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Identifying Developmental Cascades among Differentiated Dimensions of Social Competence and Emotion Regulation

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Abstract

This study utilized data from 356 children, their mothers, teachers, and peers, to examine the longitudinal and dynamic associations among three dimensions of social competence derived from Hinde's (1987) framework of social complexity: social skills, peer group acceptance, and friendship quality. Direct and indirect associations among each discrete dimension of social competence and emotion regulation were also examined. Results suggest that there are important distinctions among the dimensions of social competence as they relate to one another and to emotion regulation. Model comparisons provided evidence of cascade and reciprocal effects among the variables, demonstrating complex associations that are ongoing across middle childhood. Specifically, there were cascading effects from emotion regulation abilities at age 5 to social skills at age 7, which was then associated with age 10 outcomes of more positive friendship quality, greater peer acceptance, and greater emotion regulation.

Keywords

developmental cascades; emotion regulation; middle childhood; peer relations; social competence

Social competence is a multi-faceted, dynamic construct that includes both individual characteristics and behavioral patterns; it is considered a key indicator of positive development (Hubbard & Coie, 1994) and is linked to adaptive outcomes both concurrently and longitudinally (Ladd, 1999; Rubin, Bukowski, & Parker, 2006). Researchers have examined a variety of aspects of social competence, including specific skills useful to social situations, status with peers, and the ability to form and maintain positive friendships. To date, no one aspect has emerged as primary (Rubin, Begle, & McDonald, 2012), but instead, researchers tend to view each as reflecting important, but distinct, components of social competence (Hubbard & Coie, 1994; Rose-Krasnor, 1997). Three dimensions of social competence have been of particular interest in previous literature and are theoretically and

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empirically central to adaptive development: social skills, peer group acceptance, and friendship quality. An examination of the associations among these dimensions over time could aid in understanding the development of the broader construct of social competence.

Interpersonal interactions inherently involve emotions and their regulation and therefore the link between social and emotional competence has been well-documented. Although theoretically linked, emotional competence, and in particular the ability to regulate emotional arousal, has been theorized to underlie socially appropriate behavior and have important implications for adaptive social functioning (Eisenberg, Hofer, & Vaughan, 2007; Rose-Krasnor & Denham, 2009), rather than represent overlapping constructs. Similar to social competence, emotion regulation is a complex, multi-faceted construct; it includes both automatic and effortful processes that work together to maintain and modulate emotional expression and experience (Calkins & Hill, 2007). These regulatory processes function at a biological, behavioral, and environmental level and are hierarchical and transactional in nature (Calkins, 2011; Sameroff, 2010). The integrated and reciprocal relations across these levels account for the regulation of emotion and subsequently impact children's ability to attend to social cues, generate increasingly complex social responses, and improve overall social functioning. For example, children's interactions with peers are laden with situations that elicit strong emotions, such as cooperative and competitive play, engaging in self-disclosure, and negotiating social hierarchies within the peer group. These types of interactions are likely to provoke emotional arousal, and the degree to which children can regulate that arousal impacts how peers view them. Thus, emotion regulation skills can have lasting effects on children's peer relationships. Indeed, previous research has demonstrated that children who engage in strong emotional displays, either positive or negative, are more likely to be rejected by peers (Hubbard, 2001), whereas children who show a high degree of regulatory competency are able to engage with peers more positively and are more likely to be accepted by peers (Eisenberg, Fabes, Murphy, Maszk, Smith, & Karbon, 1995; Spinrad et al., 2006). The ability to regulate emotional arousal in a contextually appropriate manner is therefore a core component, and critical predictor, of successful social interactions (e.g., Calkins, Gill, Johnson, & Smith, 1999; Eisenberg, et al., 1993).

Although extant work linking social competence and emotion regulation abilities has generated important insights into the specific emotional behaviors and emotion-related regulatory processes associated with general social competence and behavior, less is known about how emotion regulation skills are associated with specific dimensions of social competence. In the emotion regulation literature, social competence is usually analyzed as either a broad composite or a single dimension. Yet, as we discuss below, dimensions of social competence are conceptually distinct and thus may have unique associations with children's emotion regulation ability. It has been proposed that these associations are transactional in nature (Rose-Krasnor & Denham, 2009), such that emotion regulation skills not only shape social interactions and relationships but also emerge from these dimensions of social competence. To date, there is minimal empirical evidence for this hypothesis.

In this study, we focus on middle childhood, a developmental period of substantial social transition, when children enter school, become active members of peer groups, and establish dyadic friendships. These are new social situations, with new social demands, in which the

ability to manage emotions effectively can be particularly critical for establishing long-term success in peer relationships. We tested a developmental cascades model, which posits that development in one domain spills over into other domains in a manner consistent with a chain reaction (Masten et al., 2005). We utilized three waves of data—at ages five, seven, and ten—to examine simultaneous longitudinal relations among emotion regulation and three distinct dimensions of social competence: social skills, peer group acceptance, and friendship quality.

Differentiating Dimensions of Social Competence

Theoretically, several important distinctions among dimensions of social competence have been made. Hinde (1979, 1987, 1995) theorized that social experiences can be organized into levels of complexity, providing a useful framework for beginning to distinguish the complex and reciprocal processes that occur in social development. The current study utilized this framework of hierarchical complexity and examined the ways in which three dimensions of social competence (social skills, peer group acceptance, and friendship quality), each at different levels in the hierarchy, were associated with one another and with emotion regulation throughout middle childhood.

The first, and most basic, level of Hinde's framework (1987, 1995) is the *individual*, which includes characteristics of the child such as personality, cognition, and competencies. Next is the level of *interaction*, defined as a time-limited series of exchanges between individuals. In the current study, we utilize social skills to represent Hinde's first and second levels because the social skills that individuals possess are implemented within the context of interactions (Rubin et al., 2006). Social skills include the ability to engage in behaviors that benefit others and improve social interactions, such as sharing, cooperating, helping others, appropriately asserting oneself, and responding appropriately in conflict and non-conflict situations (Gresham & Elliot, 1990; Rose-Krasnor & Denham, 2009). It is relatively common for researchers to equate social skills with social competence, but for our purposes we define social skills as one dimension of the much more complex construct of social competence.

The third level in Hinde's theory is *relationships*, which consist of interactions between two individuals over time. In the current study, we use friendship quality as an indicator of this level of the theory due to friendship's critical role in social development through middle childhood. One of the hallmarks of middle childhood is the increased focus on peer relationships and friendships (Huston & Ripke, 2006), which come to occupy a position of great importance in individuals' lives. High quality friendships are sources of support, outlets for self-disclosure, resources for identity development, and models for future relationships (Furman, 1996; Hartup & Stevens, 1997).

Finally, *groups* are the largest and most complex level of Hinde's theory, and are composed of networks of relationships defined by shared norms and environments. In this study, this dimension of social competence is represented by peer group acceptance. In early childhood, peer groups are based on proximity or they are organized by adults, and they are generally broad and inclusive. In middle childhood, however, peer groups become smaller, more

exclusive, and more central to the child's social life (Rubin et al., 2006). At this age, acceptance by the peer group has been linked to outcomes of greater school involvement, higher school achievement, and reduced loneliness over time (Kingery, Erdley, & Marshall, 2011).

Although Hinde's framework (1987) organizes social experiences by complexity, this structure does not necessarily represent their developmental sequence. Thus, for this study, the representation of the sequence of the dimensions of social competence was based on the developmental periods in which each has been shown to come online. We began with individual social skills due to evidence that behaviors such as sharing and showing sympathy are present in toddlerhood (Hay, 1994; Robinson, Zahn-Waxler, & Emde, 1994) and increase in frequency and sophistication with the entrance to school (Eisenberg, Fabes, & Spinrad, 2006). Next, children engage in interactions with their peers, both in groups and dyads. Acceptance into peer groups has been linked to positive outcomes, such as academic performance and attitudes toward school, as early as preschool (Ladd, 1990), and continue to grow in salience throughout childhood (Rubin et al., 2006). Friendships in middle childhood and preadolescence take on the essential qualities of intimate friendship, such as affective reciprocity, mutual influence, and relational commitment, and become increasingly important to individual development and well-being (Hinde, 1979; Rubin et al., 2006).

Emotion Regulation and Differentiated Dimensions of Social Competence

There is a growing body of research indicating that emotion regulation is important to social competence across the span of middle childhood. Existing work has demonstrated that children experience substantial gains in regulatory abilities as they move from early childhood through middle childhood (Raffeaelli, Crockett, & Shen, 2005). These gains in emotion regulation have been linked with children's social skills, peer group acceptance, and friendship quality. Proficient regulation of emotion predicts greater social skills, concurrently and longitudinally, and among young children as well as adolescents (Carlo, Crockett, Wolff, & Beal, 2012; Eisenberg et al., 1997). It is likely that children who are more competent in modulating their emotional reactions are better able to utilize their social skills in a range of situations (Eisenberg, Fabes, & Spinrad, 2006). In addition, previous literature has shown that children who are better able to regulate their emotions are more successful with their peer groups, and experience greater acceptance and status (Eisenberg et al., 1997; McDowell, O'Neil, & Parke, 2000). Finally, an emerging body of literature has provided some early evidence that children's emotion regulation predicts concurrent and future friendship quality in middle childhood and adolescence (Blair, Perry, Calkins, Keane, O'Brien, & Shanahan, 2014; Schwarz, Stutz, & Ledermann, 2012).

Although empirical work has underscored the importance of emotion regulation for children's social skills, peer acceptance, and friendships, few studies have considered these dimensions simultaneously. The advantage of examining associations simultaneously is the ability to parse out which pathways are particularly critical in shaping the outcomes of interest. For example, emotion regulation has been theorized to improve social outcomes through children's enhanced ability to modulate their arousal in a way that allows them to engage in adaptive and socially appropriate behaviors while minimizing behaviors that may

interfere with successful social interactions (Eisenberg et al., 2007). Thus, in the current study, we expected that there would be the direct effects we have already outlined, but also indirect effects such that that emotion regulation at age five would be related to social skills at age seven and then cascade to the peer-based social competencies of peer group acceptance and friendship quality.

Developmental Cascades

The developmental cascades framework is based on theoretical approaches that emphasize the complexity of individual development across time and contexts and the interplay of developmental processes across multiple levels (Cairns, 2000; Magnusson & Cairns, 1996; Masten, Burt, & Coatsworth, 2006). More specifically, developmental cascades models are based on the expectation that development in one domain will shape development in other domains in a progressive cascade. For example, Van Lier and Koot (2010) found evidence of developmental cascades that began with externalizing behaviors in kindergarten, moved through multiple dimensions of peer relations problems in first through third grades, and resulted in a variety of problem outcomes in fourth grade. Prior work utilizing the sample of the current study implemented the developmental cascades framework in an examination of socio-emotional competence and externalizing behaviors in early childhood. Findings suggested that emotion regulation and social competence dimensions were related to subsequent problem behaviors, but few associations were found among the emotional and social constructs (Blandon, Calkins, Grimm, Keane, & O'Brien, 2010). The current study re-conceptualizes the developmental cascades among emotion regulation and social competence in such a way as to better understand the multi-dimensional nature of social competence and extends this work to middle childhood.

The Current Study

Previous reports from the sample that is used in the present study have provided preliminary support for the hypotheses tested here, particularly with regard to the role of emotion regulation as a contributor to specific aspects of social competence. Reports utilizing these data have found that, in early childhood, lower levels of emotion regulation at preschool age were associated with lower peer group acceptance in kindergarten (Keane & Calkins, 2004). Also, among kindergarteners, physiological indices of emotion regulation were positively associated with social acceptance; an association that was mediated by peer reports of children's social skills(Graziano, Keane, & Calkins, 2007). Finally, a recent study with this sample found a positive association between emotion regulation at age 7 and friendship quality at age 10 (Blair et al., 2014). Taken together, there is accumulating support for emotion regulation abilities as foundational to social competence, measured in multiple ways, and for links between different aspects of social competence. To date, however, the full set of social competence dimensions has not been analyzed in a single study, nor has any report of these data examined the reciprocal associations between social competence and emotion regulation.

The current study builds on and extends this previous work by examining the bidirectional associations among emotion regulation abilities and specific dimensions of social

competence over time considering indirect pathways by which emotion regulation abilities may shape social development, and including multiple indicators of social competence. In particular, we hypothesized that emotion regulation would have unique, positive associations with each of the social competence dimensions, demonstrating the discrete nature of the dimensions in relation to emotion regulation. In addition, we hypothesized two possible models that represent the transactional nature of the links between emotion regulation and social competence. The first was a model in which the ability to regulate emotion influences dimensions of social competence across time, and in addition, dimensions of social competence influence emotion regulation abilities. Thus, this model is one of direct reciprocal influences between emotion regulation abilities and each of the social competence dimensions. Support for this model would suggest that the ability to regulate emotions has important implications for the development of social skills, peer acceptance, and friendship quality across middle childhood, but also that each of these also has an influence on the development of emotion regulation. The second model was a developmental cascades model in which we hypothesized that children's ability to regulate emotions at age five would be the initial point of influence, and that these regulatory abilities would be associated with development in social skills to age seven; from there, the cascade would move to both peer group acceptance and friendship quality. Support for this model would suggest that the influence of emotion regulation abilities on the discrete dimensions of social competence becomes less direct as children mature but that there are indirect effects of emotion regulation abilities through the ongoing development of social skills across middle childhood. Finally, we tested a model that combined these two hypothesized models, which we refer to as the full model. A series of nested path analyses were used to identify a process model of social and emotional developmental associations across middle childhood. The specific hypotheses tested, each depicted in Figure 1, are:

1. Children with a greater ability to regulate their emotions will show higher social competence in each dimension above and beyond the prediction of the other social competence dimensions; accordingly, a model in which emotion regulation positively shapes performance on all social competence dimensions will have better fit than models in which only a single dimension is included.
2. There will be reciprocal relations across time points among the ability to regulate emotions and each of the social competence dimensions, such that children with higher reported emotion regulation abilities at one time point will show an increase in in each aspect of social competence to the next time point, and each aspect of social competence will be associated with children's later ability to regulate emotion.
3. There will be cascade effects, such that the ability to regulate emotions at age 5 will be associated with change in social skills between ages 5 and 7, which will in turn be associated with peer group acceptance and friendship quality at age 10.
4. The cascade model will better represent the developmental processes between emotion regulation and the dimensions of social competence than the reciprocal model.

Methods

Participants

The current study utilized data from three groups of children who are part of an ongoing longitudinal study of social and emotional development. The goal for recruitment was to obtain a sample of children who were at risk for developing future externalizing behavior problems, and who were representative of the surrounding community in terms of race and socioeconomic status (SES). All cohorts were recruited through child day care centers, the County Health Department, and the local Women, Infants, and Children (WIC) program. Potential participants for cohorts 1 and 2 were recruited at two-years of age (cohort 1: 1994-1996 and cohort 2: 2000-2001) and screened using the Child Behavior Checklist (CBCL 2-3; Achenbach, 1992), completed by the mother, in order to over-sample for externalizing behavior problems. Children were identified as being at-risk for future externalizing behaviors if they received an externalizing T-score of 60 or above. Efforts were made to obtain approximately equal numbers of males and females. This recruitment effort resulted in a total of 307 selected children. Cohort 3 was initially recruited when infants were six-months of age (in 1998) for their level of frustration, based on laboratory observation and parent report, and were followed through the toddler period (see Calkins, Dedmon, Gill, Lomax, & Johnson, 2002, for more information). Children from Cohort 3 whose mothers completed the CBCL at two-years of age (N = 140) were then included in the larger study. Of the entire sample (N = 447), 37% of the children were identified as being at risk for future externalizing problems. There were no significant demographic differences between cohorts with regard to gender, $\chi^2(2, N = 447) = .63$, p = .73, race, $\chi^2(2, N = 447) = 1.13$, p = .57, or two-year SES, F (2, 444) = .53, p = .59.

At five years of age, 365 families participated. Families lost to attrition included those who could not be located, moved out of the area, declined participation, or did not respond to phone and letter requests to participate. There were no significant differences between families who participated in this wave of data compared to those who did not in terms of child gender, χ^2 (1, N = 447) = 0.76, p = .38, race, χ^2 (1, N = 447) = 0.17, p = .68, 2-year socioeconomic status, t (424) = 1.93, p = .06, or 2-year externalizing T score, t(445) = −1.73, p = .09. At 7 years of age, 356 families participated including 21 families who did not participate in the 5-year assessment. Again, there were no significant differences between families who did and did not participate in terms of child gender, $\chi^2(1, N = 447) = 2.15$, p = .16, race, $\chi^2(3, N = 447) = 0.61$, p = .90, or 2-year externalizing T score, t (445) = 1.43, p = .15. Families with lower 2-year SES, t(432) = -2.31, $p < .05$, were less likely to continue participation at the seven-year assessment. At age ten, 357 families participated, including 31 families that did not participate in the seven-year assessment. No significant differences were noted between families who did and did not participate in the ten-year assessment in terms of child gender, χ^2 (1, N = 447) = 3.31, p = .07; race, χ^2 (3, N = 447) = 5.78, p = .12; 2-year SES, t(432) = -.02, p = .98; or 2-year externalizing T score, t (445) = 0.11, p = .91.

The sample for the current study included only cases with data for at least one of the model variables at the five-year data collection point, in order to ensure that the participants who were included had adequate data coverage for the time points of interest. Also, four children

who were diagnosed with developmental delays were removed from the sample, resulting in a sample of 356. The children were fairly evenly split by gender (53% girls), and a third of the sample was ethnic minority (67% European American, 27% African American, 3% bi-racial, and 3% other). Mothers of the children had varying levels of educational attainment: 13% had a high school diploma or less, 36% had some college, 38% had a college degree, and 12% had an advanced degree. Families were economically diverse based on Hollingshead (1975) scores at the 5-year assessment, with a range from 14 to 66 (M = 43.05, SD = 10.42), thus representing families from each level of social strata typically captured by this scale. Hollingshead scores that range from 40 to 54 reflect occupations considered to be representative of middle class.

Procedures

Children and their mothers participated in an ongoing longitudinal study beginning when the children were two years of age. The current analyses include data collected when children were five, seven, and ten. Consent from mothers and assent from youths were obtained before their participation in the study. At each laboratory visit, mothers completed questionnaires regarding family demographics and their child's functioning. At the seven and ten year visits, children also answered questionnaires, which were read aloud by an experimenter. At each time point, data were also collected in schools: teachers reported on children's behavior, and peers provided sociometric data. Mothers and teachers were compensated for their time with gift cards. Children and their peers received small gifts for their participation.

Measures

Emotion regulation—Mothers completed the Emotion Regulation Checklist (Shields & Cicchetti, 1997, 2001). This measure assesses reporters' perception of the child's emotionality and regulation and includes 24 items rated on a 4-point Likert scale indicating how frequently the behaviors occur (1 = *almost always* to 4 = *never*). The emotion regulation subscale includes 8 items that assess aspects of emotion understanding and display, while the 15-item lability/negativity subscale assesses negative affect and emotional intensity. Example items included “displays appropriate negative affect in response to hostile, aggressive or intrusive play” and “can say when he/she is sad, angry, mad, fearful, or afraid.” Mean scores of mother reports of the full measure were created for ages five, seven, and ten, with lability items reverse-coded so that higher scores were indicative of greater regulation. The internal reliability was good at each age(α = .87; α = .87; α = .89). This measure was developed for use with a middle childhood sample and validity has been established using correlations with observers' ratings of children's regulatory abilities (Shields & Cicchetti, 1997).

Social skills—Teachers completed the Social Skills Rating System (SSRS, Gresham & Elliot, 1990), which assesses teachers' perceptions of children's behavioral social skills based on ratings of how often certain behaviors occur (0 = *never* to 2 = *very often*). The measure includes items such as, “Invites others to join in activities” and “Receives criticism well.” Kindergarten, second-grade, and fifth-grade teachers completed the elementary school version of the SSRS. We utilized the social skills scale, which is a mean composite of

the assertion, cooperation, and self-control subscales. The composite had adequate internal reliability in kindergarten, second grade, and fifth grade (α = .78; α = .77; α = .82).

Peer group acceptance—The classmates of study children participated in a sociometric nomination procedure in which a class roster was used and children were asked to nominate the peers they "most liked" and peers they "least liked." In kindergarten and second grade, sociometric nominations were obtained from children's classmates across 147 classrooms at 64 schools. Classrooms had an average of 20 students (range = 10-27). In fifth grade, data collection occurred at the grade level due to the structural changes from elementary to middle school. Data were collected from 42 schools in 347 classrooms, with an average of 49 students participating at each school (*SD* = 22.30). Nominations were unlimited and were not constrained to same-gender in order to improve reliability (Babcock, Marks, Crick, & Cillessen, 2013). The total number of nominations for "like most" and "like least" were standardized to obtain two separate *z* scores, then "like least" was subtracted from "like most" to create a peer group acceptance score (Coie et al., 1982). Peer group acceptance was then standardized within classrooms after computing the difference score. Higher scores represent greater acceptance. This is a widely used technique for assessing a child's overall peer acceptance within the classroom (Jiang & Cillessen, 2005).

Friendship quality—At ages seven and ten, children completed the Friendship Quality Questionnaire (FQQ; Parker & Asher, 1993) to assess their perceptions of their closest friendship. This measure includes items such as, "always tell each other our problems" and "makes me feel good about my ideas," rated on a 5-point Likert scale (0 = *not at all* to 4 = *always*). An abbreviated version of the measure was utilized for this study, which included 20 of the original items. We created total friendship quality scores with these items, which had good internal reliability (α = .76; α = .84).

Covariates—Several demographic and child characteristics were examined as potential covariates. At each time point mothers completed demographic questionnaires that included child gender (1 = *boys*, 2 = *girls*), child ethnicity (1 = *white*, 2 = *other*), and maternal education. Additionally, mothers reported on child externalizing behavior with the Child Behavioral Checklist(CBCL 2–3; Achenbach, 1992) when children were two years of age.

Analytic Strategy

We utilized Mplus version 7 (Muthen & Muthen, 2012) to conduct a series of longitudinal panel models to test our hypotheses. Panel models can account for the stability of variables over time as well as within-time correlations of independent variables, and estimate a large number of associations simultaneously. This is a strong test of effects because any significant associations found through the analyses are above and beyond the estimation of all of the possible confounding factors represented in the model. As a result, this type of analysis allows us to draw conclusions about the dynamic patterns among variables over time that move beyond what can be gleaned from correlations or regressions (Kline, 1998).

We tested a series of nested path models; each model contained the same variables, and estimated pathways were added or deleted to test the hypotheses, which allows for

comparisons between models. Each model included emotion regulation at ages five, seven, and ten; social skills and peer group acceptance at ages five, seven, and ten; as well as friendship quality at ages seven and ten. Stability paths in all models were held equivalent across time in order to account for assumptions of longitudinal invariance.

Models were then compared utilizing chi-square difference tests. In order to accept a more complex model over a more parsimonious model, the difference in chi-square must be significant at the $p < .05$ level (Kline, 1998). A non-significant chi-square difference test suggests that the addition of parameters did not substantially improve the model, and therefore the rule of parsimony dictates that we must reject the more complex model. We utilized additional measures to assess the overall fit of each model, including the comparative fit index (CFI), the Tucker–Lewis index (TLI; acceptable values > 0.90; Bentler, 1990), and the root mean square error of approximation (RMSEA; acceptable values < 0.08; Browne & Cudeck, 1993). Models were estimated using full information maximum likelihood (FIML) to handle missing data, which results in unbiased parameter estimates and appropriate standard errors when data are missing at random (Schafer & Graham, 2002).

Results

Preliminary Analyses

Table 1 contains descriptive statistics and correlations among all model variables. All repeated measures were positively and significantly correlated across time points, suggesting stability over time in all variables. Based on preliminary analyses, we considered several possible demographic covariates. All variables were regressed onto child gender and maternal education in focal analyses. We also considered the covariate of child race, but it was correlated with very few model variables, and adding it to the model did not change the significance of any model paths; therefore, the analyzed models did not include child race for the sake of parsimony.

Because this sample was oversampled for externalizing behaviors when children were 2 years old, we examined whether this selection factor had any impact on the results. We regressed all model variables onto mother-reported externalizing *t*-scores at age 2, the measure originally used to oversample. The inclusion of externalizing scores did not substantially alter the results in any way, suggesting that results of the current study were unrelated to our sampling procedure. Therefore, we dropped externalizing behaviors from further analyses.

Model Comparisons

Results for each of the tested models appear in Table 2. Model 1was a preliminary analysis of stability that included continuity paths, linking the same variables over time. This model also included within-time correlations among variables. We utilized Model 1 as a baseline for comparison to more complex models. Model fit improved by estimating the regression path between emotion regulation at age5 and at age10, which reflects the high degree of stability of the measure over time. Adding this parameter did not alter the significance of

other model paths. This model assumes no predictive associations between variables over time, only within variables. Model fit indicated the stability model was not a good fit (Table 2), suggesting there were relations among the variables that went beyond this model.

Next, we tested Hypothesis 1, that children with higher levels of reported emotion regulation abilities would show higher levels of each of the three dimensions of social competence, above and beyond the prediction of the other social competence dimensions. Model 2 included paths from emotion regulation to social skills, Model 3 from emotion regulation to peer group acceptance, and Model 4 from emotion regulation to friendship quality. Each of these models demonstrated a significant improvement in fit over the stability model, yet the fit was still less than adequate (see Table 2 for model fit statistics and comparative statistics). As predicted, however, when we included cross-lagged paths at each time point from emotion regulation abilities to all three of the social competence dimensions simultaneously (Model 5, Figure 1), the model had significantly better fit than each of the previous models.

We then tested Hypothesis 2 that there would be reciprocal effects; that is, social competence dimensions would also predict development in the ability to regulate emotions. Although the model fit was good, it was not significantly different from the previous, unidirectional model (Model 5). Therefore, we rejected Model 6 and the reciprocal effects hypothesis.

Model 7 tested Hypothesis 3, that there would be cascade effects on the social competence dimensions from emotion regulation, which fit better than the unidirectional model (Model 5). This difference was not significant (Table 2), although it was trend-level. However, Model 7 did have significantly better fit than Model 6, providing some support for Hypothesis 4.

Given these conflicting results, we moved on to Model 8, which incorporated both reciprocal and cascading effects. This model had excellent fit and was significantly better than the unidirectional model (Model 5). Therefore, Model 8 was considered the final model and was utilized for further interpretation.

Two-wave Cross-Lagged Effects

The results from the final model, Model 8, showed that the model variables were associated with one another above and beyond their own stability over time and their within-time correlations (see Figure 2 for standardized estimates and *p*-values). Table 3 contains unstandardized estimates, standard errors, confidence intervals, and standardized estimates for all cross-lagged paths in the final model. Estimates were considered significant if confidence intervals did not contain 0. From age five to age seven, higher levels of emotion regulation predicted higher levels of social skills and peer acceptance. Children who were better able to regulate emotions at age seven demonstrated higher levels of social skills, peer group acceptance, and friendship quality at age ten. This was above and beyond the similar associations from age five to seven, indicating that ongoing development in emotion regulation throughout middle childhood continued to be related to development in each dimension of social competence. Social skills at age seven also proved to be an important

underlying factor in the model such that higher levels of social skills at age seven were linked with higher levels of friendship quality, peer acceptance, and emotion regulation at age ten.

Three-wave Indirect Effects

To test our cascade hypotheses, we conducted tests of the indirect effects in the model using a bias-corrected bootstrapping procedure (5,000 draws). This approach has been shown to generate the most accurate confidence intervals for indirect effects, reducing Type 1 error rates and increasing power over other similar tests (MacKinnon, Lockwood, & Williams, 2003). For the purposes of interpretation, we will focus only on indirect effects that did not include stability paths.

There were three significant indirect paths that represented cascade effects across three waves among multiple variables. Each of these paths supported our hypothesis that early emotion regulation would be linked to social skills at age 7, which would go on to associate with other dimensions of social competence at age 10. The first indirect pathway began with emotion regulation at age 5, which predicted social skills at 7, which then predicted friendship quality at age 10 (unstandardized estimate = .048, 95% BC Bootstrap CI [.005, .126]; standardized estimate = .03). Similarly, emotion regulation at age 5 predicted social skills at age 7, when then predicted peer acceptance at age 10 (unstandardized estimate = .102, 95% BC Bootstrap CI [.026, .246]; standardized estimate = .03). Finally, there was an indirect effect in which emotion regulation at age 5 predicted social skills at age 7, when then predicted emotion regulation at age 10 (unstandardized estimate = .020, 95% BC Bootstrap CI [.002, .055]; standardized estimate = .02). In sum, our hypothesis of cascade effects whereby emotion regulation at age 5 would be associated with social skills at age 7, which would then be associated with other social competence dimensions was supported for both friendship quality and peer acceptance, with additional support for the same pathway influencing later emotion regulation.

Discussion

Most previous research aimed at better understanding the developmental process from emotion regulation to social competence has defined social competence quite broadly. The present study examined a longitudinal model in which children's ability to regulate emotion is viewed as laying the foundation for the development of three specific dimensions of social competence: social skills, peer group acceptance, and friendship quality. Results demonstrated that emotion regulation did indeed predict later social competence. Also, in turn, early social skills demonstrated cascading effects on later peer group acceptance, friendship quality, as well as emotion regulation. Empirically, the strengths of this study lie in its multi-method, multi-informant, longitudinal design. We utilized sociometric as well as questionnaire data, and included reports from mothers, teachers, peers, and study children. In addition, the longitudinal design allowed us to control for earlier levels of the variables in our analyses.

This study advances our understanding of development in two primary ways. First, by identifying differentiated dimensions of social competence in a manner consistent with

Hinde's (1987) theoretical framework, we were able to examine dynamic and reciprocal developmental processes within and across developmental domains. As a result, we found evidence of cascading as well as reciprocal effects among constructs, which further illuminates our understanding of how these variables are associated across childhood. Second, the study moved beyond the usual focus on early childhood and examined emotional underpinnings of social competence during middle childhood, a developmental period that has previously been characterized as relatively static in socio-emotional development (Huston & Ripke, 2006). Our findings indicate that despite stability over time, the social and emotional constructs examined are not static but show individual differences in development throughout middle childhood. We discuss our findings and their implications in terms of these contributions.

Toward a Dynamic Process Model of Differentiated Dimensions of Social Development

We examined three specific aspects of social competence -- social skills, peer group acceptance, and friendship quality – using a process model that tested dynamic relations among each of these dimensions and their relation to children's ability to regulate emotion. As hypothesized, we found complex and reciprocal associations among these constructs that go beyond direct effects at one or two time points. Specifically, we found social skills at age 7 to be the key mechanism through which children's earlier abilities to regulate emotions shaped longer-term social-emotional development. These findings support previous work that has found cascading effects across development that indicate competence begets further competence (Masten et al., 2010).

As Eisenberg and Spinrad (2004) have noted, researchers often encounter problems with clearly differentiating between emotion regulation abilities and social competence. Our results indicate that there are reciprocal effects among the constructs that speak to the interdependent nature of emotional and social development. The ability to regulate emotions effectively affords children increased opportunities to participate actively and positively in social settings, which in turn promotes the earlier development of more advanced social skills such as cooperation and assertiveness. In turn, social skills at age 7 equip children to engage in positive interactions with their peers, which then translates to greater peer group acceptance and higher friendship quality by late childhood. Thus, this model demonstrates the “snowballing” effects that are common to cascades models (Masten & Cicchetti, 2010). Given the importance of friends and peers in the transition to adolescence (Berndt, 1996), the results of this study shed light on middle childhood processes that are likely to continue to shape development and well-being far beyond middle childhood. Nevertheless, the sizes of indirect effects in our model are relatively small, suggesting that these paths represent just one set of influences on children's socio-emotional development.

Socio-emotional Development in Middle Childhood

We examined patterns of stability and change in emotion regulation and social competencies across a six-year period in middle childhood. There is growing awareness that changes in the ability to regulate emotion do occur in middle childhood and adolescence (Klimes-Dougan & Zeman, 2007), but much less is known about what shapes these changes or, perhaps even more crucially, how these changes shape other developmental processes. Our findings

indicate that the assumption of stasis in emotion regulation abilities beyond the transition to school is indeed problematic. Emotion regulation, social skills, and peer group acceptance were relatively stable across the three time points, but there was also individual variability within each construct that predicted and was predicted by the others.

We examined the reciprocal relations from the social competence variables to emotion regulation and found few significant associations. However, the one significant path that moved in the direction from social competence to emotion regulation is noteworthy; greater social skills at age 7 were associated with greater emotion regulation at age 10 and this association was part of an indirect pathway that began with emotion regulation at age 5. The relation between social skills at age 7 and greater emotion regulation at age 10 demonstrates the truly reciprocal nature of these competencies over time and further highlights that social skills gained in middle childhood continue to impact later emotional development. Similarly, the indirect path from emotion regulation at age 5 to social skills at age 7 back to emotion regulation at age 10 highlights one of the many dynamic ways that social competence and emotion regulation develop together over time. Further research to examine the interplay between emotion regulation abilities and social competence is clearly needed. For example, perhaps a multi-dimensional measure of emotional regulation abilities would allow a stronger test of this hypothesis by defining specific aspects of emotion regulation that would be expected to be enhanced by positive social experiences.

The fact that the three dimensions of social competence showed stability across time, even with different teachers and classmates reporting on study children, also adds credence to their validity as distinct constructs. These distinctions are important because they suggest that competence in specific dimensions may have different outcomes. Further research is needed to examine how different aspects of social competence may lead to differences in adolescent and adult functioning. For instance, we could speculate that mastery of social skills in middle childhood will result in greater occupational success in adolescence or early adulthood, whereas higher levels of friendship quality will be particularly likely to lead to higher quality romantic relationships later in life. Recognition of the distinctions among social competence dimensions may present opportunities for targeted intervention to help children build on existing competencies in ways that link to the development of differentiated but related aspects of social development.

Limitations and Future Directions

Despite the methodological strengths of this study, it is not without limitations. Issues of measurement are always of concern in studies of emotion regulation and social competence. Emotion regulation is a complex construct with various dimensions, similar to social competence; however, the current study addressed emotion regulation abilities quite broadly. Many empirical studies of emotion regulation use observed measures rather than, or in combination with, questionnaires. However, as children mature, they tend to use internal mental or cognitive regulatory strategies (Eisenberg & Morris, 2002), which make observational measurement difficult and unreliable. Nevertheless, future research may consider how specific observed emotion regulation strategies in middle childhood are related to aspects of social competence. In addition, it should be noted that by utilizing the Emotion

Regulation Checklist (Shields & Cicchetti, 1997, 2001) in its entirety, our measure of emotion regulation includes elements of negative emotional reactivity. However, because adaptive emotion regulation includes the ability to express and modulate emotions in a way that is socially appropriate, we feel this measure is an adequate representation of children's overall emotion regulation abilities. This study represents a first step toward understanding the interplay between emotion regulation and several dimensions of social competence; thus, our broad treatment of the construct was appropriate. Additionally, it is important to consider that the dyadic nature of friendship quality means that there are always two perspectives of the quality of the relationship that can be evaluated. The current study focuses on friendship quality from the perspective of the study child, but including the perception of the child's friends could potentially alter the results. Future research should consider the dyadic nature of friendship when examining emotional and social predictors of friendship quality.

Finally, modeling latent variables, rather than manifest variables as used in the current study, allows for tests of longitudinal measurement invariance, which can be utilized to establish and improve the validity of the model and reliability of the measures (Little, Preacher, Selig, & Card, 2007). A model of such complexity would require a very large sample size in order to produce stable parameter estimates (Kline, 1998); therefore, we opted for a more conservative approach, which gave us the freedom to model our complex hypotheses. Our analyses included constraining stability paths to be equivalent across time, which imposed invariance on the trajectories of our variables, but did not address possible measurement error.

Conclusion

This study provides evidence for a novel, dynamic model of development in middle childhood that identifies relations between children's ability to regulate emotions and their social competence. We provide empirical support for the importance of distinguishing among multiple dimensions of social competence and for examining their unique developmental processes. Specifically, findings demonstrated that even when considered simultaneously, children's ability to regulate emotions underlies the development of three specific dimensions of social competence, and, in turn, children's social skills at age 7 are related to developments in peer group acceptance, friendship quality, and emotion regulation at age 10. Finally, the findings in this study highlight the need for researchers to examine the complexities and nuances of broadly defined constructs in order to gain a better understanding of developmental mechanisms and the way in which they relate to adaptive functioning.

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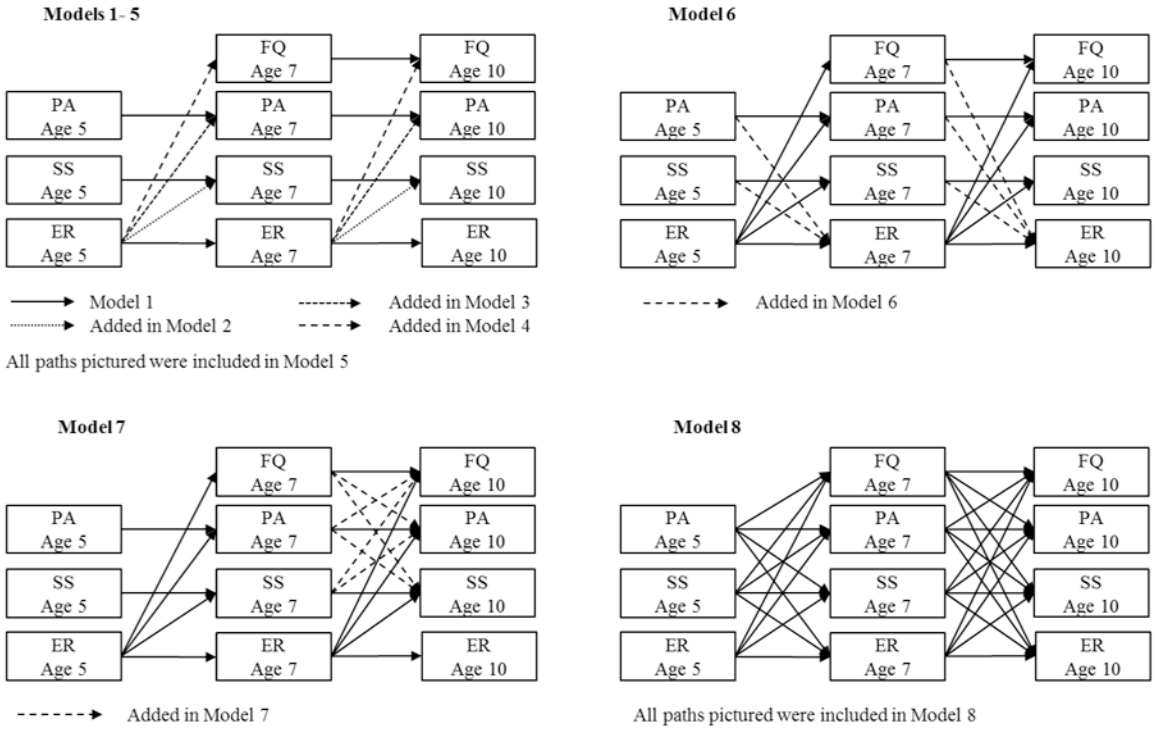

Figure 1.

Hypothesized models of associations among emotion regulation (ER), social skills (SS), peer group acceptance (PA), and friendship quality (FQ). Not pictured, but included in all models: child gender, maternal education, and within-time correlations. Analytic models are described in text.

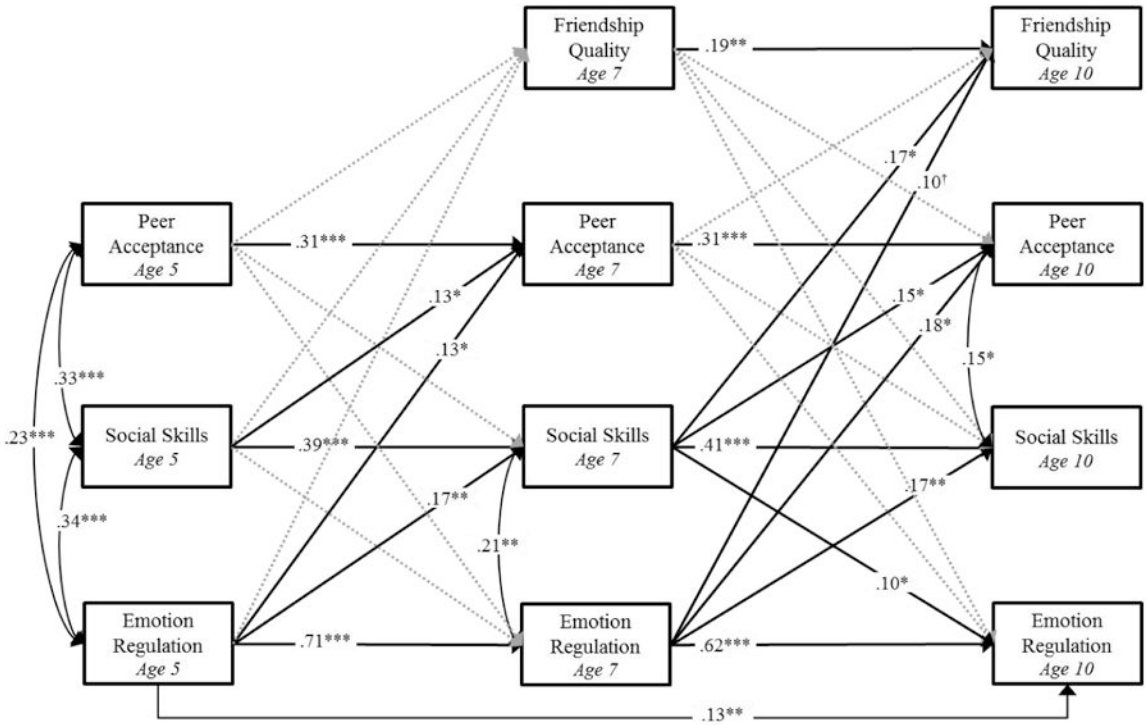

Figure 2.

Standardized path coefficients for significant paths of the final model (Model 8). Dotted lines represent non-significant direct paths. Not displayed: non-significant within-time correlations and all model variables were regressed onto child gender and maternal education. $^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 1

Descriptive Statistics and Correlations among Model Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. ER (5y)	--												
2. ER (7y)	.76***	--											
3. ER (10y)	.67***	.74***	--										
4. SS (5y)	.37***	.29***	.29***	--									
5. SS (7y)	.35***	.41***	.41***	.47***	--								
6. SS (10y)	.32***	.39***	.32***	.37***	.55***	--							
7. PA (5y)	.25****	.19**	.14*	.34***	.22**	.18*	--						
8. PA (7y)	.26***	.25***	.28***	.33***	.27***	.24**	.40***	--					
9. PA (10y)	.33***	.31***	.34***	.20**	.34***	.36***	.25**	.40***	--				
10. FQ (7y)	.11	.04	.03	.05	.06	.07	.08	.15*	.16*	--			
11. FQ(10y)	.25***	.18**	.14*	.14**	.26***	.14*	.08	.08	.19*	.26***	--		
12. Child gender	.23***	.11	.07	.19**	.16*	.20**	.14*	.11	.14*	.22**	.32***	--	
13. Maternal Ed.	.09	.05	.09	.12†	.26***	.21***	.07	.07	.01	-.04	-.02	-.02	--
Mean	3.16	3.32	3.33	1.42	1.39	1.44	.00	.02	.02	2.42	2.67	1.53	3.56
SD	.31	.33	.36	.33	.34	.34	1.00	1.01	.98	.55	.50	.49	.91
N	343	313	297	264	274	275	251	257	236	242	278	356	340

Note: ER = Emotion Regulation, SS = Social Skills, PA = Peer Acceptance, FQ = Friendship Quality; Maternal Ed = Maternal Education Level.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2

Fit Statistics and Model Fit Comparisons for Nested Models

				Fit Indices			Model Fit Comparisons			
Model	**χ^2**	**df**	***p***	**CFI**	**TLI**	**RMSEA**	**Comp.**	**$\Delta\chi^2$**	**Δdf**	***p***
Preliminary Models										
1. Stability Model	97.61	36	.00	.936	.862	.069				
2. ER to Social Skills	78.81	34	.00	.953	.894	.061	2 vs. 1	18.80	2	.000
3. ER to Peer Acceptance	82.06	34	.00	.950	.886	.063	3 vs. 1	15.55	2	.000
4. ER to Friendship Quality	91.61	34	.00	.940	.864	.069	4 vs. 1	6.00	2	.049
5. Unidirectional Model	50.79	30	.02	.978	.944	.044	5 vs. 1	47.12	4	.000
Hypothesized Models										
6. Reciprocal Model	45.89	25	.01	.978	.933	.048	6 vs. 5	6.09	5	.298
7. Cascade Model	38.59	24	.03	.985	.951	.041	7 vs. 5	12.2	6	.058
							7 vs. 6	7.30	1	.007
8. Full Model	25.18	15	.05	.989	.945	.044	8 vs. 5	25.61	15	.042

Note: N = 356; ER = Emotion Regulation

Table 3

Model 8 Estimates of Cross-Lagged Paths - Unstandardized Model Estimates, Standard Errors, 95% Bias-Corrected Bootstrap Confidence Intervals, and Standardized Estimates

			Confidence Intervals		
	Estimate	SE	Lower	Upper	Standard. Estimate
Emotion Regulation (5y) → Social Skills (7y)	.19	.06	.071	.306	.17
Emotion Regulation (5y) → Peer Acceptance (7y)	.43	.22	.006	.886	.13
Emotion Regulation (5y) → Friendship Quality (7y)	.12	.14	-.154	.405	.07
Emotion Regulation (7y) → Social Skills (10y)	.19	.07	.051	.311	.17
Emotion Regulation (7y) → Peer Acceptance (10y)	.53	.21	.116	.946	.17
Emotion Regulation (7y) → Friendship Quality (10y)	.17	.10	-.037	.369	.10
Social Skills (5y) → Emotion Regulation (7y)	.06	.06	-.059	.174	.06
Social Skills (5y) → Peer Acceptance (7y)	.52	.23	.046	.967	.17
Social Skills (5y) → Friendship Quality (7y)	-.06	.16	-.375	.242	-.04
Social Skills (7y) → Emotion Regulation (10y)	.11	.05	.001	.206	.10
Social Skills (7y) → Peer Acceptance (10y)	.53	.21	.143	.950	.18
Social Skills (7y) → Friendship Quality (10y)	.25	.12	.001	.479	.17
Peer Acceptance (5y) → Emotion Regulation (7y)	.01	.02	-.025	.041	.03
Peer Acceptance (5y) → Social Skills (7y)	.01	.02	-.032	.052	.03
Peer Acceptance (5y) → Friendship Quality (7y)	.04	.04	-.050	.121	.07
Peer Acceptance (7y) → Emotion Regulation (10y)	.01	.02	-.034	.042	.02
Peer Acceptance (7y) → Social Skills (10y)	.02	.02	-.025	.063	.06
Peer Acceptance (7y) → Friendship Quality (10y)	-.03	.03	-.101	.035	-.06
Friendship Quality (7y) → Emotion Regulation (10y)	.01	.03	-.058	.067	.01
Friendship Quality (7y) → Social Skills (10y)	-.01	.04	-.092	.067	-.02
Friendship Quality (7y) → Peer Acceptance (10y)	.16	.12	-.070	.392	.09