteristics, research designs, treatment lengths, country in which the study was conducted, and measures of the dependent variables.

Social interdependence theory. Social interdependence theory predicts that successful goal achievement results in liking for those who promoted one's success. According to Deutsch's (1985) crude law of social relations, the positive relation between achievement and positive social relationships may be attributed to a "benign spiral" in which successful goal achievement leads to increased positiveness of relationships among group members, which in turn leads to greater achievement and so forth.

The results of this meta-analysis provide some validation of this model by demonstrating that cooperative goal structures were associated with both higher achievement and more positive peer relationships than were competitive or individualistic goal structures. In addition, by finding a positive correlation between higher levels of achievement and more positive peer relationships, the results also provide some validation of the crude law of social relations. Specifically, it may be inferred that positive social relationships are not only one of the results of cooperative goal structures but are also one of the processes contributing to higher levels of achievement.

Building on this last point, it must be emphasized that in this meta-analysis we did *not* test a directional hypothesis, raising questions about whether Deutsch's (1985) crude law of social relations (i.e., the benign spiral) fully accounts for the processes associated with cooperative (as opposed to competitive and individualistic) goal structures. It is equally possible that the positive correlation reflects the history of promotive interactions rather than higher levels of achievement per se. From this perspective, higher achievement and more positive social relationships may actually be independent, albeit complementary, outcomes associated with cooperative goal structures. Following Hinde (1976), a history of interaction patterns may result in more positive social relationships independent of whether achievement goals are successfully attained. Experiments in which individuals' goals are structured cooperatively and goal achievement is manipulated (e.g., success vs. failure) are needed to test this possibility (see Ames, 1981, for one possible design).

Theories suggesting a complementary relation. Theories such as hierarchy of needs and belongingness postulate a complementary relation between positive peer relationships and achievement. Specifically, these theories predict that (a) some goals may be prioritized over others (e.g., social goals before achievement goals) and that (b) the attainment of social goals may facilitate achievement. Thus, early adolescents with insufficient or complete lack of positive peer relationships may achieve at lower levels. This study's results suggest that goal structures are strongly associated with positive peer relationships and, more specifically, that cooperative goal structures may actually enhance these outcomes. Theories suggesting a complementary relation between peer relationships and achievement may need to be modified to indicate that the extent to which social goals may be satisfied depends on relational goal structures. Alternatively, it may be that these theories should

be modified to indicate that the salience of social goals may be stronger when relational goals are structured cooperatively than competitively or individualistically. To the extent that salience predicts goal attainment, cooperative goal structures may enhance these outcomes compared with competitive or individualistic goal structures.

Theories suggesting a conflicting relation. Theories of distraction/conflict suggest that school-related academic and social goals are likely to conflict and inhibit optimal achievement. From this perspective, peers may distract students and place them in conflict between social pursuits and achievement tasks. This study's results do not support this view, suggesting that distraction/conflict theories may need to be modified to indicate that, under cooperative goal structures, social goals do not distract from achievement. To the contrary, this study suggests that cooperative goal structures are associated with a positive relation between achievement and social goals. It may be that social goals distract from achievement only under competitive and individualistic goal structures.

Group cohesion theories make two predictions regarding the relation between achievement and social goals, only one of which was supported by this study's results. Cohesion theory predicts that the relation between achievement and positive social relationships depends on whether peer group norms promote or discourage school-related achievement. When group norms promote achievement, it is expected that achievement and social goals would be positively related. When group norms discourage school-related achievement, it is expected that achievement and social goals would be negatively related. Thus, this study's results support group cohesion theory in part, as the positive relation between achievement and positive social relationships under cooperative goal structures suggests that peer group norms may have been positively oriented toward school achievement. More likely perhaps, it may be that cooperative goal structures induce, or at the very least increase, the salience of positive achievement norms.

Implications for Practice

By implication, this study suggests that the more early adolescents' teachers structure students' academic goals cooperatively (as opposed to competitively or individualistically), (a) the more students will tend to achieve, (b) the more positive students' relationships will tend to be, and (c) the more higher levels of achievement will be associated with more positive peer relationships. Alternatively (and yet equally beneficial), this study may also imply that the more teachers structure students' academic goals cooperatively (as opposed to competitively or individualistically), the more positive peer relationships may promote higher levels of achievement. Until research determines otherwise, it appears that causation may go either way.

By showing evidence that treatment fidelity moderates or accounts for variation in ES outcomes, this study also adds further understanding of the occasional gap between research and practice in comparing cooperative, competitive, and individualistic goal structures (though it should be pointed out that failure to report on treatment fidelity does not necessarily prove that one was not carried out). More specifically, finding that treatment fidelity increases the effectiveness of cooperative over competitive and individualistic goal structures provides strong evidence that more attention should be paid to how cooperative goal structures are

implemented in learning situations (see Rohrbeck, Ginsburg-Block, Fantuzzo, & Miller, 2003, for similar evidence about peer-assisted learning procedures). This finding also stresses the importance of instruction and on-going training when using these instructional methods.

The results of this study also have important implications for work teams in all settings. Katzenback and Smith (1993), for example, found anecdotal evidence that extraordinary high performing teams in business and industry were differentiated from effective teams by the closeness and caring of the relationships among members. They concluded that the more positive the relationships among members, the more productive a team would be. In addition, research by the Gallup Organization shows that people who work in units where they have a "best friend" perform better than those who do not have a best friend in their unit (J. K. Harter, Schmidt, & Hayes, 2002). This study's results provide support for these conclusions.

These results also have important implications for middle schools. When early adolescents become disengaged from school, it represents both a failure for the middle school and a developmental disadvantage for the individual student. Doing well in school significantly increases a student's opportunities, whereas doing poorly restricts future opportunities. When teachers use competitive or individualistic goal structures, academic and social outcomes tend to be separated and may form competing agendas, with peer interaction excluded from classrooms and relegated to hallways and lunchrooms. When teachers implement cooperative goal structures in learning situations, however, the results of this study indicate that both academic and social goals may be attained simultaneously. This finding provides yet another reason that schools should deemphasize competitive and individualistic work and promote cooperation (Ames, 1992; D. W. Johnson, 1970; D. W. Johnson & Johnson, 1999; Juvonen, 1996). Cooperative goal structures require that students interact while working on academic assignments, thus building relationships *while* making academic progress. As the results of this study suggest, the more successful students are in building positive peer relationships, the more likely these students are to achieve.

Limitations

One of the limitations of this study is the small number of studies that measured both achievement and positive social relationships (i.e., 17 studies). Although this may be considered a small sample for linear regression, sensitivity analyses showed the effect to be robust (see Appendix IV in the supplemental materials). Moreover, the correlation reflects a relationship across different samples, measures, and operationalizations, thus revealing a robust positive relation between achievement and positive social relationships across all these factors. Another potential limitation of this study is that the sample included only early adolescents. As suggested by Juvonen (2006), future research should examine the relation between achievement and positive peer relationships across other developmental periods (e.g., elementary school students), as different age groups may place different amounts of emphasis on peer relationships (see also Coleman, 1961; Erikson, 1963, 1968).

Another limitation of the study is the focus on broad conceptualizations of achievement and social goals. Future research may

wish to examine other indices of productivity, such as achievement motivation and achievement values. Likewise, future research may also examine whether different kinds of social goals (e.g., to be prosocial, to be well liked, etc.; see Ford & Nichols, 1991) are differentially affected by cooperative, competitive, and individualistic goal structures. As discussed earlier, this study's macro-level approach emphasizes construct validity at the cost of aggregating over potentially meaningful variation among subconstructs (Cronbach, 1971). Several theoretical models of motivation (e.g., expectancy value theory; see Wigfield & Eccles, 2000), for example, differentiate among goals, values, and other variables. Whether goal structures differentially affect these constructs remains an empirical question.

Another limitation of this study is that it focuses exclusively on the effects of peer relationships within school settings, thus ignoring the effects of other relationships, such as peers outside instructional settings, sibling relationships, parent relationships, and teacher-student relationships. Research suggests, for example, that positive teacher-student relationships are also associated with adaptive school outcomes, such as academic competence (Roeser et al., 2000), participation and effort (Wentzel, 1997), and maintaining high motivation during the transition from middle school to high school (Murdock, Anderman, & Hodge, 2000). The extent to which different relationships (e.g., student-student and student-teacher) mutually affect each other remains an important topic for future research.

Conclusion

The results of this meta-analysis indicate that, for early adolescents, cooperative goal structures were associated with both higher achievement and greater positive peer relationships than were competitive or individualistic goal structures. In addition, the results indicate that the more positive the relationships were among early adolescents, the higher they tended to achieve. These results have considerable significance for social interdependence and other theories. The results also have important practical implications for middle schools and educators who work with early adolescents.

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