

THE DEVELOPMENT OF SOCIAL COMPETENCE FROM EARLY CHILDHOOD
THROUGH MIDDLE ADOLESCENCE: CONTINUITY AND ACCENTUATION OF
INDIVIDUAL DIFFERENCES OVER TIME

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ABSTRACT

Title: The development of social competence from early childhood through middle adolescence: Stability and accentuation of individual differences over time

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One of the fundamental concerns of developmental psychology is the nature of continuity and change across development. The present study investigated the continuity of social competence across developmental periods, paying special attention to the transition from middle childhood to adolescence. Using a birth cohort of youths (277 males, 315 females), I examined the stability of social competence across developmental periods, assessed the relation between quality of early parenting and later competence, and tested how timing of pubertal maturation and school transition impact the stability of social competence, using both variable-centered and person-centered analyses. It was expected that social competence would be highly stable across development, but less stable across the transition to adolescence, and that higher quality parenting would predict greater competence among males and females. Furthermore, I expected that pubertal maturation and school transition would deflect trajectories of social competence over time, accentuating individual differences (e.g., socially competent youths would become more competent, whereas incompetent youths would become less competent).

As expected, the nature of social competence was fairly stable from early childhood to adolescence, although there is evidence that social competence is less stable as youth transition from early childhood to middle childhood and from middle childhood to adolescence. Moreover, individuals with warm parenting evinced greater social competence

across time. Consistent with my hypothesis, off-time pubertal maturation and school transition accentuated individual differences in social competence, increasing social competence among more competent youths, and further diminishing social competence among less competent youths. Finally, I find evidence that experiencing both off-time pubertal maturation and a school transition simultaneously incurred more risk for females, particularly among less competent females, than experiencing only off-time maturation or a school transition.

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CHAPTER 1

INTRODUCTION

In recent years, the conceptualization and investigation of social development in childhood and adolescence has shifted away from a focus on deficits or risk factors for maladjustment and has begun to emphasize the impact of protective factors that promote resilience or positive adaptation (Cicchetti, 1990; Masten et al., 1995; Sroufe, 1990). One such protective factor, *social competence*, has been described as the ability to engage in successful interactions with others (Rose-Krasnor, 1997), as successful and positive adaptation to one's interpersonal environment (Masten, 1994), and as effective social adaptation across development (Cicchetti & Schneider-Rosen, 1986).

Across the lifespan, competent social functioning is associated with a number of positive outcomes such as more successful and fulfilling interpersonal relationships (Steinberg, 2008), more adaptive coping mechanisms in response to stressors (Reijntjes, Stegge, & Terwogt, 2006), better mental health (Denham & Holt, 1993), and less substance use (Clingempeel, Henggeler, Pickrel, Brondino, & Randall, 2005; Griffin, Epstein, Botvin, & Spoth, 2001; Griffin, Nichols, Birnbaum, & Botvin, 2006). Adolescents who have higher social competence are more likely to have stable careers, satisfying marriages, and report better mental health as adults (Clausen, 1991). Social competence is also a more general protective factor; when children or adolescents experience times of stress, foundations of past social success act as a protective factor, helping foster positive psychological adjustment in the face of contextual demands (Luthar, 1991; Luthar & Zigler, 1991; Masten & Coatsworth, 1998). In contrast, social incompetence is a risk factor for negative outcomes across the lifespan, such as suicidal ideation (King et al., 2001), peer rejection, and various forms of

psychopathology (Fine, Izard, Mostow, Trentacosta, & Ackerman, 2003; Newcomb, Bukowski & Pattee, 1993; Schultz, Izard, Ackerman, & Youngstrom, 2001).

Not all individuals are able to successfully adapt to their environment, and there is wide variability in individuals' social competence (Berndt & Burgoyne, 1996; Eccles et al., 1989; Hussong, Zucker, Wong, Fitzgerald, & Puttler, 2005). However, surprisingly little research has examined variability in social competence longitudinally, and no research has identified long-term predictors of social competence or tested how other factors might moderate an individual's ability to adapt to changes in the requirements for social competence in different developmental periods. These issues are the focus of the present study.

Although social competence is associated with healthy development throughout the lifespan, surprisingly little research has examined social competence across developmental periods. This gap in the literature is partially due to the variable nature of social competence; as youths develop, the skills necessary for social competence become increasingly complex. Given its dynamic nature, it is often difficult to provide a specific definition of social competence, since its meaning is often stage-specific. For the purposes of the present study, social competence is conceptualized as the presence of positive social behaviors (i.e., skills that facilitate social relationships and that are associated with indicators of social adjustment, such as cooperation or empathy) and the absence of negative social behaviors (i.e., skills that do not facilitate social relationships and are associated with social maladjustment such as aggression or social reticence). This broad definition of social competence allows for the examination of social competence from early childhood to adolescence, a range of development where social skills and interpersonal interactions change dramatically.

In general, past research on social competence and social relationships has focused on two main topics: (a) factors that *promote* social competence in a specific developmental stage and (b) factors that *predict* subsequent social competence. Left by the wayside is research examining the development of social competence over time, long term predictors of social competence, and the impact of biological development and contextual change on the stability of social competence. Because social competence is important for positive adjustment, and because there is individual variation in how social competence changes over time (Berndt & Burgy, 1996; Eccles et al., 1989; Hussong, Zucker, Wong, Fitzgerald, & Puttler, 2005), it is necessary to examine individual differences in social competence across development. Examining continuity and discontinuity in social competence during the transition from childhood to adolescence is an especially important endeavor, because understanding why some individuals fare well during this transition while others do not may serve to inform our understanding of how to promote positive (and prevent negative) development in adulthood. The present study aims to fill current voids in the literature on continuity and change in social competence by examining (a) the stability of social competence from childhood to adolescence, (b) patterns of social competence as youths develop, (c) long term predictors of social competence, and (d) how pubertal timing and school transition impact trajectories of social competence over time.

Social Competence as a Dynamic Construct

Henry Stack Sullivan's model of social development captures the dynamic nature of the unfolding of social competence over time (1953). As individuals develop, their interpersonal needs become increasingly complex. The challenge of successful social development is to satisfy these developmentally salient needs, a particularly difficult task

given that the needs change over time. Within Sullivan's framework, successfully fulfilling one's interpersonal needs is associated with positive adjustment (in Sullivan's language, security) while failure to fulfill these needs is associated with poor adjustment (in Sullivan's language, anxiety). In this model, development is cumulative; thus, early experiences set individuals on trajectories of relative success or failure in interpersonal relationships.

Sullivan's theoretical perspective proposed that there are 6 developmental stages (1953), each of which has different interpersonal or social needs that must be fulfilled in order to attain positive adjustment. In infancy (ages 0 to 2-3 years), the first developmental stage, infants need to have contact with others and to experience parental warmth and tenderness. In early childhood (ages 2-3 to 6-7, the second developmental stage), children need to satisfy the interpersonal need for adult involvement in play. The third stage is middle childhood which ranges from ages 6-7 to ages 8-10. Children in this stage have a need for peer playmates and acceptance in peer social groups. In preadolescence, which ranges from 8-10 to 12-14 years, individuals have a need to attain intimacy and to have same-sex friendships. By early adolescence (ages 12-14 to 17-18), individuals have an interpersonal need for sexual contact and intimacy with an opposite sex partner. Finally, in the 6th stage, individuals in late adolescence (17-19 years to adulthood) need to be integrated into adult society and accepted into adult roles.

Infancy and Early Childhood

Sullivan's ideas about the milestones of social development in each developmental epoch map well onto the current literature. In infancy (ages 0 to 2-3), socially competent infants intentionally direct facial expressions and gestures to playmates (Hay, Pederson, & Nash, 1983) and demonstrate social interest in peers (Eckerman, 1979). Sullivan suggested

that youths need quality parenting to develop social competence, and indeed, youths with more sensitive (Baumrind, 1967; Baumrind, 1971; Bryant & Crockenberg, 1980) and less harsh parenting (Baldwin, 1955; Baumrind, 1967; Eron, 1982; George & Main, 1979; Winder & Rau, 1962) are more likely to evince social competence both in infancy and in future developmental periods.

By early childhood (ages 2-3 to 6-7), Sullivan proposed that adult involvement in play, and play more generally, becomes important for social development (1953). During early childhood, children's interactions with peers occur primarily in the context of play (Brownell & Brown, 1992), and children gradually engage in more complex types of play (e.g., playing with peers) in addition to more simple types of play (e.g., playing next to peers; Robinson, Anderson, Porter, Hart & Wouden-Miller 2003; Rubin et al., 1998). Indeed, play *with* others, as opposed to play *next* to others, is associated with greater success with peers (Howes & Matheson, 1992) and greater social competence (Cillessen & Bellmore, 2002; Creasy, Jarvis, & Berk, 1998; Pelligrini, Kato, Blatachford, & Baines, 2002). Thus, as Sullivan suggested, successful adaptation in early childhood in the realm of peer relationships involves an increasing awareness of others, as well as being able to successfully engage in play with peers (Denham, Salisch, Olthof, Kochanoff, & Caverly, 2002).

In addition to play, research indicates that friendships are an important aspect of social competence in early childhood. Clearly, children with friendly, prosocial behavioral styles who have mastered developmentally appropriate social skills make friends more easily than children with poor social skills (Berk, 2004). In general, youths are more successful in peer interactions and friendships if they are able to generate solutions to conflict (Mayeux & Cillessen, 2003; Shure & Spivack, 1980) and effectively share resources, such as toys

(Rubin, Bukowski, & Parker, 2006). The majority of youths are able to successfully make friends in early childhood (approximately 75%; Dunn, 1993) and tend to treat friends more favorably than non-friends (e.g., talking, laughing, and looking at each other more often; Hartup & Stevens, 1999; Vaughn et al., 2001); thus, because of more social interactions, having friends provides an opportunity to practice social skills that facilitate concurrent and future social skills. It is important to note, however, that while socially competent behavior is similar among males and females, same-sex friendships are viewed as indicative of greater competence during early childhood than opposite-sex friendships. Specifically, children who engage in more same-sex play are better liked by peers and are rated as more socially competent by teachers than youths who engage in play with opposite-sex peers (Colwell & Lindsey, 2005). Thus, in support of Sullivan's theoretical framework, socially competent children possess social and communicative abilities in early childhood that enable successful social interactions with both adults and peers (Ladd & Price, 1986).

Middle Childhood

According to Sullivan, the key developmental task of middle childhood (ages 6-7 to 8-10) is to have peer playmates and to be accepted by peer social groups. In middle childhood, successful interaction with peers is increasingly important because children spend more than 30% of their time with peers, a large increase from just 10% in early childhood (Rubin, Bukowski, & Parker, 2006). In general, children who demonstrate social competence in middle childhood use cooperative, helpful, and positive communications (Keane & Conger, 1981; Newcomb, Bukowski, & Patee, 1993) and do not respond aggressively to provocation (Dodge, Pettit, McClaskey & Brown, 1986; not all aggression need to be suppressed however, see Vaughn et al., 2003). Competent children are able to participate in

group-oriented activities, become involved in satisfying relationships, and are able to meet individual goals and needs while also developing the ability to understand their experiences with others (Rubin et al., 2006). Types of play are more reciprocal in middle childhood than in earlier development; for example rough-and-tumble play becomes very important in middle childhood and is composed of running, chasing, fleeing, wrestling, and open-handed hitting, but differs from antisocial aggression in that it also involves smiling (see Pellegrini, 2002 for a review). This type of play is generally associated with increases in social interaction skills (Parke, Cassidy, Burks, Carson, & Boyum, 1992), greater social competence (Pellegrini, 1994), peer acceptance (Newcomb, Bukowski, & Patee, 1993; Parker, Rubin, Price, & Derosier, 1995), and friendships (Rubin, Bukowski, & Parker, 2006), all of which are markers of successful adaptation within Sullivan's theoretical framework.¹ Thus, youths with a mastery of developmentally appropriate skills achieve Sullivan's milestones of social development in middle childhood.

In contrast to children with successful adaptation in middle childhood, children who lack social skills are less likely to achieve Sullivan's milestones of having peer playmates and being accepted by peers. Maladaptive social skills, such as poor social understanding, poor emotion regulation, poor perspective taking, high levels of social anxiety, negative expectations of peer interactions, misinterpreting peer behavior as hostile, and blaming others for social difficulties, are associated with peer rejection in middle childhood (Berk, 2004; Coie & Dodge, 1998; Crick, Casas, & Nelson, 2002; Hart et al., 2000; Ladd & Burgess, 1999). Moreover, children who are highly physically aggressive in middle childhood have lower social competence and are more likely to be lonely, dissatisfied, and friendless (Ladd & Burgess, 1999). Interestingly, aggressive children tend to have inflated views of their

social competence, a misperception that is associated with increases in aggressive behavior (Hughes, Cavell, & Grossman, 1997). Furthermore, children who engage in very high levels of rough-and-tumble play (e.g., youths who engage in high levels of aggressive play) are less liked by peers (Hart, DeWolf, Wozniak, & Burts, 1988; Ladd & Price, 1987), although levels of peer acceptable rough-and-tumble play may be higher among males than females (DiPietro, 1981). Finally, aggressive youths tend to have fewer friendships, and these friendships tend to be with other aggressive youths (Cairns, Cairns, Neckerman, Gest, & Garipey, 1988). Therefore, poor social development is associated with less acceptance by peers and less success in making friends, both developmentally salient tasks for middle childhood.

Adolescence

Transitioning to adolescence, Sullivan proposed that there were three key developmental tasks: attaining intimacy in same-sex friendships (early adolescence), developing sexual contact and intimacy with an opposite-sex partner (middle adolescence), and becoming integrated into adult society (late adolescence). In general, during adolescence, socially competent behavior is marked by a capacity to engage in intimate relationships (Berndt, 1981; Bigelow & LaGaipa, 1975). Intimacy in this sense is not necessarily sexual or physical, but instead implies an emotional relationship between two people (friendships or romantic relationships) characterized by a concern for another's well-being, reciprocal disclosure of personal information, and a sharing of common interests (Steinberg, 2008). Intimacy in social relationships increases throughout adolescence, with the most rapid changes occurring in early adolescence (Buhrmester, 1996). Between the 5th and 8th grades, roughly ages 12 to 14, intimate relationships with peers become the most important social

relationships (Buhrmester & Furman, 1986), and adolescents report greater levels of intimacy in their friendships (Buhrmester & Furman, 1986; Buhrmester, 1990) and higher quality friendships (Way & Greene, 2006) than younger children. Further supporting Sullivan's theoretical framework, successfully attaining intimacy in relationships during adolescence is associated with greater social competence (Buhrmester, 1990).

Although Sullivan suggested that intimacy is equally important for both males and females during adolescence, it is important to note that males and females may develop intimacy at different rates. Specifically, males may be slower to develop some types of intimacy than females. When using self-disclosure as a measure of intimacy, it is not until late adolescence that males' same-sex friendships approach the same level of intimacy as females' same-sex friendships (Buhrmester, 1996; Savin-Williams & Berndt, 1990).

However, on other dimensions of intimacy, such as intimate knowledge about a friend, same-aged males and females have equivalent knowledge of their same-sex peers (Diaz & Berndt, 1982). Perhaps because of greater intimacy at younger ages, females are more likely than males to distinguish how they interact with intimate friends compared to non-intimate friends and prefer to keep friendships more exclusive (Berndt, 1981). Consequently, although both males and females develop intimacy in social relationships during adolescence, there is some evidence that females may develop intimacy sooner than males.

Regardless of the rate of development, Sullivan suggested intimacy in social relationships followed a specific progression first occurring with same-sex peers, then with opposite-sex peers, and finally with romantic partners. In general, research supports this sequence; individuals begin with friendships with individuals of the same gender (Maccoby, 1990), then, as same-sex friendships continue to develop, other-sex friendships are added to

one's social repertoire (Sharabany et al., 1981), although the majority of adolescents do not list other-sex peers as significant individuals in their lives (Buhrmester & Furman, 1987). Being part of a small group of close, same-sex friends predicts involvement in other-sex peer networks (Connolly, Furman, & Konarsk, 2000). Interestingly, when females engage in other-sex friendships, the peer is usually an older male; among males the opposite is true: males who report other-sex friendships tend to report younger females as friends (Blyth, Hill, & Thiel, 1982).

Involvement in other-sex friendships is closely followed by involvement in romantic relationships (Connolly, Furman, & Konarsk, 2000). The earlier an individual engages in other-sex friendships, the earlier he or she begins to have romantic relationships (Feiring, 1999). Intimacy in romantic relationships is distinct from intimacy in friendships, and adolescents clearly differentiate between friendships and romantic relationships in their patterns of intimate interaction (Collins, 2003). In general, and similar to the pattern seen in non-romantic other-sex friendships, males typically report dating younger females and females tend to report older males as romantic partners (Montgomery & Sorell, 1998). This trend may be due to differences in how quickly males and females attain intimacy in romantic relationships. There is research to suggest that females are typically better at achieving intimacy in relationships (Collins & Sroufe, 1999) and are more likely to have relationships that revolve around emotional involvement, intimacy, and love (Montgomery, 2005), leading some to hypothesize that interactions with girls teach boys how to be more intimate (Simon & Gagnon, 1969). In sum, there is much research to suggest that youths who attain intimacy in social relationships exhibit higher social competence and that Sullivan's

proposed progression of developmentally salient tasks in adolescence is an accurate portrayal of key interpersonal milestones during this period of the lifespan.

Continuity of Social Competence

Sullivan's theory suggests that the development of social competence is cumulative, with early social competence laying the foundation for later social competence. However, Sullivan's theoretical perspective is not the only one to suggest that social competence is stable across development. Notably, attachment theory also suggests that individuals utilize internal working models (methods of interaction with others) that are consistent across time (Bowlby, 1988). If this internal working model is healthy (e.g., facilitates positive social interactions), youths will demonstrate social competence over time; if it is not, youths will have poor social outcomes and evince low social competence over time. It is also possible that continuity in social competence is the product of biological or genetic underpinnings that consistently impact social competence over time (Schore, 1994; Siegel, 1999). For example, youths with an extraverted, easygoing temperament might be more successful in social interactions across development and youths with more difficult or inhibited temperament may be at risk for lower social competence (Bohlin, Hagekull, & Andersson, 2005). Finally, continuity in competence over time might be the result of consistency in the environment of a child (Sroufe, Egeland, Carlson, & Collins, 2005). These explanations for stability of social competence are not mutually exclusive, and some combination of such factors likely contributes to continuity of social competence across development (Bohlin, Hagekull & Andersson, 2005). Thus, although in the present study Sullivan's theoretical perspective provides the framework for conceptualizing social competence in each developmental stage,

continuity in social competence over time might be explained by a number of theoretical perspectives.

Continuity of Social Competence from Infancy and Early Childhood to Middle Childhood

Consistent with the idea that there is continuity and increasing complexity in development, research has found that earlier social competence predicts later social competence. For example, successful play with other children in early childhood predicts successful peer interactions in middle childhood (Cillessen & Bellmore 2002; Creasy, Jarvis, & Berk, 1998). In contrast, poor ability to interact with peers during early childhood predicts poor social competence in middle childhood (Coie, Dodge, & Kupersmidt, 1990), and children with deficits in social skills in the preschool years tend to also have difficulties in middle childhood (Campbell, Pierce, March, Ewing, & Szumowski, 1994; Winsler, Diaz, Atencio, McCarthy, & Adams, 2000).

Utilizing multifaceted markers of social competence (combining a number of developmentally appropriate measures of social competence), research also finds that social competence is generally stable from early childhood to middle childhood (Obradovic et al., 2006; Sroufe, Egeland, & Kreutzer, 1990). Obradovic and colleagues (2006) examined competence of 191 at-risk children across multiple domains -- social, cognitive and emotional -- from early childhood to middle adolescence. Focusing on the stability of social competence from early childhood to middle childhood, the researchers found social competence to be highly stable from early childhood to middle childhood, and found no differences in stability between males and females. Thus, both specific and more global measures of social competence find strong continuity of social competence from early childhood to middle childhood.

Continuity of Social Competence from Middle Childhood to Adolescence

In contrast to research examining stability of social competence from early childhood to middle childhood, evidence is mixed regarding the stability of social competence from middle childhood to adolescence. Generally, continuity in social competence (or social incompetence) from middle childhood to adolescence is most frequently reported in studies that examine the benefits of having good social skills. Children who demonstrate greater social skills (e.g., lower negative emotionality and good emotion regulation) have better social skills as young adolescents (Murphy, Shepard, Eisenberg, & Fabes, 2004). Moreover, peer acceptance forecasts success in later forms of social adaptation in adolescence, including competence in peer relationships (Parker, Rubin, Price, & Derosier, 1995), romantic relationships, and work (Roisman, Masten, Coatsworth, & Tellegen, 2004).

Continuity is also found for less competent behaviors. In contrast to peer acceptance, being rejected by peers is associated with less caring, less guidance, more conflict, more loneliness in peer relationships (Parker & Asher, 1993), and problems in romantic and social domains in adolescence (Gest, Sesma, Masten & Tellegen, 2006). Peer rejection impairs children's social information processing and increases hostile attributions in social interactions which heightens aggression (Dodge et al., 2003) and perpetuates deficits in social skills in later developmental periods. Indeed, peer rejection is associated with a number of long-term maladaptive outcomes, such as mental health problems, academic failure, delinquency, and a lack of friendships (Bagwell, Newcomb, & Bukowski, 2000; Ladd & Troop-Gordon, 2003; McDougall, Hymel, Vaillancourt, & Mercer, 2001).

Studies of the relationship between a single outcome (e.g., peer acceptance or peer rejection) and future social competence have found continuity of social competence.

However, multifaceted approaches to the study of social competence over time have yielded conflicting accounts of the stability of social competence from middle childhood to adolescence. Foremost, some research indicates that social competence is stable from middle childhood (ages 8-12) through late adolescence (ages 17-23) (Masten et al., 1995). Using a sample of 205 children from the Project Competence community-based sample, longitudinal analyses revealed that social competence in late childhood significantly predicted social competence and romantic relationship competence in late adolescence. Obradovic and colleagues (2006), however, found the opposite trend: social competence was significantly less stable from middle childhood to adolescence than it was from early childhood to middle childhood. It is important to note that there has been limited longitudinal research on social competence. Consequently, discrepancies among the studies may be the result of different samples or different assessment tools of social competence. However, given the current literature, it is unclear if social competence is relatively stable or unstable from middle childhood to adolescence.

Continuity of Social Competence from Adolescence to Adulthood

Little research has examined the stability of social competence from adolescence to adulthood but this small body of work suggests that social competence is generally quite stable. One study found social competence to be stable from adolescence to adulthood (Masten et al., 2004), while another found socially competent adolescents to have more stable careers and marriages as adults (Clausen, 1991). Moreover, individuals who establish successful relationships with peers during adolescence are more psychologically healthy, both in adolescence and in later development (Burhmester, 1996; Hightower, 1990; Willits, 1988).

Support for the stability of social competence also comes from research examining Sullivan's markers of social competence in adolescence, namely intimacy in same-sex, other-sex, and romantic relationships. Timing of intimacy of romantic relationships is linked to later well-being, with premature involvement in a romantic relationship linked to a number of behavioral and emotional problems during adolescence (Davila, Steinberg, Kachadourian, Cobb, & Fincham, 2004; Neemann, Hubbard, & Masten, 1995). Importantly, this relation between maladaptive outcomes and early onset of romantic relationships is stronger among youths who are unpopular with same-sex peers (Brendgen, Vitaro, Doyle, Markiewicz, & Bukowski, 2002). In contrast, later involvement in romantic relationships (involvement in middle to late adolescence) is not associated with maladaptive adjustment. Although Sullivan's theory would suggest that negative outcomes of early involvement in romantic relationships may be a product of failure to achieve developmentally appropriate markers of competence (e.g., failure to achieve intimacy in other-sex friendships in middle adolescence and entering romantic relationships prior to late adolescence), it is also possible that more incompetent youths jump into romantic relationships earlier than competent youths. In general, research suggests that mastery of developmentally appropriate skills such as intimacy in romantic relationships predicts social competence in adulthood, while off-timed or poor development of intimacy begets poor functioning.

Conclusions about the Stability of Social Competence

Although research indicates that there is high stability of social competence from early childhood to middle childhood and from adolescence to adulthood, the continuity of social competence from middle childhood to adolescence is less clear. Regarding the transition to adolescence, the current literature suggests two possible predictions about the

stability of social competence across the transition to adolescence. Based on the cumulative nature of social competence (e.g., social competence at one developmental period forecasts social competence in later development periods), one prediction is that social competence is highly stable from childhood to adolescence. Alternatively, social competence may be less stable across development because of the increasing complexity of social competence. To the extent that social competence requires the development of new skills, it might be expected to be unstable across developmental periods. This may be especially true during the transition between middle childhood and adolescence because this transition is characterized by more intra- and inter-individual change than prior developmental periods.

Factors Influencing the Continuity of Social Competence

If social competence varies in stability over time, especially during adolescence, a subsequent inquiry is needed to examine factors that contribute to continuity and change of social competence during the transition from middle childhood to adolescence. Foremost, Sullivan's theory would suggest that youth with high quality parenting as children are more likely to evince social competence, and because of parental support, may be more likely to continuously achieve social competence over time.

In addition, past research has identified demographic (gender and ethnicity) and contextual (e.g., stressful life events) factors that contribute to stability and instability in social competence. Although some research has found no gender differences in the stability of social competence from middle childhood to adolescence (Obradovic, et al., 2006), other research suggests that gender and ethnicity moderate the stability of social competence, with greater stability observed among females and White participants (Masten et al., 1995). Moreover, because many changes occur during adolescence, it is reasonable to hypothesize

that moderating factors, such as pubertal timing or school transitions, could contribute to the relative instability of social competence during this epoch. Furthermore, the impact of pubertal timing and school transitions may very well differ across males and females (potentially explaining why some studies have found gender differences in the stability of social competence) and vary as a function of one's level of social competence at the time of the biological or contextual change.

The idea of pubertal timing and school transition impacting an individual's social competence is counterintuitive. To the extent that social competence is indicative of social skills, social competence is typically a marker for the ability to adapt to change (Haggerty, Sherrod, Garnezy, & Rutter, 1994; Zins, Elias, Greenberg & Weissberg, 2000). However, periods of transition may impact the stability of social competence by emphasizing individual differences in social competence. Although it would seem that periods of transition are ideal for changing one's behavior (e.g., a student starting in a new school working to become popular), research indicates that during periods of discontinuity or transition individual differences are actually accentuated (Caspi & Bem, 1990; Caspi, Bem, & Elder, 1989; Caspi & Moffitt, 1991; Caspi & Moffitt, 1993). For example, in times of stress (e.g., during the onset of puberty) personality differences are more pronounced (Caspi & Moffitt, 1991). The accentuation of individual tendencies during periods of transition is especially strong in unstructured or novel situations (Snyder & Ickes, 1985). Indeed, during periods of stress, individuals tend to resort to the most familiar and accessible responses (e.g., a natural individual response; Withey, 1962). Although these responses may not be the most adaptive, it is much faster to apply a well-rehearsed strategy than a novel one, partly because learning

is especially difficult during times of stress, when individuals' problem solving abilities often decrease (Mandler, 1984).

With regards to the present study, periods of transition may accentuate individual differences in social competence; specifically, in times of stress, individuals may resort to past interpersonal skills. If these skills are good, socially competent behavior may increase but if these skills are poor, socially competent behavior may decrease. There are two possible predictions: (1) biological or contextual change impact all youth in the same general way, although the magnitude of the effect might differ as a function of the individual's level of competence at the time of the change, and (2) biological or contextual change negatively impact people who have lower levels of social competence (e.g. are less resilient in the face of stress) but positively impacts youth with higher levels of social competence. Specifically, biological or contextual change may accentuate individual differences, with stronger effects among vulnerable youth (e.g., those with lower social competence), but research is needed that tests this prediction.

In the present study, two aspects of the adolescent transition that may impact social competence between middle childhood and adolescence are of interest: pubertal timing and school change. Although it is unlikely that puberty has a direct effect on social competence, research indicates that puberty, in particular, pubertal timing, has a significant impact on social relationships. Consequently, it might be expected that social competence may be more or less stable depending on pubertal timing (early vs. late pubertal onset) because of the link between pubertal maturation and social relationships. Second, it would be expected that school transitions, which typically occur between middle childhood and adolescence, would greatly impact an individual's social world, potentially influencing social competence.

Pubertal Timing

The timing of pubertal development may affect the stability of social competence from middle childhood to adolescence, although the effects may differ among males and females. Specifically, early pubertal maturation relative to peers may have positive effects among males, yet negative effects among females. Among males, early pubertal development generally has a positive impact on social relationships, with early maturing males being more popular among peers, more likely to be leaders (Simmons & Blyth, 1987), and more likely to be have higher peer status (Savin-Williams, 1979). Although early pubertal maturation relative to peers may exert a positive influence on social relationships among males, late maturation (e.g., being one of the last males to enter puberty) may negatively impact social relationships (Brooks-Gunn et al., 1985), leading to decreases in social competence. Taken together, these results suggest that early pubertal timing may have a positive impact on social relationships, while late-maturation may have a negative impact on social relationships.

Pubertal timing also impacts peer relationships among females, although research indicates that the effects are different than the pattern observed among males. In general, research indicates that early pubertal timing negatively impacts social relationships. Brooks-Gunn and colleagues (1987) found that the most physically developed and the least physically developed teenage females reported fewer close friends than females with average physical development. Among a small group of females ($N = 21$), the earliest maturers were more likely to withdraw from social contacts and were less sociable than later maturers (Peskin, 1973). Not all research has supported this claim however, and some research has found that early maturing females experience greater prestige among peers compared to later maturers (Faust, 1960) and tend to be in leadership positions within their peer group (Savin-

Williams, 1979). Although early maturers spend fewer hours with friends, there are no differences among adolescents in the reported *number* of friends as a function of pubertal maturation status (Susman et al., 1985). Finally, some studies found no association between pubertal timing and reported relationships with peers (Petersen & Crockett, 1985), and teachers' reports of popularity are unrelated to pubertal timing (Duncan, Ritter, Dornbusch, Gross, & Carlsmith, 1985). Thus, research indicates that pubertal maturation may impact peer relationships, although it is unclear if early maturation has a positive or negative impact on peer relationships. Regardless of the direction of that effect, it appears that early-maturation does impact peer social relationships during adolescence and may account for variations in the continuity of social competence from middle childhood to adolescence. Further research is needed to untangle the positive or negative effects of pubertal timing on social relationships among females.

School Transition

Although pubertal timing may have different effects among males versus females, the effects of school transition on social competence is likely to be the same across sex. Research suggests that the transition from elementary school to middle or junior high school negatively impacts social adjustment. To the extent that school transitions disrupt students' peer groups (Eccles et al., 1993; Entwistle, 1990), peer social support decreases in the transition between schools (Seidman, Allen, Aber, Mitchell & Feinman, 1994). The impact of this disruption on social competence is not clear, with some studies finding that students' perceived social ability (Wigfield et al., 1991) and social competence (Berndt, Hawkins, & Jiao, 1999) decrease after the transition to middle school, while other research suggests that student's perceived social competence either does not change or increases across the transition

(Nottelmann, 1987; Proctor & Choi, 1994). These disparate findings may be the result of a failure to account for the idea that a school transition may have different effects based on one's level of previous social competence (e.g. the transition might accentuate pre-existing individual differences in social competence). Thus, there is at least some reason to hypothesize that the transition to middle or junior high school may significantly impact the stability of social competence from middle childhood to adolescence.

Methodological and Analytic Challenges of Studying Developmental Change

Studying constructs across development raises a number of methodological issues, foremost of which is that it is difficult to assess the stability of a construct over time when the meaning of a construct changes across developmental periods. There are two approaches to this methodological challenge. First, researchers can examine stability by utilizing the same measure across multiple time points. While this approach allows for an examination of *homotypic stability* (i.e., stability in a trait measured in the same way at different points in time), it is limited in that it is unclear how well a single measure adequately operationalizes the construct of interest in each developmental phase. For example, biting and kicking in early childhood are commonplace and are good measures of aggressive behavior during that time period, but by adolescence, biting and kicking are rare and are poor measures of aggression; measuring aggression the same way in early childhood and adolescence may yield an inaccurate measurement of the construct at one of those points in time. Thus, while utilizing the same measure across time points allows for a better examination of stability, it does so at the potential cost of inappropriately examining a construct according to its developmental meaning.

In a second approach to studying constructs developmentally, researchers examine stability by creating measures of developmentally appropriate markers of the construct at each developmental stage (i.e., these researchers examine what is referred to as *heterotypic stability*). Social competence is defined differently in each period, and constructs are operationalized (often by using multiple indicators) based upon that definition. While this approach is strengthened by using developmentally appropriate measures of a construct, it is limited in its ability to estimate the stability of a construct across developmental stages. This is because it is impossible to discern if observed variations in stability are due to actual differences in a construct or merely variation in measurement.

One solution to this methodological challenge is to build upon the strengths of both approaches. Consider the present investigation, for example. First, measures of social competence can be derived using the same instrument at each time point from early childhood to adolescence. To investigate whether this measurement approach adequately captures the age-appropriate meanings of social competence, analyses can test if the age-invariant measure of social competence is related to developmentally appropriate measures of social competence at a specific age. For instance, an age-invariant measure of competence (e.g., maternal ratings of a child's social skills) can be examined in relation to several age-specific measures (e.g., the quality of play behavior in early childhood or intimacy with peers in adolescence). To the extent that age-invariant and age-variant measures are correlated, this provides greater confidence that the age-invariant measure of social competence is an appropriate assessment of social competence at each time point. In other words, age-specific measures of social competence can be used to validate the age-invariant measures. The

present study aims to examine stability of social competence with this combined validation approach.

In addition to the methodological challenges of studying constructs over time, analytic techniques can also impact the assessment of continuity. In general, most research has examined the development of social competence over time utilizing a variable-centered approach to data analysis (e.g., correlations, regression, growth-curve modeling, and structural equation modeling). These techniques tend to identify average (or mean) patterns of development and the relation between variables and outcomes is assumed to be homogenous for individuals (Magnusson, 2003). Thus, variable-centered analyses predict the average relation between covariates and outcomes based on all individuals in the sample. These types of analyses tend to be the most common and can provide valuable information about general patterns of development over time. Variable-centered analyses are ideal if (a) researchers expect individuals to all follow a similar pattern of development and (b) the impact of covariates is the same for all individuals.

While variable-centered analyses can provide useful information about average effects of variables across all individuals, they fail to inform about individual patterns of development (e.g., if there are stronger or weaker relations among variables for some people in a population). The latter is the strength of person-centered analyses. Person-centered analyses (e.g., profile analyses, cluster analysis, group-based trajectory modeling) capitalize on individual differences, not averaging effects across all youths, but instead focusing on patterns of individual variability. These analyses identify latent groups or classes of individuals who share attributes or show similar patterns of relations among attributes and then analyze the impact of covariates within groups, allowing for these effects to vary across

groups. The person-centered approach describes differences among individuals in how variables are related to one another (Magnusson, 2003), rejecting the assumption that the impact of variables is homogenous across individuals. Thus, person-centered analyses are ideal if (a) outcomes are expected to vary across individuals, and (b) if the impact of covariates might differ based on one's pattern of development.

Although both variable-centered and person-centered approaches are useful, when applied to longitudinal studies each provides a unique perspective on development over time. To the extent that social competence varies at the individual level, it is useful to utilize both approaches to understand both average patterns of social competence and individual patterns of social competence over time. Moreover, because the impact of pubertal timing and school transition may not be homogenous for all youth, research is needed that examines the stability of social competence and the impact of these moderating factors on stability of social competence with both variable-centered and person-centered analyses.

The Present Study

The purpose of the proposed research is to examine patterns of stability and change in social competence over time among individuals followed from birth to adolescence, with a special emphasis on trajectories of social competence during the transition from childhood to adolescence. The present study tests how timing of pubertal maturation and a change in schools might impact the continuity of social competence over time. Furthermore, through both variable-centered and person-centered approaches, I test if the impacts of pubertal timing and school transition differ as a function of the individual's level of social competence at the point of transition into adolescence.

CHAPTER 2

METHOD

Participants

The present analyses use data from individuals who have been studied since birth in the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development (SECCYD).

Procedures

Recruitment

Families were recruited in 1991 during hospital visits to mothers shortly after the birth of a child in ten locations in the U.S. (Little Rock, AR; Irvine, CA; Lawrence, KS; Boston, MA; Philadelphia, PA; Pittsburgh, PA; Charlottesville, VA; Morganton, NC; Seattle, WA; Madison, WI). During pre-selected 24 hour periods, any woman giving birth was screened for eligibility and willingness to be contacted again. Eligible families met certain requirements: mother over the age of 18, family spoke English, mother was healthy, the baby was not multiple birth or released for adoption, the family lived within an hour of the research site, the family could not be planning a move from the area in the next year, and the neighborhood in which the family lived could not have been deemed by local police to be too dangerous to visit by teams of trained researchers.²

A total of 8,986 mothers gave birth during the sampling periods, 60% (5,416) of whom agreed to be telephoned in 2 weeks. Of that group, a conditionally random sample of 3,015 was selected (56%) to be contacted by phone two-weeks later. At the 2-week follow-up phone call, families were excluded from the study if the baby had been hospitalized for more than 7 days, the family expected to move in the next 3 years, or the family could not be

reached in three attempts at telephone contact. A total of 1,525 families were eligible to participate and agreed to the interview. Of those families, 1,364 completed a home interview when the infant was 1 month old and became study participants. In the final sample, 24% reported minority heritage, 11% of the mothers had not completed high school, and 14% of the families were headed by a single mother. On average, mothers had 14.4 years of education and the average family income was 3.6 times the poverty level. The participating sample was similar to the eligible hospital sample in terms of maternal education, ethnic diversity, and presence of a husband/partner in the household.

Because one goal of the present study was to examine the impact of pubertal timing and school transition on the stability of social competence, data were limited to youths who were examined by a nurse for pubertal development at least once and attended public school (information about school transition was only available for youth in public school settings). The analytic sample consisted of 592 individuals (277 males, 315 females). There were no differences between the current sample and full sample in family income, parent education, birth order, or ethnicity, although youths in the analytic sample were more likely to be female than youths in the full sample. Furthermore, there were no differences between the analytic sample and the full sample on social competence at any age.

Data Collection

Children were followed from birth to age 15. Over the course of the study, measures were administered in different contexts, such as home, classroom, laboratory, etc. Analyses in the present study utilize variables from the 54 month time point (Phase II) to the age 15 follow-up (Phase IV) from maternal and self-report data.

Measures

Social Competence

Constructing an age-invariant measure of social competence. An age-invariant measure of social competence was created from 8 items from the Social Skills Rating System (SSRS; Gresham & Elliot, 1991; see Appendix A for list of all items), which was administered at each of the 9 time points from 54 months to age 15. The SSRS was normed on a diverse, national sample of children and shows high levels of internal consistency and test-retest reliability. Mothers (or primary caregiver) were asked to report how often a statement reflecting ability in social-interactions was true of their child (e.g., “Makes friends easily”; ‘Never’, ‘Sometimes’, ‘Often’). Mothers completed the SSRS at each major data collection time point, providing three assessments of social competence in early childhood (54 months, kindergarten, and 1st grade), 4 assessments of social competence in middle childhood (3rd grade, 4th grade, and 5th grade), and 2 assessments of social competence in adolescence (6th grade and age 15).

Age-variant measures of social competence. In addition to an age-invariant measure of social competence, age-specific variables of social competence were also of interest in the present study. At each developmental period (early childhood, middle childhood, and adolescence) markers of social competence were identified that were consistent with Sullivan’s theoretical framework.

In early childhood, the interaction style of participants with their peers (as reported by mother) was used as markers of social competence. At 3 time-points in early childhood (54-months, Kindergarten, and 1st grade), mothers completed a measure assessing their child’s play behaviors and peer relations. This measure asks the mother to name up to six regular playmates and report information about how a child plays with his or her peers (Vandell,

1995). Nineteen items (derived from Quality of Classroom Friends; Clark & Ladd, 2000) ask the respondent to rate interaction processes characteristic of the child-playmate dyad, including interactional harmony (e.g., "Play happily together"), balance (e.g., "Often show a pattern where one child dominates over other child"), and conflict (e.g., "Fight verbally") on a 4-point scale ("Strongly disagree" to "Strongly agree"). Two variables are derived: positive peer interactions and negative peer interactions. Positive peer interactions are marked by reciprocal, balanced play while negative peer interactions are characterized as conflictual and hostile.

In middle childhood, developmentally appropriate measures of social competence were peer aggression, prosocial behavior with peers, and friendship quality. In 3rd, 4th, and 5th grades, a 43-item questionnaire, Child Behavior with Peers, was designed to measure the study child's relationships and behaviors with peers. Thirty-one of the items in the scale were derived from the Child Behavior Scale (Ladd & Profilet, 1996), 6 items were adapted from the Peer Victimization Scale (Kochenderfer & Ladd, 1996), and 6 items came from the Children's Social Behavior Scale-Teacher Form (Crick, 1996). Mothers reported on a 3-point scale from "Not true" to "Often true" on a number of items about aggressive and prosocial behaviors (e.g., "My child loses his/her temper easily with peers", "My child is cooperative with peers", and "My child threatens other children"). Both peer aggression ($\alpha = .90$, $\alpha = .89$, and $\alpha = .89$ in 3rd, 4th, and 5th grades respectively) and prosocial behavior with peers ($\alpha = .91$, $\alpha = .87$, and $\alpha = .89$ in 3rd, 4th, and 5th grades respectively) showed good reliability.

The Friendship Quality Questionnaire (Parker & Asher, 1993) used in 3rd, 4th and 5th grade assesses the child's perceptions of a 'best' friend ('X'). Individuals are presented with 21-items (e.g., "When mad, I talk to <X> about it" and "<X> and I always talk about

our problems”) and are asked to rate them on a 5-point scale from “Not at all true” to “Really true”. A total friendship quality variable is calculated, with higher scores indicating higher quality friendship ($\alpha = .87$, $\alpha = .90$, and $\alpha = .90$ for 3rd, 4th, and 5th grades respectively).

Finally, during adolescence, 7 measures were used as indexes of socially competent behavior: friendship quality, aggression with peers, prosocial behavior with peers, overt aggression, intimate disclosure with peers, and items pertaining to romantic relationship quality and intimacy. The Friendship Quality Questionnaire (Parker & Asher, 1993) was again administered in the 6th grade and 15-year follow-up. Beginning in adolescence, the Friendship Quality Questionnaire was altered slightly; the first 21 statements in the measure are identical to the statements asked in the Friendship Quality Questionnaire used at earlier assessment points (3rd, 4th and 5th). The last 8 items were changed to be more suitable for use with adolescents. The 29-item questionnaire utilizes the same 5-point response scale (“Not at all true” to “Really true”) and a total quality of friendships score ($\alpha = .93$ in 6th grade; $\alpha = .92$ at age 15) as well as an intimate exchange with peers score (e.g., “<X> and I tell each other private things”; $\alpha = .80$ in 6th grade; $\alpha = .87$ at age 15) were used as indexes of socially competent behavior during adolescence.

Slightly different measures were used to assess aggression and prosocial behavior with peers during adolescence in the 6th grade and 15-year follow-up. Again during the 6th grade, aggression with peers and prosocial behavior with peers were assessed by the Child Behavior with Peers measure. Peer aggression ($\alpha = .90$), prosocial behavior with peers ($\alpha = .91$), and overt aggression ($\alpha = .91$) showed good reliability. At age 15, overt aggression and perceived popularity were used as indexes of good social functioning. To identify overt aggression with peers, the Aggression Scale (Little, et al., 2003) presents participants with

18-items and asks them to rate the validity of the statement (e.g., “I often threaten others to get what I want” or “When others anger me, I often hit/kick them” from “Not at all true” to “Completely true”). The overt aggression subscale was found to have good internal validity (6 items; $\alpha = .82$). Furthermore, at age 15, popularity with peers was used as a measure of successful social relationships. Popularity (Cillessen & Rose, 2005) is assessed by 8-items which ask youths to self-report about how well they are liked by their peers (e.g., “How many people in your grade think that you are not popular?” on a 7-point scale from “Almost nobody” to “Almost everybody”).

Finally, in the 6th grade and at the 15-year follow up, adolescents were asked to self-report about the quality of their romantic relationships (Furman, 1996; Furman & Buhrmester, 1985). If youths endorsed being involved in a romantic relationship, they were asked 30-items about the quality interactions with a significant other (e.g., “How much do you and that person talk about things?” or “Does that person really care about you?” from “Little or none” to “Almost always”). Nine subscales were derived from the measure: companionship with romantic partner (3 items, $\alpha = .77$ grade 6 and $\alpha = .61$ 15-year follow-up), conflict with romantic partner (3 items, $\alpha = .64$ grade 6 and $\alpha = .88$ 15-year follow-up), instrumental aid with romantic partner (3 items, $\alpha = .64$ grade 6 and $\alpha = .79$ 15-year follow-up), intimacy with romantic partner (3 items; $\alpha = .87$ grade 6 and $\alpha = .87$ 15-year follow-up), nurturance with romantic partner (3 items; $\alpha = .78$ grade 6 and $\alpha = .74$ 15-year follow-up), affection for romantic partner (3 items, $\alpha = .85$ grade 6 and $\alpha = .90$ 15-year follow-up), admiration for romantic partner (3 items; $\alpha = .86$ grade 6 and $\alpha = .81$ 15-year follow-up), reliable alliance with romantic partner (3 items, $\alpha = .80$ grade 6 and $\alpha = .85$ 15-year follow-

up), and antagonism with romantic partners (3 items, $\alpha = .74$ grade 6 and $\alpha = .87$ 15-year follow-up).

Validating the age-invariant measure of social competence. To examine the reliability of the social competence measure, Cronbach's alpha was calculated at each time point. The alpha was moderate at each time point (see Table 1). However, given that Cronbach's alpha is sensitive to the number of items in a scale, and there are only 8 items in the current scale, it is unsurprising that these values are conservative. In addition, confirmatory factor analyses were conducted to test the fit of the age-invariant measure of social competence at each time point. Items that were perceived to capture a similar aspect of social competence were allowed to correlate; thus, 'Responds appropriately when hit or pushed by other children' was allowed to correlate with 'Controls temper when arguing with other children', 'Introduces herself or himself to new people without being told' was allowed to correlate with 'Starts conversations rather than waiting for others to talk first', and 'Makes friends easily' was allowed to correlate with 'Is liked by others'. After allowing for these correlations, fit indices indicated that the measure showed good reliability across time (See Table 1).

In addition to confirmatory factor analyses, it was necessary to validate the age-invariant measure of social competence with age-specific measures of social competence. Bivariate correlations were conducted at each time point, and the age-invariant social competence measure was validated by age-appropriate measures of social competence.

First, I tested the validity of age-invariant social competence in early childhood by testing the correlation between age-invariant social competence and youth play and peer

Table 1. Reliability Statistics and Confirmatory Factor Analyses Results of Social Competence from 54 Months to 15 Years

Age	Reliability		Fit Statistics		
	<i>Alpha</i>	<i>CMIN</i>	<i>NNFI</i>	<i>NFI</i>	<i>RMSEA</i>
54 months	.67	.98	.95	.96	.04
Kindergarten	.68	.96	.90	.94	.06
Grade 1	.70	.99	.98	.97	.02
Grade 3	.75	.98	.97	.97	.04
Grade 4	.73	.98	.94	.96	.05
Grade 5	.72	.98	.95	.96	.04
Grade 6	.74	.96	.90	.95	.06
15 Years	.71	.98	.98	.96	.04

Note. Fit Statistics are Cronbach's alpha, Comparative Fit Index, Non-Normed Fit Index, Normed Fit Index, Root Mean Square Error of Approximation.

relations. At 54 months, greater social competence was associated with more positive play interactions with peers ($r = .25, p < .01$) and less negative play with peers ($r = -.07, p < .10$) as reported by mothers. The same pattern of results was found for positive peer relations ($r = .30, p < .01; r = .31, p < .01$) and negative peer relations ($r = -.15, p < .01; r = -.20, p < .01$) in Kindergarten and 1st grade, respectively.

Throughout middle childhood, the age-invariant measure of social competence also showed a strong correlation with developmentally salient constructs. In grades 3, 4, and 5 respectively, social competence was associated with less aggression with peers ($r = -.29, p$

<.01; $r = -.29$, $p < .01$; $r = -.28$, $p < .01$), more prosocial behavior when interacting with peers ($r = .42$, $p < .01$; $r = .49$, $p < .01$; $r = .41$, $p < .01$), and higher quality friendships ($r = .11$, $p < .01$; $r = .17$, $p < .01$; $r = .11$, $p < .01$).

Finally, in adolescence, social competence was significantly related to friendship quality ($r = .18$, $p < .01$ in 6th grade and $r = .18$, $p < .01$ at age 15). Youths who scored high on social competence were less aggressive ($r = -.30$, $p < .01$ in 6th grade) and more prosocial with their peers ($r = .45$, $p < .01$ in 6th grade). At age 15, youths who scored high on social competence had higher perceived popularity ($r = .23$, $p < .01$), reported less overt aggression with peers ($r = -.14$, $p < .01$), and greater intimate disclosure with friends ($r = .15$, $p < .01$).

Although social competence scores were related to lower antagonism in romantic relationships at grade 6 ($r = -.23$, $p = .02$) and at age 15 ($r = -.21$, $p = .01$), in general social competence was not related to measures of intimate disclosure with romantic partners or the stability/reliability of romantic relationships. Although Sullivan suggested that romantic relationships were an important domain for social competence during adolescence, other researchers have questioned whether romantic relationships are indeed an aspect of competent behavior during this period (Roisman et al., 1996; Roisman et al., unpublished manuscript). To the extent that this competence is emerging in early and mid-adolescence, and that only a small number of youths in the present sample report involvement in romantic relationships (19% in the 6th grade, 23% at age 15), it is not surprising that correlations between the age-invariant measure of social competence and aspects of romantic relationships are nonsignificant.

Taken together, the results of confirmatory factor analysis and the correlations with age-variant measures of social competence attest to the reliability and validity of the age-invariant measure of social competence for use in the present study.

Predictors of Social Competence Trajectory

Maternal sensitivity and hostility. Quality of mother-child interaction was assessed by a 15-minute observational video of structured play between mother and child (coding was adapted from Egeland & Hiester, 1993 to be age and task appropriate) at 54 months. The measure was designed for the NICHD SECCYD but is similar to common measures of parenting quality described in the literature (e.g., Ainsworth, Blehar, Waters, & Wall, 1978; Egeland & Farber, 1984). Mother-child interaction is observed over the course of a number of activities. Two of the three activities were designed to be beyond the developmental abilities of the child (task 1 and 2). In the 54-month visit, the first activity involved completing a maze using an Etch-A-Sketch that had been altered by attaching a maze to the screen (Task 1). The second activity required the dyad to form a series of same-sized rectangular cube “towers” from variously shaped wooden blocks (Task 2). The third activity involved play with a set of six hand puppets: 2 parrots, 2 frogs, and 2 blue alligators (Task 3). The procedure was designed to elicit normative mother-child interaction and to assess the mother's capacity to interact in a sensitive, warm, and stimulating manner with her child. The present analyses use measures of maternal sensitivity and hostility derived from this observational task.

Biological and Contextual Variables

Timing of pubertal development. Tanner staging was used to assess pubertal development. Nursing professionals assessed individuals' pubertal development in the course

of a larger health examination in grades 4 through 6 and again at age 15. Among males, genital and pubic hair development were assessed and among females, breast and pubic hair development were assessed. Importantly, some youths did not participate in the health-exams and thus were not assessed for pubertal development and eliminated from the analytic sample.

At each time point, mean pubertal development was calculated separately among males and females. Individuals who were one standard deviation above their gender group at a time point were identified as “early-maturers” and received a value of ‘1’ (youths who were not early maturers were coded as ‘0’). Individuals who were “late-maturers” were also identified (e.g., youths who were 1 standard deviation below their gender mean at each time point received a value of ‘1’; youths who were not late received a value of ‘0’). For time points prior to pubertal development being assessed (54 months to 3rd grade), pubertal timing was set to ‘0’.

School transition. Information about the type of school (e.g., elementary or middle school) was only available for youths enrolled in public schools. Parents reported information about the school (e.g., name of the school, grade levels at the school) at each year. Individuals were classified as transitioning to a new school setting (e.g., transitioning from elementary school to middle school) if they moved from a school where they were enrolled in the oldest grade taught and transitioned to a new school where they were enrolled the lowest grade taught. Because I am primarily interested in school transitions during adolescence, school transitions prior to grade 4 were not evaluated (e.g., values were set to ‘0’). For every year prior to the transition, youths were received a value of ‘0’. If the child

transitioned to a new school setting, he or she then received a value of '1' at that time point and while youths who did not transition received a value of '0'.

Hypotheses

The goal of the present study is to examine the stability of social competence and identify unique trajectories of socially competent behavior from childhood to adolescence. In addition, the present study tests how biological development and contextual change impact changes in social competence. The following hypotheses are proposed:

- *Hypothesis 1.* The stability of social competence will vary based on the developmental period:
 - Social competence will be stable from early childhood to middle childhood.
 - During the transition from middle childhood to adolescence, social competence will be relatively less stable.
- *Hypothesis 2.* Changes in biological functioning (pubertal maturation) and context (school transitions) will impact the stability of social competence over time.
 - Early maturing females will experience greater instability in social competence during the transition from childhood to adulthood than will on-time or late maturers.
 - Pubertal timing will be unrelated to stability of social competence among males.
 - School transitions will account for the relatively lower stability of social competence from middle childhood to adolescence.
- *Hypothesis 3.* Four distinctly different trajectories of social competence from early childhood to adolescence will be identified.

- Some individuals will have high social competence across all time points and other individuals will have consistently low social competence over time. A third and fourth trajectory group will be found, one that decreases in social competence from childhood to adolescence and another that increases in social competence from childhood to adolescence.
- *Hypothesis 4.* Children with higher quality parenting at 54 months (as characterized by greater maternal sensitivity and less maternal hostility) will be more likely to evince high social competence over time.
- *Hypothesis 5.* The impact of biological development and contextual change on social competence will vary based on individuals' prior level of social competence.
 - Individuals with the highest degree of social competence during early childhood and middle childhood will be positively affected by school changes and pubertal timing during the transition from childhood into adolescence.
 - Individuals with lower levels of social competence through middle childhood will be at greater risk for changes in social competence as they enter adolescence.

CHAPTER 3

RESULTS

Review of Analytic Strategy

Because some research suggests that males and females differ in the stability of social competence (Masten et al., 1995) and the impact of pubertal timing and school transition may differ among males and females, all analyses examine the sexes separately. Analyses were conducted in two parts. The first set of analyses use structural equation modeling (SEM) to examine the stability of social competence from 54 months to 15 years and test whether biological development and contextual change account for any observed instability of social competence from childhood to adolescence. The second set of analyses utilizes two distinct techniques, person-centered analyses (finite mixture modeling) and variable-centered analyses (growth-curve modeling) to examine trajectories of social competence. Using the trajectories of social competence identified in each type of analyses (person-centered and variable-centered), I subsequently test whether timing of biological development and contextual change impact youths differently based on their level of social competence. In the person-centered analyses, I test if puberty or school transitions impact youths differentially as a function of their trajectory of social competence. In the variable-centered analyses, I test for an interaction effect between level of pre-adolescent social competence and either biological development or contextual change.

Examining the Stability of Social Competence

The first set of the analyses use structural equation modeling (SEM; AMOS software) to examine the stability of social competence over time. Social competence is identified as an observed variable at each time point in separate models for males and females (54 months to

15 years; 8 time points total). First, the model is tested without any of the paths constrained (allowing each path to vary) and fit of the model is examined (e.g., Comparative Fit Index, Non-Normed Fit Index, Normed Fit Index, Root Mean Square Error of Approximation). This model will be used as the reference (Model 1) to determine if subsequent models provide better fit of the data.

A second model constrains the paths between each time point of social competence to be equal (Model 2). This model presumes that the cross-period links between measures of social competence are equivalent, or that the stability of social competence is equal across developmental periods. Fit statistics combined with the Chi-square difference statistic will be used to test if the fully constrained model fits the data significantly better than the reference model ($\chi^2_{\text{model 1}} - \chi^2_{\text{model 2}}$; $df_{\text{model 1}} - df_{\text{model 2}}$). If the χ^2 difference statistic is significant, it indicates that the models are significantly different from each other and this, combined with examination of the CMIN, NNFI, NFI, and RMSEA, inform which model best describes the stability of social competence among males and females.

A third model constrains the paths between variables from early childhood to middle childhood but unconstrains the paths from middle childhood to adolescence (freeing the parameter between Grade 5 and Grade 6 assessments; Model 3). This model presumes that the stability of social competence is different from early to middle childhood than from middle childhood to adolescence. Based on the hypotheses of the current study, it is expected that the third model will provide the best fit of the data (as determined by fit statistics and a test of the χ^2 difference between Model 3 and Model 1). If the third model provides the best fit, and if the stability coefficients are smaller between middle childhood and adolescence

than between early and middle childhood, it would suggest that social competence is highly stable until middle childhood but is less stable between middle childhood to adolescence.

Impact of Biological Development and Contextual Change on Stability of Social Competence

In follow-up analyses, I test if social competence is more or less stable among youths who experience off-time (early or late) pubertal maturation or a school transition compared to youths who experience on-time puberty or do not change schools. To test the impact of pubertal timing and school transition on the stability of social competence, multi-group SEM models will compare individuals with respect to pubertal timing (early-maturing versus not-early maturing; late-maturing versus not-late maturing) and the presence or absence of a school transition separately for males and females. In these analyses, dichotomous measures of pubertal timing (early vs. not early; late vs. not late) and school transition (yes/no) at the 6th grade will be used.

For each moderating factor of interest, three models will be compared, one in which the factor loadings between the two groups are fixed to be the same (i.e., assuming that there are no differences between youths who experience the particular covariate and those who do not; Model 1), a second model where the factor loadings are fixed in childhood but allowed to vary in adolescence (indicating comparable degrees of stability in childhood but differences in stability during adolescence as a function of pubertal status or school change; Model 2), and a third model that allows all factor loadings in childhood and adolescence to vary between groups (indicating differences in stability at *all* time points between those who experience the change and those who do not; Model 3). Although Model 1 is testing the same effects as in prior analyses that examined stability (i.e., Model 1 from the single-group SEM models that examined stabilities), I run this model again to account for the increase in

degrees of freedom that occur in multi-group compared to single-group analyses (changes in degrees of freedom impact calculation of the χ^2 statistic). Thus, the analyses are run again as a multi-group analysis in order to have valid χ^2 and fit statistics as a reference for subsequent models (Model 2 and Model 3).

As an example, one set of models will compare individuals with a school transition to those without a school transition. The first model will examine if the stability of social competence is the same for youths who experience and youths who do not experience a school transition. The second model will test whether these youths are the same with respect to social competence up until they experience a school transition, but vary thereafter, and the third model will examine whether youths who experience a transition and youths who do not experience a transition have different stability of social competence from early childhood through adolescence.

Examining Trajectories of Social Competence

After examining the stability of social competence, two types of analyses examine trajectories of social competence. The first of these analyses is person-centered; the second set of these analyses is variable-centered.

Person-Centered Analyses

Using a person-centered analytic strategy, I use finite mixture modeling (group-based trajectory modeling, also called PROC TRAJ) to examine latent classes or groups that describe distinct patterns of social competence over time (Nagin & Land, 1993; Nagin, 2005). Using a macro program designed for SAS (Jones, Nagin, & Roeder, 2001), I estimate distinct group trajectories of social competence from early childhood to adolescence and simultaneously estimate the probability that an individual belongs to each of the groups. This

probability is calculated on the basis of the maximum likelihood parameter estimates associated with the mixture model (referred to as the “posterior probability of group membership”) and is used to assign individuals to the most likely group. Finite mixture modeling uses variations in the data to identify patterns of development over time.

Importantly, individuals are grouped based on their pattern of social competence across *all* time points (e.g., there are no random effects within trajectory). That is, individuals can vary around a mean intercept of a given latent class, but there can be no variation within the class in how social competence changes over time. The use of group-based trajectory modeling is particularly well-suited to the current analyses because it assumes that data are missing at random, allowing inclusion of individuals who are missing data at a time point (e.g., youths who were not assessed for pubertal development at every time point). This is especially desirable given that the data for the current project are longitudinal, and some participants are missing data at one or two time points.

Models will test for different numbers of latent classes (up to 4) to determine what number of groups best describes the trajectories of social competence over time and what form of a polynomial (linear, quadratic) accurately describes each trajectory pattern. Models are compared for fit using the Bayesian Information Criterion (BIC).³ The model with (a) the lowest BIC value across all models that is (b) conceptually clear and (c) has ample group size (groups consisting of greater than 5% of the sample) will be utilized in further analyses.

Predicting trajectory group membership. After identifying group-based patterns of social competence over time, analyses will attempt to predict membership in the previously identified group-based trajectories of social competence. Specifically, the analyses will test if maternal sensitivity and hostility differentially predict membership in group trajectories.

Impact of biological development and contextual change. In order to examine the impact of biological and contextual change on social competence, I will test if the impact of each change differs as a function of social competence trajectory. Because individuals cannot be randomly assigned to experience a life event, such as school transition, testing for the effects of school transition within trajectory group approaches a quasi-experimental test of a life event on a trajectory of development. Indeed, if it is assumed that youths who are in the same trajectory group are the same with respect to their level of social competence (and with respect to factors that contribute to their level of social competence), testing the effect of pubertal timing and school transition within a group approaches an experimental design where individuals are matched on their level of social competence as well as factors that contribute to social competence. The effects of pubertal timing and school transition are thus tested within group, and since it is a person-centered technique, the effect directions and magnitude of effects are allowed to vary across latent classes. In other words, I identify a group of individuals who follow the same trajectory of social competence over time and test if biological maturation or contextual change are associated with changes in their trajectory of social competence.

Each variable of interest (pubertal timing and school transition) will be entered as a time-varying covariate, allowing for a test in how pubertal timing and school transition correspond to changes in level (intercept) of social competence (A time-varying covariate is one that potentially changes from one measurement point to the next, such as pubertal status; a time-invariant covariate is one that is stable across time periods, such as ethnicity or gender.). Results of these analyses will indicate (a) if a given variable significantly impacts social competence of members of a trajectory group, (b) the direction of that change, and (c)

the magnitude of that change. It is expected that the relation between moderating factors and social competence will differ based on trajectory group. Specifically, I expect more vulnerable groups (those with low social competence to begin with) will be impacted negatively by pubertal timing and school transition, while youths who belong to groups with relatively higher social competence will be particularly impacted by these factors.

In addition to testing the independent impact of pubertal timing and school transition on trajectories of social competence, I also examine the impact of cumulative biological and institutional changes. For these analyses, two time-varying covariates will be entered: one that indicates pubertal timing (either early or late) and another that indicates school transition. Both effects are estimated simultaneously allowing for an estimate of the impact of: (1) pubertal timing only, (2) school transition only, or (3) both pubertal timing and school transition simultaneously. Results of these analyses will examine if cumulative changes impact youths differently based on their trajectory of social competence.

Variable-Centered Analyses

After identifying trajectories of social competence utilizing a person-centered approach, subsequent analyses will examine the mean pattern of social competence over time using a variable-centered approach. Using growth curve modeling from a multilevel modeling perspective (SAS modeling software). I identify individual development of social competence over time based on a reference point (the intercept; in the present analyses the reference point is pre-adolescence/age 11). I examine individual change in social competence over time and test if pubertal timing and school transition impact (a) pre-adolescent social competence (i.e., the intercept of the line) and (b) change in social competence over time (i.e., the slope of the line). Moreover, to test if the impact of pubertal timing and school

transition differ based on one's level of social competence relative to other youths at age 11, I test for an interaction effect between pubertal timing and school transition and an adolescent's relative level of social competence as he or she enters adolescence. For example, I test how being identified as early maturing in adolescence interacts with relative social competence as youths enter adolescence (age 11) to see whether off-time maturation differentially affects individuals as a function of their level of social competence relative to their peers. Furthermore, these analyses allow a test of the impact of pubertal timing and school transition on both fixed effects (that is, mean social competence in the sample as a whole) and random effects (that is, individual differences in development of social competence over time). This permits an examination of how biological maturation or contextual change predicts how social competence changes over time, which cannot be tested in person-centered analyses due to the assumptions of group-based trajectory modeling (e.g., that individuals do not differ in their patterns of change). As in prior analyses, males and females are examined separately.

Multilevel modeling in SAS will be used to measure average growth in social competence over time. First, unconditional models will be used to determine the general pattern of change over time in social competence among both males and females, testing for various polynomial trends (e.g., linear and quadratic growth). Individuals are divided into year long age categories, with the exception of the 54 month time point, which is 6 months prior to the next assessment time point, and the final time point, which is 4 years after the previous time point. Thus, the first assessment occurs 6 months prior to the 2nd assessment and individuals are classified by age into each subsequent age bracket. Youths are sorted into the age bracket corresponding to their age in years, without rounding up for individuals who

are more than halfway to their next birthday. This was done because the SECCYD data is a birth cohort, and it ensures that youths are classified in the same age-bracket consistently across time (for example, an individual who is 14.6 years of age is assigned membership in the 14 year old group). Growth will be examined as a function of age (e.g., 6 years, 7 years, etc.) and will be centered at the mean age at the 6th grade assessment, the assessment point that most closely maps onto the entry into adolescence (in the present sample, the mean age at grade 6 assessment is 11). This means that all intercept coefficients are interpreted as the level of social competence at age 11.

Impact of biological development and contextual change. After identifying the best fitting model and the best fitting polynomial form of the curve, analyses will test how pubertal timing and school transition interact with level of social competence as youths enter adolescence to predict future social competence. In these analyses, pubertal timing (time-varying covariate), school transition (time-varying covariate), and pre-adolescent level of social competence compared to other youths in the sample will be used as predictors of level of social competence (remember that age is centered at age 11; thus I am testing how pubertal timing and school transition impact level of social competence at the beginning of adolescence) and how social competence changes over time as a function of pubertal timing and school transition. In order to test for an interaction of either pubertal timing (early or late) or school transition with social competence, pre-adolescent social competence will be centered around the mean social competence in the sample at age 11, separately for males and females (Social Competence at age 11_{individual} – Social Competence at age 11_{μ sample}). Thus, this variable is an index of a youth's relative pre-adolescent social competence (higher or lower than sample average). Centering the data in this way avoids collinearity between

social competence as predictor variable and social competence as an outcome variable. The interaction between pubertal timing or school transition and relative social competence will be used to predict both level of social competence and change in social competence over time (see Appendix B for analytic formulas).

Part I: Testing the Stability of Social Competence

Using AMOS, a series of analyses tested the stability of social competence from 54 months to 15 years among males and females (see Table 2; see Figure 1 for males; see Figure

Table 2. Fit Statistics of Social Competence Stability Models Among Males and Females

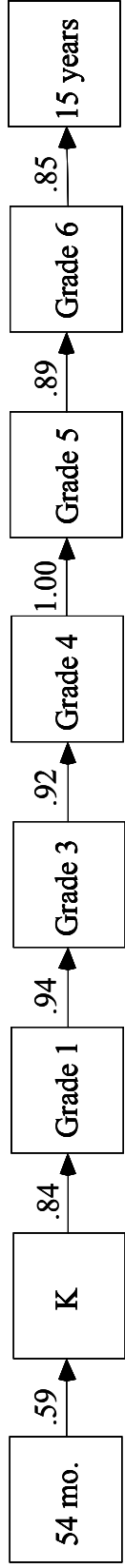
Model	$\chi^2(df)$	CMIN	Fit Statistics		RMSEA	Change in $\chi^2(df)^a$
			NNFI	NFI		
<i>Males</i>						
Model 1	25.9 (15)	.99	.98	.98	.05	-
Model 2	76.4 (21)	.95	.92	.94	.10	-50.5 (6)**
Model 3	71.5 (19)	.96	.92	.94	.10	-45.6 (4)**
Model 4	28.8 (18)	.99	.98	.98	.05	-2.9 (3)
<i>Females</i>						
Model 1	15.6 (15)	1.00	1.00	.99	.01	-
Model 2	62.7 (21)	.97	.95	.95	.08	-47.1 (6)**
Model 3	51.3 (19)	.98	.95	.96	.07	-35.7 (4)**
Model 4	19.2 (18)	1.00	1.00	.99	.01	-3.6 (3)

Note. Dashes indicate that term was not calculated. Fit Statistics are Comparative Fit Index, Non-Normed Fit Index, Normed Fit Index, Root Mean Square Error of Approximation.

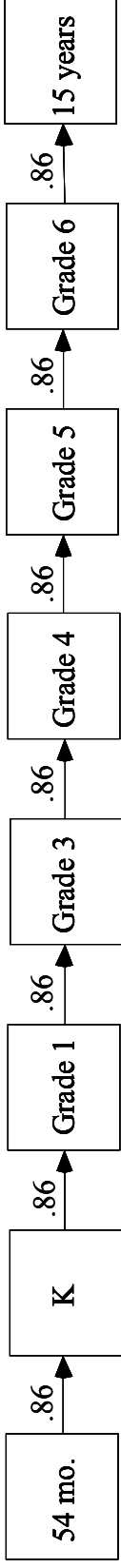
^a Change in χ^2 is calculated $(\chi^2_{\text{Model X}} - \chi^2_{\text{Model 1}}) (df_{\text{Model X}} - df_{\text{Model 1}})$.

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

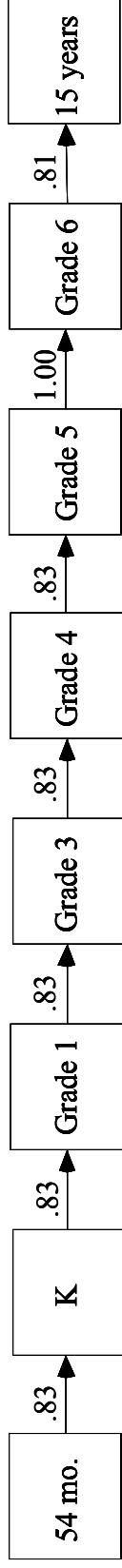
(a) Model 1: Parameters allowed to vary freely



(b) Model 2: Parameters fixed



(c) Model 3: Parameters fixed from early childhood to middle childhood and free in adolescence



(d) Model 4: Parameters fixed in middle childhood and free in early childhood and adolescence

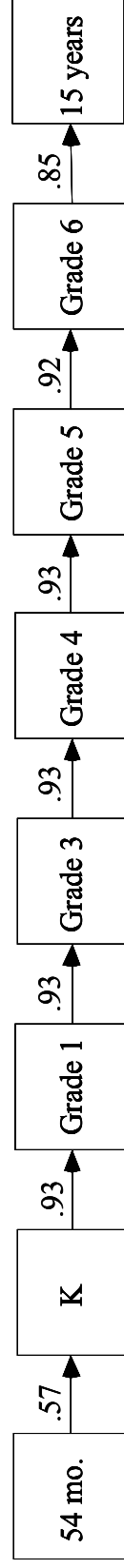


Figure 1. Coefficients of the Stability of Social Competence Among Males

Note. 54 mo. = 54 months; K = Kindergarten.

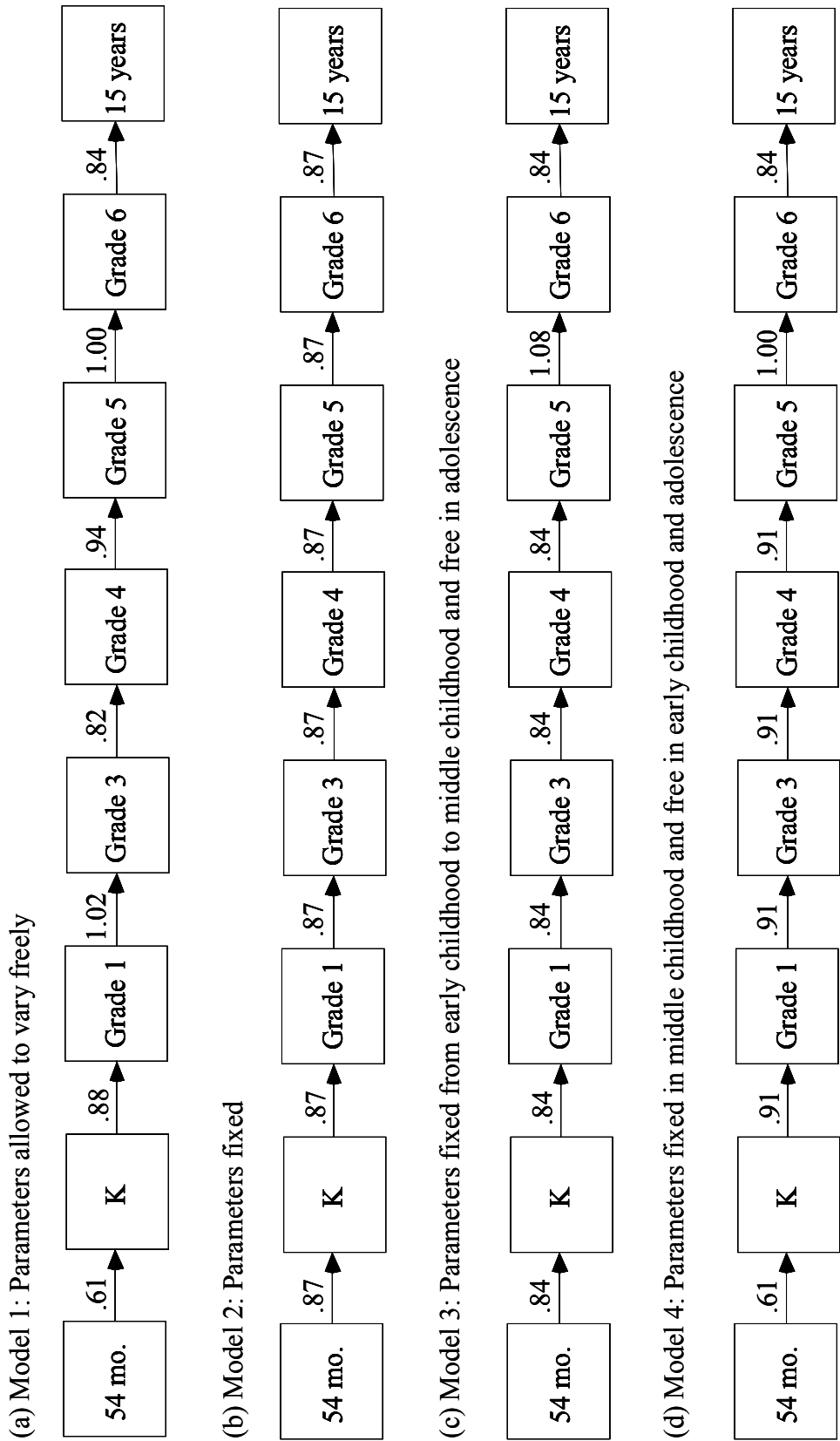


Figure 2. Coefficients of the Stability Social Competence Among Females
Note. 54 mo. = 54 months; K = Kindergarten.

2 for females). As discussed earlier, Model 1 allowed for all parameters to vary freely. Model 2 constrained all pathways from childhood to adolescence to be equal. Finally, Model 3 constrained parameters in childhood to be equal, but allowed parameters in adolescence to vary. In Model 1, examination of the parameters showed that the stability of social competence was very modest from early childhood to Kindergarten, was highly stable throughout childhood, and became less stable during adolescence, especially among females. In Model 2, parameter terms were fixed to be equal across age periods and, as designed, indicated moderate stability of social competence over time. Finally, in Model 3, results indicate that when paths were constrained during the earlier years but allowed to vary from middle childhood on, social competence was moderately stable throughout childhood, but less stable in adolescence for both males and females (as indicated by more modest parameter weights).

Comparing the three models, results indicated that Model 1, which indicated modest stability in early childhood, high stability in middle childhood, and less stability in adolescence, best fit the data; there was no evidence indicating that Model 2 or Model 3 provided a better fit the data for either males or females. Indeed, the change in Chi-square statistic between models indicated that Models 2 and 3 provided significantly *worse* fits than model 1 (as indexed by a significant negative χ^2 statistic).. In general, then, the pattern of findings for both males and females suggests that social competence is relatively unstable in early childhood, stable during middle childhood, and less stable as youths transition into adolescence, particularly among females.

One final statistical test was conducted to confirm this pattern of stability of social competence. An SEM model was tested that compared Model 1, where all parameters

allowed to vary freely to a new model (Model 4), where parameters were free to vary in early childhood (between 54 months and Kindergarten assessments) and in adolescence (between Grade 5 and Grade 6 assessments), but were fixed to be equal in middle childhood among males and females (see Table 2). Among both males (see Figure 1) and females (see Figure 2) results indicated that there was no significant χ^2 difference between Model 1 and Model 4. Furthermore, the fit statistics are identical across the two models. Thus, because Model 4 fits the data equally as well as Model 1, results confirm that there is continuity of social competence during middle childhood, but significantly less continuity among youths transitioning into middle childhood (from early childhood) and, as hypothesized, among youths transitioning out of middle childhood (into adolescence). Notably, however, the magnitude of this instability is modest and does not seem to be a product of variation in time between assessment periods.⁴

The Impact of Biological Development and Contextual Change

Next, analyses tested if the stability of social competence varied among (a) youths who were early maturers compared to on-time or late-maturers in grade 6, (b), youths who were late maturers compared to on-time or early-maturers in grade 6, and (c) youths who transitioned schools compared with those who did not in grade 6. In these analyses, Model 1 fixed parameters to be equal across groups (i.e., no differences in stability by pubertal timing group or by school transition group). This is the same model that was run earlier to look at stability in the entire sample (i.e., parameters are held constant regardless of pubertal maturation or school transition), but it was necessary to re-run the model to obtain an accurate reference point for Models 2 and 3 (results of this model and the previous model

Table 3. Fit Statistics of Social Competence Stability Models by Pubertal Timing Among Males and Females

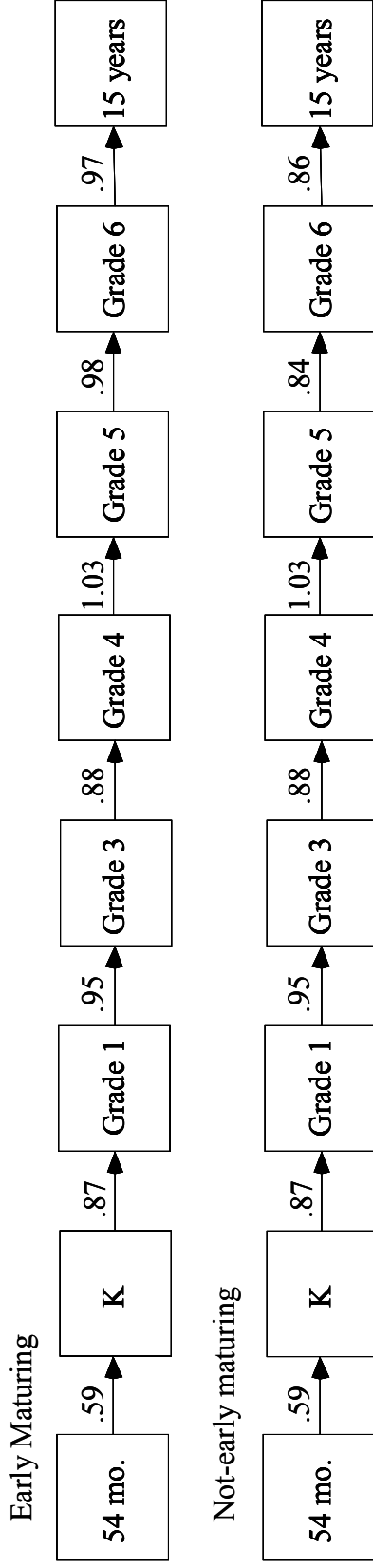
Model	$\chi^2(df)$	<i>CMIN</i>	<i>NNFI</i>	<i>NFI</i>	<i>RMSEA</i>	Change in $\chi^2(df)$ ^a
Males						
Reference Model	53.5 (37)	.98	.97	.94	.04	-
Model 1 Early Puberty	51.1 (35)	.98	.97	.95	.05	2.4 (2)
Model 2 Early Puberty	39.9 (30)	.99	.97	.96	.04	13.6 (7)
Model 1 Late Puberty	49.1 (35)	.99	.98	.95	.04	4.4 (2)
Model 2 Late Puberty	44.5 (30)	.98	.96	.96	.05	9.0 (7)
Females						
Reference Model	41.4 (37)	1.00	.99	.97	.02	-
Model 1 Early Puberty	40.9 (35)	1.00	.99	.97	.03	.5 (2)
Model 2 Early Puberty	34.3 (30)	1.00	.99	.97	.02	7.0 (7)
Model 1 Late Puberty	40.6 (35)	.99	.99	.95	.03	.8(2)
Model 2 Late Puberty	33.7 (30)	.99	.99	.97	.02	7.7(7)

Note. Dashes indicate that term was not calculated. Fit Statistics are Comparative Fit Index, Non-Normed Fit Index, Normed Fit Index, Root Mean Square Error of Approximation.

^a Change in χ^2 is calculated $(\chi^2_{\text{Model X}} - \chi^2_{\text{Reference Model}}) (df_{\text{Model X}} - df_{\text{Reference Model}})$.

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

(a) Model 1: Only parameters in adolescence allowed to vary for Early and not-Early maturing



(b) Model 2: All parameters allowed to vary for Early and not-Early maturing

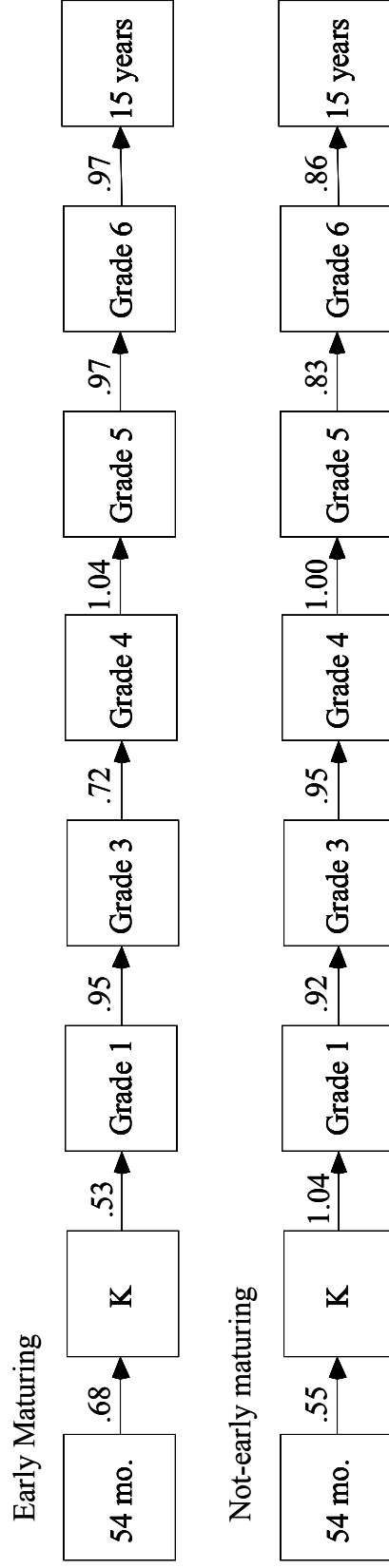
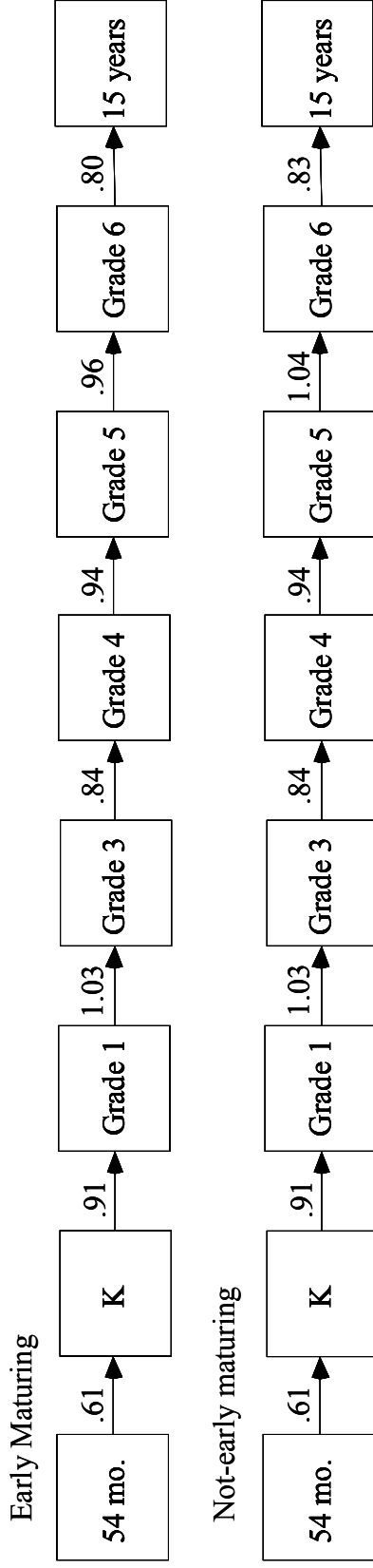


Figure 3. Impact of Early Pubertal Timing on the Stability of Social Competence Among Males

Note. 54 mo. = 54 months; K = Kindergarten.

(a) Model 1: Only parameters in adolescence allowed to vary for Early and not-Early maturing



(b) Model 2: All parameters allowed to vary for Early and not-Early maturing

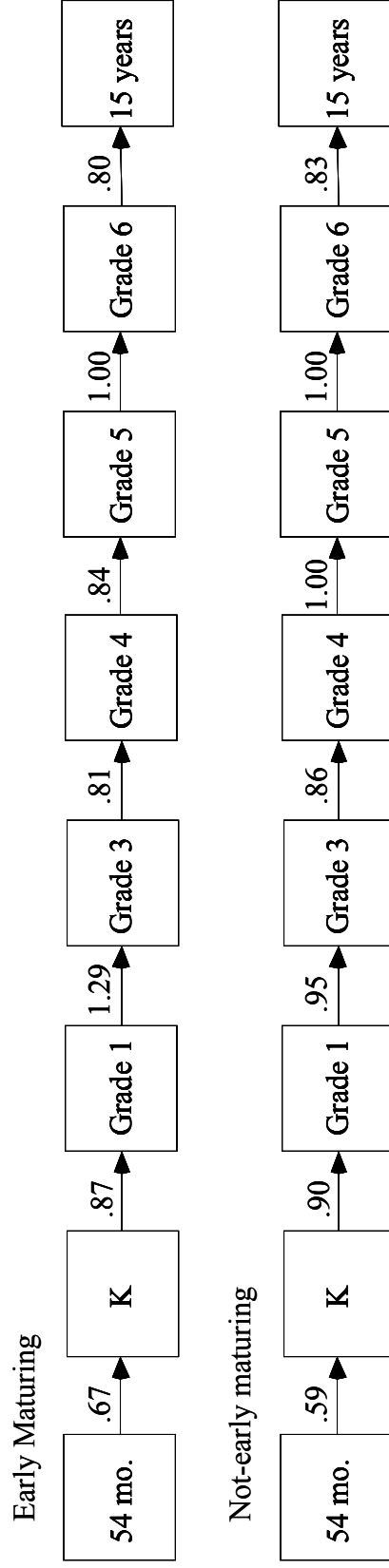


Figure 4. Impact of Early Pubertal Timing on the Stability of Social Competence Among Females

Note. 54 mo. = 54 months; K = Kindergarten.

might differ slightly because participants with missing school data or with missing puberty data were excluded or because of changes in degrees of freedom). Results of this model are not reported to avoid redundancy (see Table 3 for reference model fit and χ^2 statistics). Model 2 forced the parameters for the biological maturation or contextual change variables to be equal during childhood, but allowed stability to vary across groups in adolescence. Model 3 allowed groups to vary in stability from childhood to adolescence.

First, I tested how pubertal timing impacted social competence (see Table 3). Results indicated that there were no significant differences in stability during adolescence (Model 2) or during childhood and adolescence (Model 3) based on early pubertal timing (see Figure 3 and 4 for males and females respectively) or late pubertal timing (see Figure 5 and Figure 6 for males and females respectively). The χ^2 difference statistic and fit statistics both indicated that there were no differences in stability based on pubertal timing (Model 2 and 3 provided no better fit of the data compared to Model 1). Thus, results suggest that there are no significant differences in the stability of social competence as a function of timing of pubertal maturation.

Finally, analyses examined if the stability of social competence varied based on whether youths transitioned to middle school (see Table 4). Among males (see Figure 7) and females (see Figure 8), the stability of social competence did not vary in adolescence (Model 2) or in childhood and adolescence (Model 3) based on whether or not youths transitioned to middle school. Model 1 better fit the data in terms of χ^2 and fit statistics compared to Models 2 and 3 (see Table 4). Thus, there is no evidence to suggest that the stability of social competence varies between males and females as a function of whether or not the youths change schools.

Table 4. Fit Statistics of Social Competence Stability Models by School Transition Among Males and Females

Model	$\chi^2(df)$	CMIN	Fit Statistics			Change in $\chi^2(df)^a$
			NNFI	NFI	RMSEA	
Males						
Reference Model	52.9 (37)	.99	.97	.96	.04	-
Model 1 School Transition	52.1 (35)	.99	.97	.96	.04	.8 (2)
Model 2 School Transition	46.9 (30)	.99	.97	.96	.05	6.0 (7)
Females						
Reference Model	50.3 (37)	.99	.98	.96	.04	-
Model 1 School Transition	48.9 (35)	.99	.98	.97	.04	1.4 (2)
Model 2 School Transition	37.9 (30)	.99	.99	.97	.03	12.4 (7)

Note. Dashes indicate that term was not calculated. Fit Statistics are Comparative Fit Index, Non-Normed Fit Index, Normed Fit Index, Root Mean Square Error of Approximation.

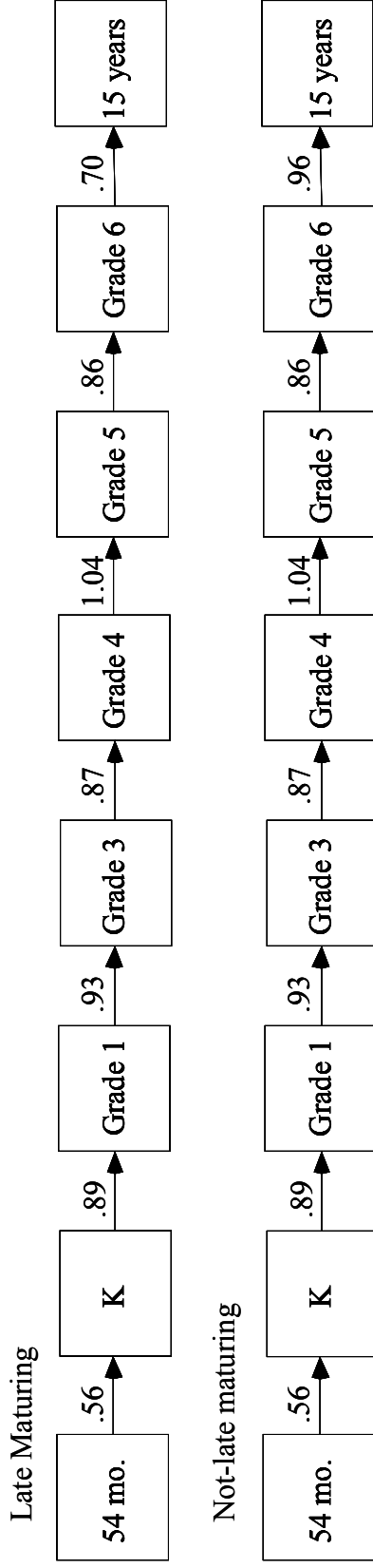
^a Change in χ^2 is calculated ($\chi^2_{\text{Model X}} - \chi^2_{\text{Model 1}}$) ($df_{\text{Model X}} - df_{\text{Model 1}}$).

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

Summary of Part I Analyses

Results of the first set of analyses indicate that social competence is highly stable during middle childhood, but somewhat less stable during early childhood and adolescence. This pattern is found both among males and females (although the magnitude of the instability is somewhat higher among females) and is similar regardless of pubertal timing and transition to middle school. Thus, to the extent that social competence is less stable as

(a) Model 1: Only parameters in adolescence allowed to vary for Late and not-Late maturing



(b) Model 2: All parameters allowed to vary for Late and not-Late maturing

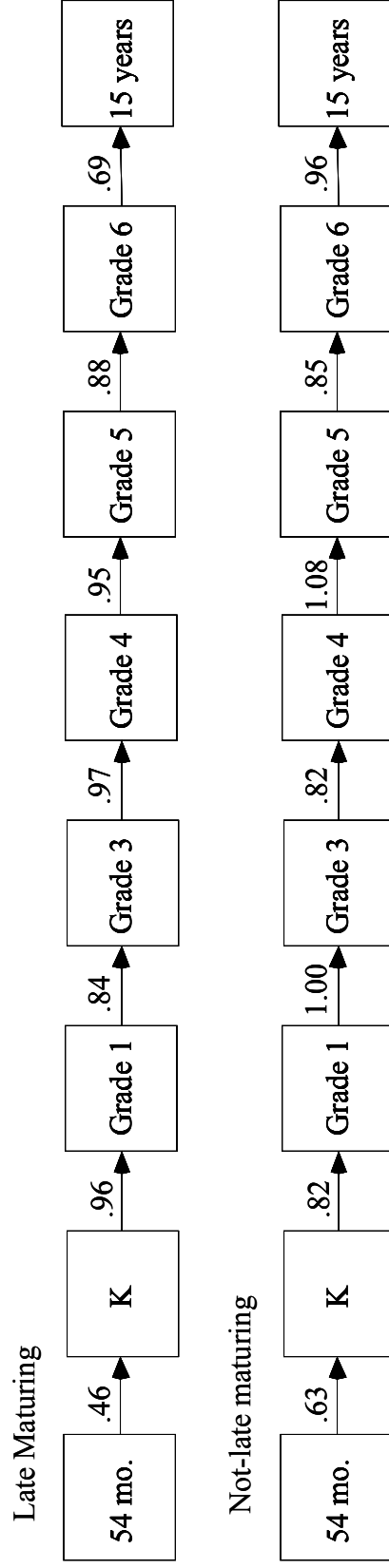
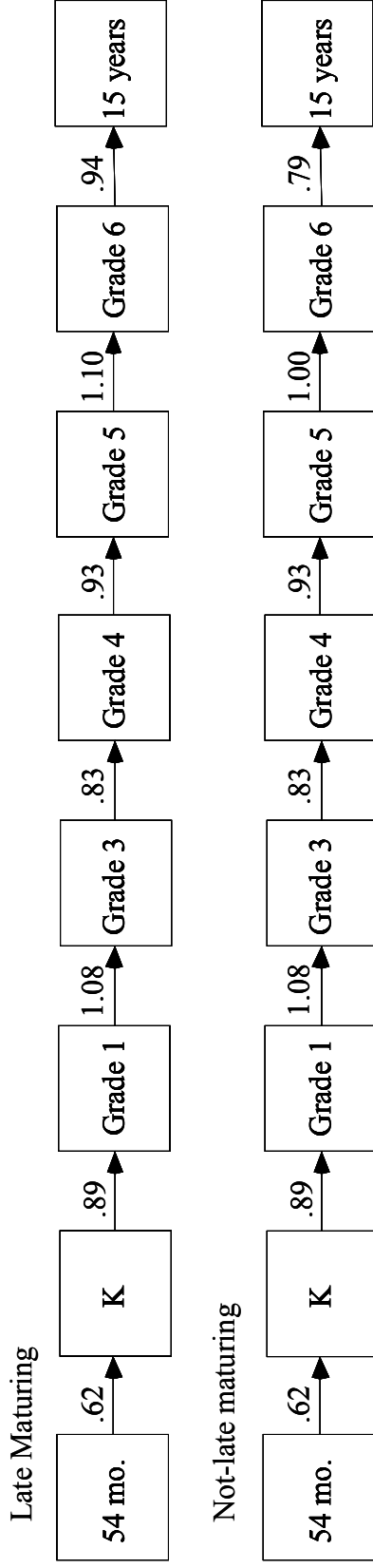


Figure 5. Impact of Late Pubertal Timing on the Stability of Social Competence Among Males

Note. 54 mo. = 54 months; K = Kindergarten.

(a) Model 1: Only parameters in adolescence allowed to vary for Late and not-Late maturing



(b) Model 2: All parameters allowed to vary for Late and not-Late maturing

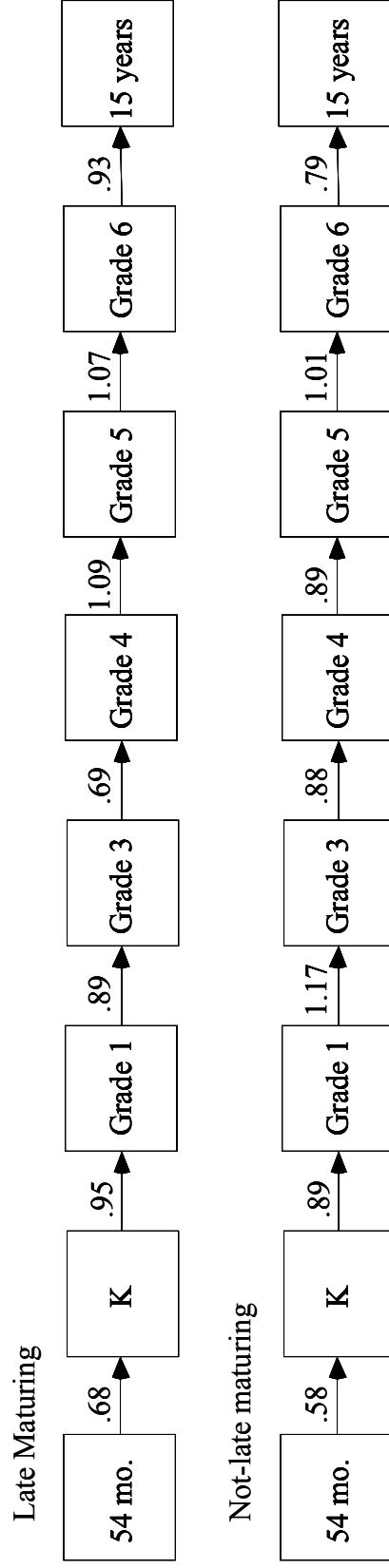
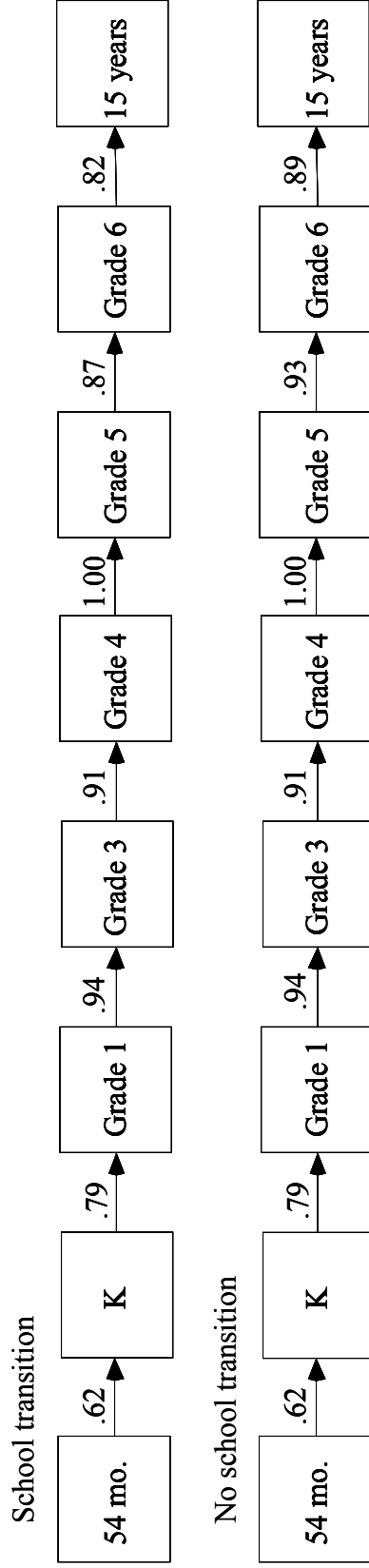


Figure 6. Impact of Late Pubertal Timing on the Stability of Social Competence Among Females

Note. 54 mo. = 54 months; K = Kindergarten.

(a) Model 1: Only parameters in adolescence allowed to vary for youths transitioning to middle school and youths not transitioning



(b) Model 2: All parameters allowed to vary for youths transitioning to middle school and youths not transitioning

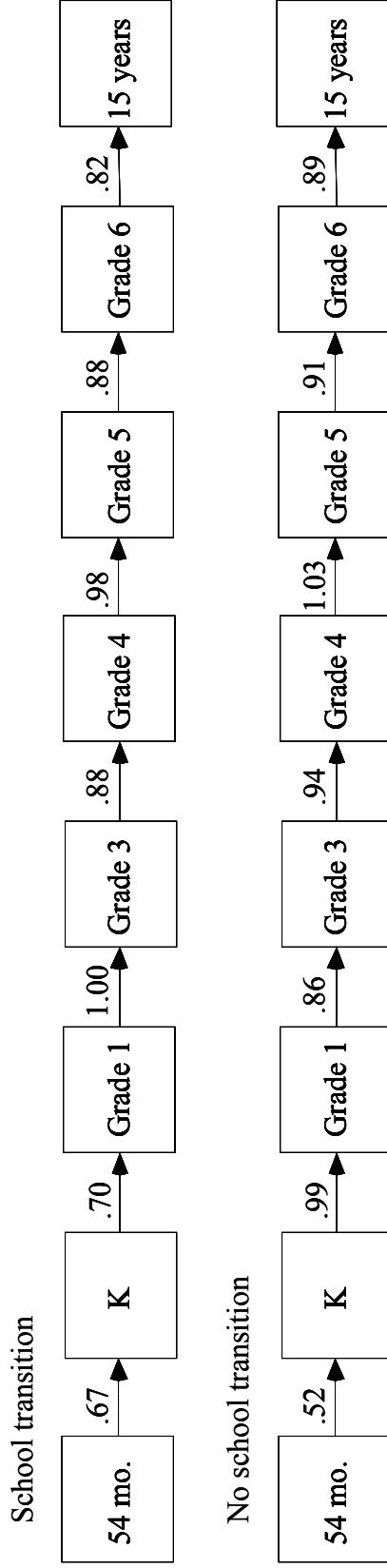
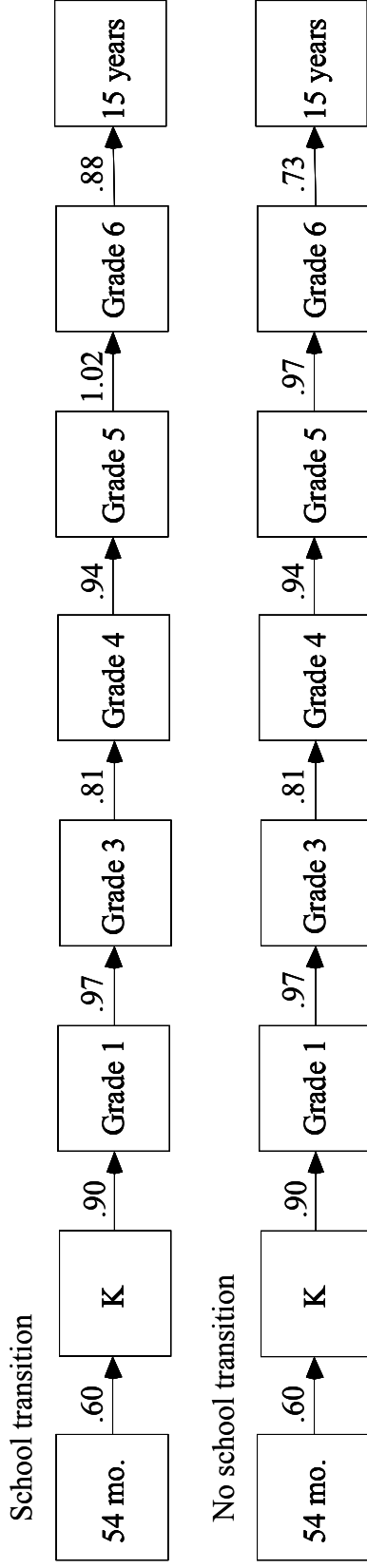


Figure 7. Impact of School Transition on the Stability of Social Competence Among Males

Note. 54 mo. = 54 months; K = Kindergarten.

(a) Model 1: Only parameters in adolescence allowed to vary for youths transitioning to middle school and youths not transitioning



(b) Model 2: All parameters allowed to vary for youths transitioning to middle school and youths not transitioning

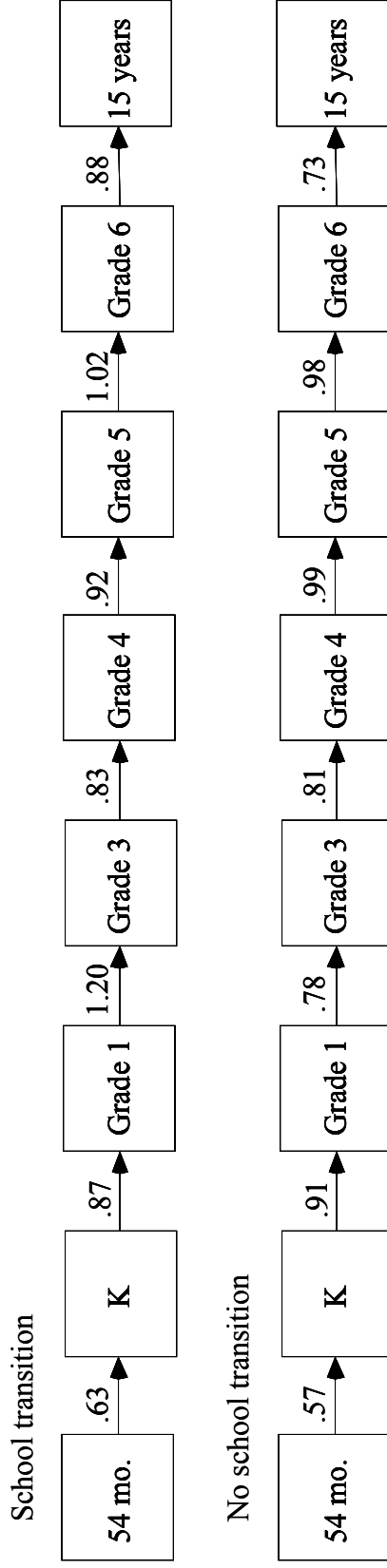


Figure 8. Impact of School Transition on the Stability of Social Competence Among Females

Note. 54 mo. = 54 months; K = Kindergarten.

youth transition into adolescence, this instability is not attributable to either off-time pubertal maturation or to undergoing a school transition.

Part II: Examining Trajectories of Social Competence

Person-Centered Analyses

Mixture modeling was used to identify group-based patterns of social competence over time for males and females. Models with 1, 2, 3, and 4 groups were considered (see Table 5). Although the four-group solution provided the best fit for the data as indexed by the relative BIC value, a 3-group solution was selected for both males and females as providing the best fit to the data. This is because the 4-group solution did not (a) identify a trajectory unique in shape or pattern beyond the 3-group solution and (b) one trajectory group in the 4-group solution consisted of fewer than 5% of the sample for males and females. Thus, a three group solution was selected as the most parsimonious. Posterior probabilities indicated that individuals were excellently matched to trajectory group (e.g., had a very high posterior

Table 5. Bayesian Information Criterion (BIC) and $2 \log_e (B_{10})^a$ of the Group-Based Trajectory Models Considered

	BIC	Null model	$2 \log_e (B_{10})$
Number of groups		<i>Males</i>	
1	-4818.54	-	
2	-4498.14	1	320.40
3	-4398.42	2	99.72
4	-4350.68	3	47.74
		<i>Females</i>	
1	-5562.09	-	
2	-5192.34	1	369.86
3	-5102.06	2	90.28
4	-5059.60	3	42.46

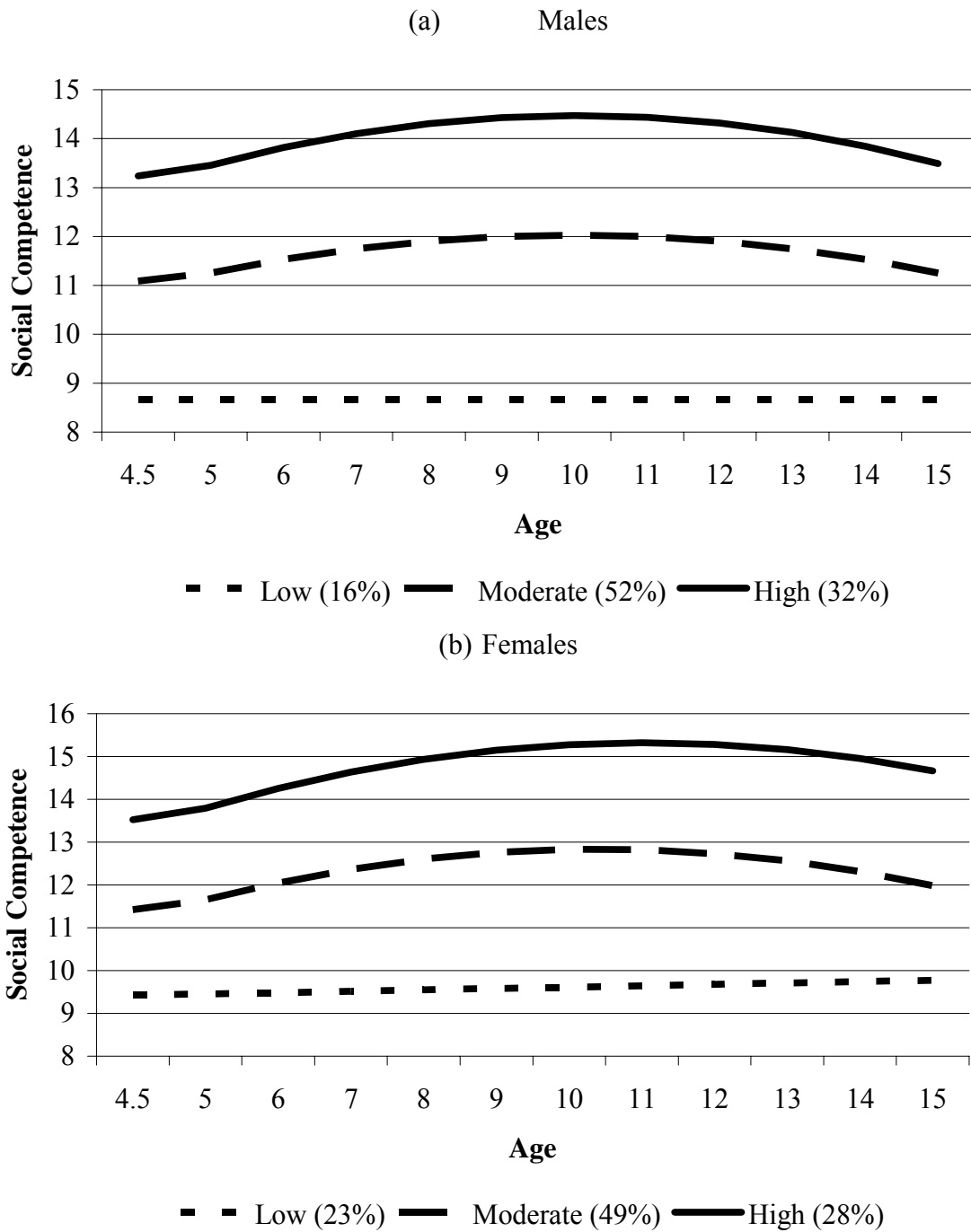


Figure 9. Group-based Trajectories of Social Competence Among Males and Females

probability of membership to the group to which they were assigned): among males, 96% posterior probability for group 1 (16% of the sample), 91% for group 2 (52% of the sample), and 93% for group 3 (32% of the sample); among females: 93% for group 1 (23% of the sample), 90% for group 2 (49% of the sample), and 92% for group 3 (28% of the sample). Group-based patterns of social competence are similar among males and females. Three relatively stable patterns of social competence are found: high, moderate, and low trajectory groups (see Figure 9). Among males and females, the high and moderate trajectory groups showed quadratic patterns of growth, with social competence increasing throughout middle childhood, peaking around grade 5, and declining thereafter. The low trajectory group was generally low and stable in social competence across time (although among females there was a slight linear increase in the low trajectory group). Note that each of the trajectories is consistent with a cumulative model of developing social competence; there are no large shifts in either direction; indeed, social competence varies very little over time.

Predicting trajectory group membership. After identifying group trajectories of social competence, I tested whether maternal sensitivity and maternal hostility differentially predicted membership in the low, moderate, and high trajectory groups among males and females (see Table 6). In these analyses, maternal sensitivity and hostility are compared across the trajectories, with the low trajectory group used as the reference group. Results indicated that, compared to youths in the low trajectory group, males in the highest social competence trajectory were more likely to have sensitive mothers; there were no differences between the moderate trajectory and the low trajectory in maternal sensitivity. Maternal hostility was unrelated to latent class trajectory membership among males. Among females,

Table 6. Impact of Parenting Quality on Trajectory Group Membership Among Males and Females

	Males	Females
	Coefficient (SE)	Coefficient (SE)
Group 1: Low Group		
Intercept	8.89(.21)**	9.42(.18)**
Linear	-	.03(.03)
Maternal Sensitivity	a	a
Maternal Hostility	a	a
Group 2: Moderate Group		
Intercept	11.23(.18)**	11.37(.18)**
Linear	.37(.06)**	.48(.06)**
Quadratic	-.03(.01)**	-.04(.01)**
Maternal Sensitivity	.06(.12)	.19(.10) ⁺
Maternal Hostility	-.23(.41)	.39(.34)
Group 3: High Group		
Intercept	13.42(.24)**	13.48(.20)**
Linear	.43(.08)**	.55(.08)
Quadratic	-.04(.01)**	-.04(.01)**
Maternal Sensitivity	.29(.14)*	.24(.11)**
Maternal Hostility	.62(.47)	.26(.37)

Note. Dashes indicate that term was not estimated.

^a Term not estimated because it acts as reference group for other estimates.

⁺ $p < .10$. * $p < .05$. ** $p < .01$.

compared to youths in the low trajectory, youths in both the moderate and high trajectory groups had significantly more sensitive mothers. Similar to males, there were no differences in maternal hostility across trajectory groups.

The impact of biological and contextual change. Utilizing the group based trajectories of development identified previously, analyses tested whether early pubertal timing impacted individuals differentially as a function of their trajectory of social competence. Among males in the low competence trajectory group, early pubertal timing had a negative impact on social competence (see Table 7; see Figure 10). In contrast, among males in the high social

Table 7. Impact of Pubertal Timing on Trajectories of Social Competence Among Males

	Males Early Pubertal Timing Coefficient (SE)	Males Late Pubertal Timing Coefficient (SE)
Group 1: Low Group		
Intercept	8.50(.18)**	8.48 (.23)**
Linear	-	-
Pubertal Timing	-.97(.47)*	.25 (.33)
Group 2: Moderate Group		
Intercept	10.98(.14)**	11.01(.14)**
Linear	.34(.06)**	.37(.06)*
Quadratic	-.03(.01)**	-.04(.01)**
Pubertal Timing	.01(.22)	-.04(.22)
Group 3: High Group		
Intercept	13.22(.18)**	13.24(.19)**
Linear	.41(.07)**	.44(.08)**
Quadratic	-.04(.01)**	-.04(.01)**
Pubertal Timing	.66(.29)**	-.36(.28)

Note. Dashes indicate that term was not estimated.

⁺ $p < .10$. * $p < .05$. ** $p < .01$.

competence trajectory, early puberty was associated with increases in competence. There was no relation between early pubertal timing and social competence among youths in the moderate trajectory group. Thus, early maturation positively impacted more competent youths, but negatively impacted less competent youths. In addition, I also tested the impact of late-pubertal maturation among males on social competence (see Table 7). Late-pubertal timing among males was not related to social competence for youth in any of the competence trajectories.

Next, the impact of early maturational timing on social competence among females was examined. Among females in the moderate or high social competence trajectories early

Table 8. Impact of Pubertal Timing on Trajectories of Social Competence Among Females

	Females Early Pubertal Timing	Females Late Pubertal Timing
	Coefficient (SE)	Coefficient (SE)
Group 1: Low Group		
Intercept	9.07(.21)**	8.99(.29)**
Linear	.03(.04)	.01(.05)
Pubertal Timing	-.58(.38)	.15(.44)
Group 2: Moderate Group		
Intercept	10.87(.18)**	10.88(.24)**
Linear	.46(.06)**	.43(.07)**
Quadratic	-.03(.01)**	-.03(.01)**
Pubertal Timing	-.52(.26)*	-.14(.27)
Group 3: High Group		
Intercept	13.21(.15)**	13.24(.17)**
Linear	.57(.07)**	.54(.07)**
Quadratic	-.05(.01)**	-.04(.01)**
Pubertal Timing	-.56(.26)*	-.01(.28)

Note. Dashes indicate that term was not estimated.

⁺ $p < .10$. * $p < .05$. ** $p < .01$.

puberty had a negative impact on social competence (see Table 8; See Figure 10). In contrast, there was no relation between early pubertal timing and social competence among females in the low trajectory group. That is, early maturation may negatively impact social competence, but only among the most competent females. Late-pubertal timing among females was not related to social competence for youth in any of the competence trajectories. The impact of school transition on social competence as a function of trajectory group membership was the focus of the next set of models; among males there was no relation between transition to middle school and social competence for youths in any of the social competence trajectories (see Table 9). The findings among females were somewhat different. Among females in the

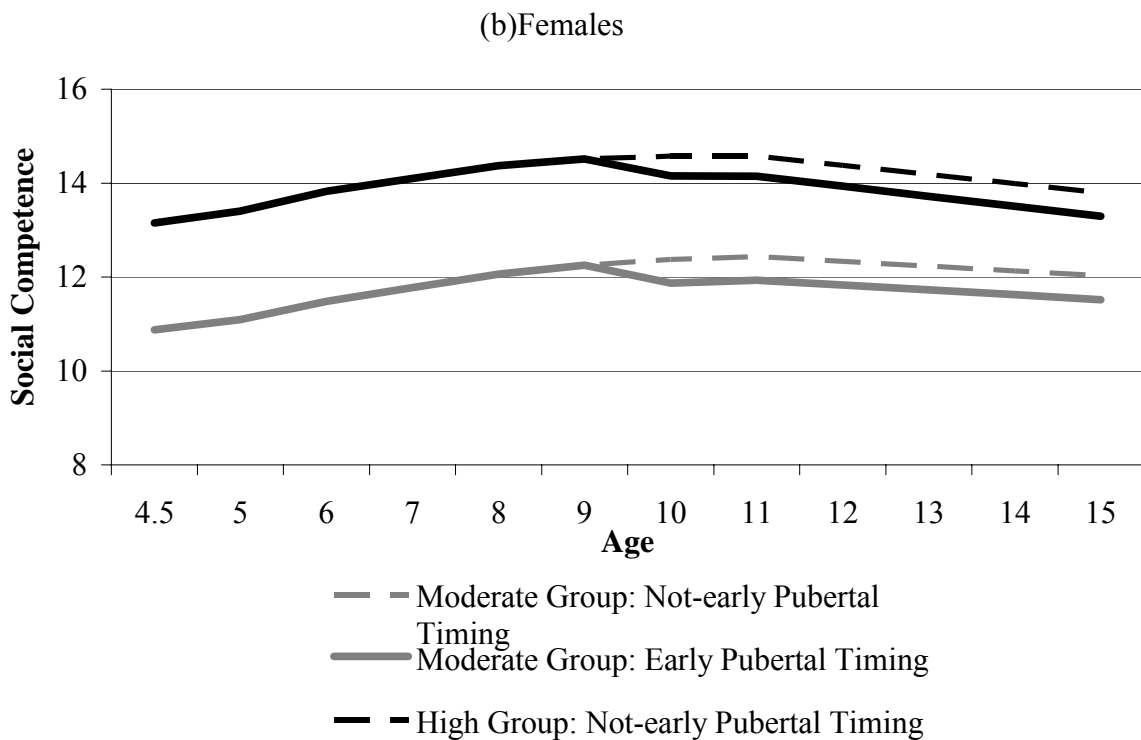
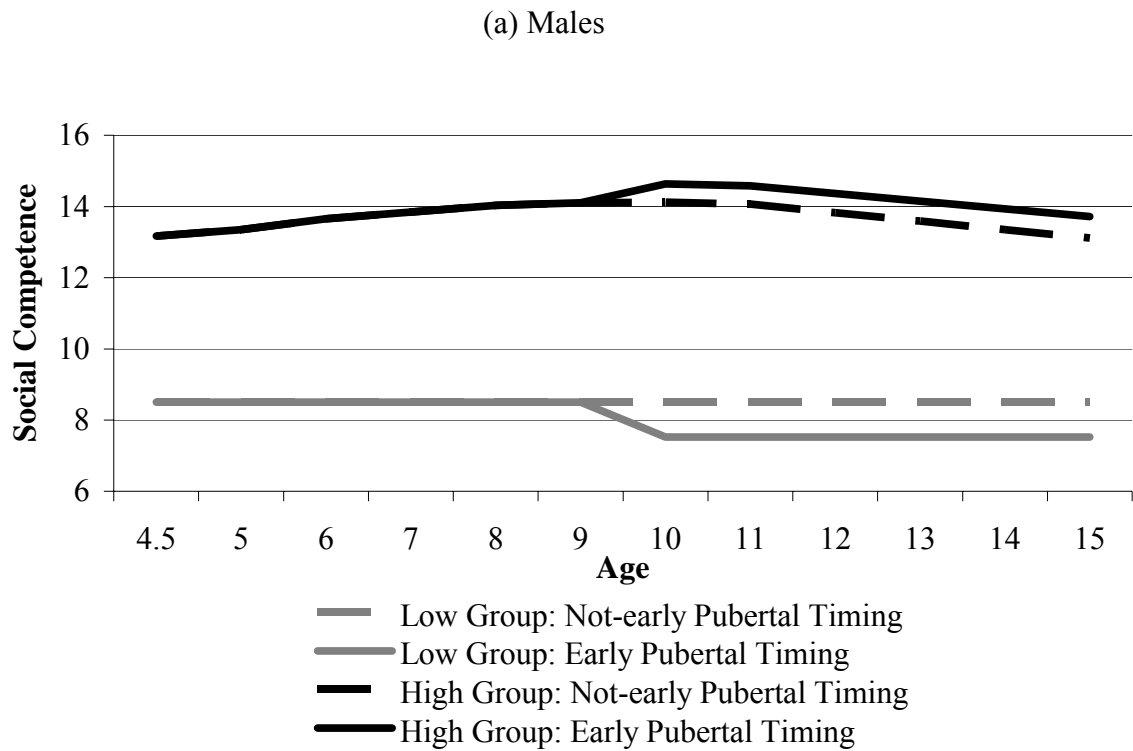


Figure 10. Impact of Early Pubertal Timing on Trajectories of Social Competence Among Males and Females

Table 9. Impact of School Transition on Trajectories of Social Competence Among Males and Females

	Males	Females
	Coefficient (SE)	Coefficient (SE)
Group 1: Low Group		
Intercept	8.52(.25)**	9.40(.18)**
Linear	-	.09(.03)**
School Transition	.10(.33)	-.85(.31)**
Group 2: Moderate Group		
Intercept	11.07(.17)**	11.47(.18)**
Linear	.32(.06)**	.49(.06)**
Quadratic	-.03(.01)**	-.04(.01)**
School Transition	.08(.23)	-.26(.23)
Group 3: High Group		
Intercept	13.20(.23)**	13.60(.23)**
Linear	.44(.07)**	.54(.08)**
Quadratic	-.04(.01)**	-.04(.01)**
School Transition	.07(.27)	.07(.35)

Note. Dashes indicate that term was not estimated.

⁺ $p < .10$. * $p < .05$. ** $p < .01$.

low social competence trajectory, experiencing a transition to middle school was associated with a decrease in social competence (see Table 9; see Figure 11). There was no such effect however, among females in the moderate and high social competence trajectories.

Finally, analyses estimated if the cumulative effects of timing of biological development and the experience of contextual change (for example, both early pubertal timing and school transition) impacted individuals differentially as a function of their trajectory group (see Table 10). First, the joint impact of early maturation and school transition was examined among males. As in previous models, there was a negative effect of early pubertal timing among youths in the low trajectory, but a positive effect of early pubertal timing among males in the high social competence trajectory (there was no effect for

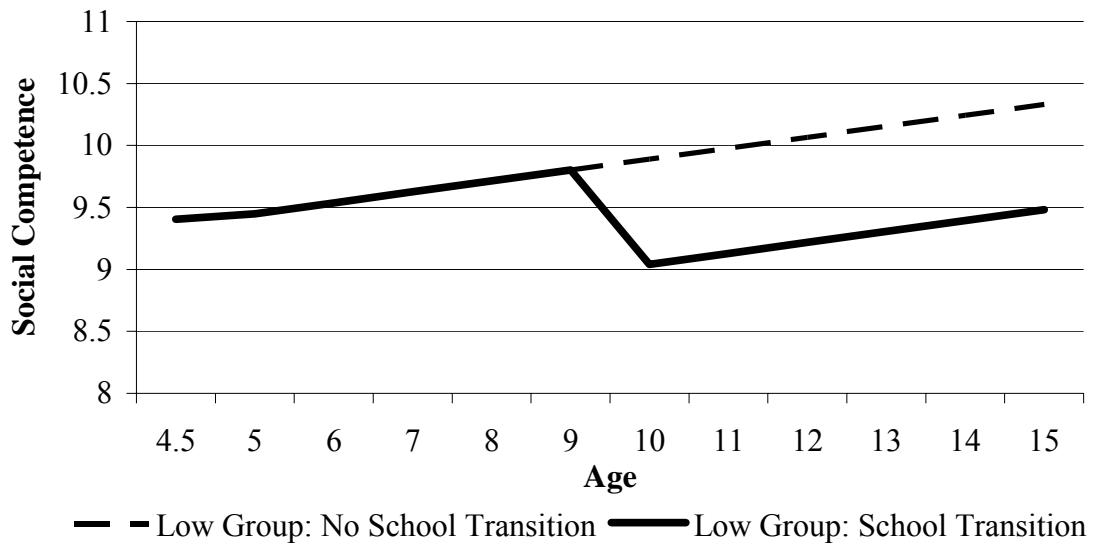


Figure 11. Impact of School Transition on Trajectories of Social Competence Among Females

youths in the moderate trajectory). Moreover, there was no impact of school transition on social competence trajectories when early pubertal timing was also estimated. In addition to estimating the effects of early pubertal timing and school effects, I also tested how late-maturational timing and school transition impacted social competence among males (see Table 10). As in prior models, results found no impact of late-pubertal timing or school transition on social competence among males in the low, moderate, and high trajectories of social competence.

Among females, when examining early pubertal timing and school transition simultaneously, results indicate that early pubertal timing does not impact youths in the low trajectory, whereas school transition negatively impacts their social competence (see Table 11). Moreover, among females in the high social competence trajectory, early pubertal timing

Table 10. Impact of Pubertal Timing and Transition to Middle School on Trajectories of Social Competence Among Males

	Males Early Pubertal Timing & School Transition	Males Late Pubertal Timing & School Transition
	Coefficient (SE)	Coefficient (SE)
Group 1: Low Group		
Intercept	8.40(.17)**	8.34(.21)**
Linear	-	-
Pubertal Timing	-1.41 (.51)**	.23(.36)
School Transition	.51(.42)	.10(.41)
Group 2: Moderate Group		
Intercept	11.00(.13)**	10.99(.14)**
Linear	.33(.06)**	.35(.06)**
Quadratic	-.03(.01)**	-.03(.01)**
Pubertal Timing	.09(.21)	-.01(.22)
School Transition	>.01(.24)	-.12(.25)
Group 3: High Group		
Intercept	13.22(.17)**	13.22(.18)**
Linear	.42(.07)**	.45(.08)**
Quadratic	-.04(.01)**	-.04(.01)**
Pubertal Timing	.66(.30)**	-.39(.29)
School Transition	.24(.30)	.20(.32)

Note. Dashes indicate that term was not estimated.

⁺ $p < .10$. * $p < .05$. ** $p < .01$.

was associated with decreases in social competence; there was no effect of school transition among females in the high social competence trajectory. Thus, there is no additive impact of early pubertal timing or school transition among females in the low, moderate or high school competence trajectory. In addition to estimating the effects of early pubertal timing and school transition, analyses also examined how late maturation and school transition impacted social competence (see Table 11). Whereas there was no relation between late pubertal timing and social competence in the prediction of social competence, females in the low

Table 11. Impact of Pubertal Timing and Transition to Middle School on Trajectories of Social Competence Among Females

	Females	Females
	Early Pubertal Timing & School Transition	Late Pubertal Timing & School Transition
	Coefficient (SE)	Coefficient (SE)
Group 1: Low Group		
Intercept	8.90(.27)**	9.05(.28)**
Linear	.12(.05)**	.11(.05)**
Pubertal Timing	-.58(.39)	.18(.39)
School Transition	-1.20(.41)**	-1.27(.40)**
Group 2: Moderate Group		
Intercept	10.89(.20)**	11.15(.27)**
Linear	.44(.07)**	.42(.06)**
Quadratic	-.03(.01)**	-.03(.01)**
Pubertal Timing	-.50(.27)	-.03(.28)
School Transition	-.50(.27)	-.26(.27)
Group 3: High Group		
Intercept	13.23(.16)**	13.38(.20)**
Linear	.56(.07)**	.55(.08)**
Quadratic	-.05(.01)**	-.05(.01)**
Pubertal Timing	-.53(.26)*	.01(.32)
School Transition	.14(.29)	.10(.34)

Note. Dashes indicate that term was not estimated.

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

social competence trajectory who experienced a school transition decreased in social competence during adolescence.

Variable-Centered Analyses

A second set of analyses tested the impact of pubertal timing and school transition on social competence utilizing variable-centered analyses, specifically growth-curve modeling from a multilevel modeling perspective. Unconditional growth models were conducted to identify mean patterns of change in social competence over time, separately among males and females (see Table 12; see Figure 12). For both sexes, there was linear and quadratic

growth in social competence. The terms for the intercept (indicating mean level of pre-adolescent social competence at age 11) and slope (indicating the rate, or velocity, of change) were both significant among males, but among females only the slope parameter was significant. However, analyses indicated that there was significant variance around the intercept and linear slope (but not the quadratic term), indicating within-group heterogeneity around each of these patterns among males and females. Consequently, intercept and linear slope parameters were allowed to vary freely in future models and the quadratic term (indicating acceleration in the rate of change) was fixed for both males and females.

Table 12. Unconditional Linear and Quadratic Models of Growth Among Males and Females

Effect	Males		Females	
	<i>Linear</i> Coefficient (SE)	<i>Linear and Quadratic</i> Coefficient (SE)	<i>Linear</i> Coefficient (SE)	<i>Linear and Quadratic</i> Coefficient (SE)
Fixed effects				
Intercept	11.94(.12)**	12.17(.13)**	12.41(.12)**	12.69(.12)**
Linear slope	.03(.01)**	-.05(.02)**	.07(.02)**	-.03(.02)
Quadratic slope	-	-.03(>.01)**	-	-.03(>.01)**
Random effects				
Intercept	3.65(.36)**	3.67(.36)**	3.69(.34)**	3.73(.33)**
Linear slope	.03(.01)**	.03(.01)**	.04(.01)**	.04(.01)**
Level-1 error	2.54(.09)**	2.42(.09)**	2.54(.08)**	2.36(.08)**
Model Fit				
-2 Log Likelihood	8651.8	8578.4	10107.8	9974.7
AIC	8663.8	8592.4	10119.8	9988.7
BIC	8685.5	8617.8	10142.4	10014.9

Note. Dashes indicate that term was not estimated.

⁺ $p < .10$. * $p < .05$. ** $p < .01$.

Covariates were utilized in conditional models to predict heterogeneity in the intercept and linear slope parameters. Since all individuals showed the same acceleration in the rate of change over time, as indexed by the quadratic term, I do not predict differences in this parameter.



Figure 12. Mean Growth in Social Competence Among Males and Females

The impact of biological development and contextual change. Next, analyses tested if pubertal timing, school transition, and the cumulative impact of experiencing both of these factors interacted with level of social competence to predict deflection of trajectories of social competence. Among males, early pubertal timing was unrelated to average level of social competence (see Table 13). However, males who had relatively higher pre-adolescent social competence reported greater social competence over time, consistent with the previous

Table 13. Growth Models of Pubertal Timing and Pre-Adolescent Social Competence Among Males

Effects	Males	Males	
	Early Pubertal Timing	Late Pubertal Timing	
	Coefficient (SE)	Coefficient (SE)	
Fixed Effects			
Intercept (Mean)	12.16(.07)**	12.15(.07)**	
Pubertal Timing (PT)	.05(.26)	.09(.17)**	
Social Competence at age 11 (SC)	.73(.03)**	.73(.03)**	
PT X SC	.25(.10)*	.17(.07)*	
Linear slope	-.09(.02)**	-.10(.02)**	
Pubertal Timing (PT)	.20(.22)	.23(.12)	
Social Competence at age 11 (SC)	.03(.01)**	.03(.01)**	
PT X SC	.18(.10)	-.02(.06)	
Quadratic slope	-.03(>.01)**	-.03(>.01)**	
Random effects			
Intercept	.49(.11)**	0.4853	0.1069
Linear slope	.03(.01)**	0.02756	0.006593
Level-1 error	2.33(.09)**	2.3232	0.09179
Model Fit			
-2 Log Likelihood	6968.4	6965.2	
AIC	6994.4	6991.2	
BIC	7041.2	7037.9	

⁺ $p < .10$. * $p < .05$. ** $p < .01$.

identification of stable, low, moderate, and high competence trajectories. There was a significant interaction between early pubertal timing and pre-adolescent social competence. Among males with high pre-adolescent social competence, early pubertal timing was associated with greater social competence (see Figure 13). In contrast, among less competent pre-adolescent males, early maturation was associated with diminished social competence.

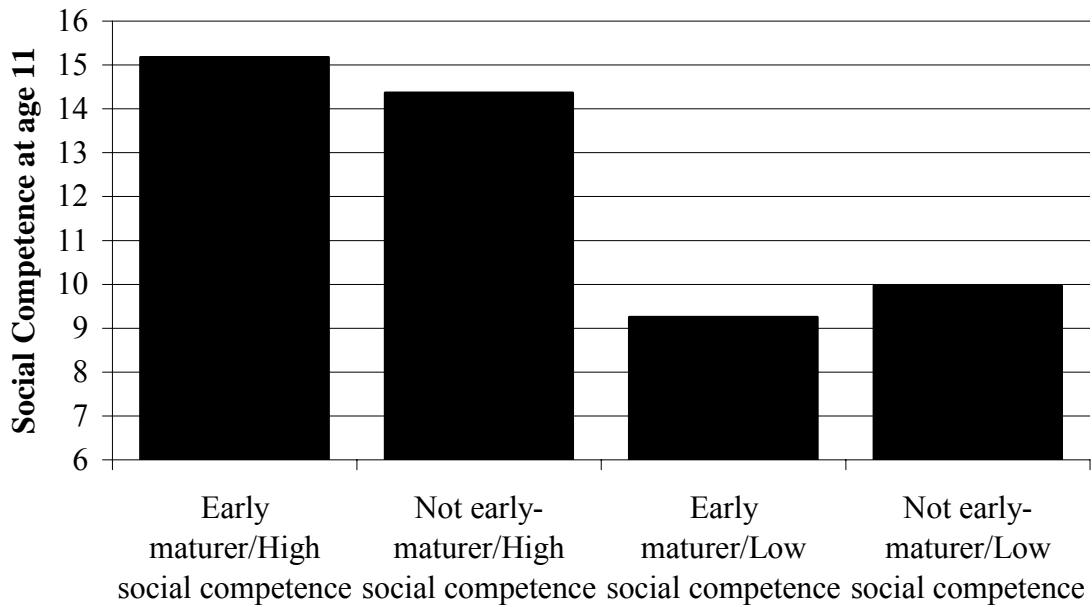


Figure 13. Impact of Early Pubertal Timing and Pre-Adolescent Social Competence on Trajectories of Social Competence Among Males

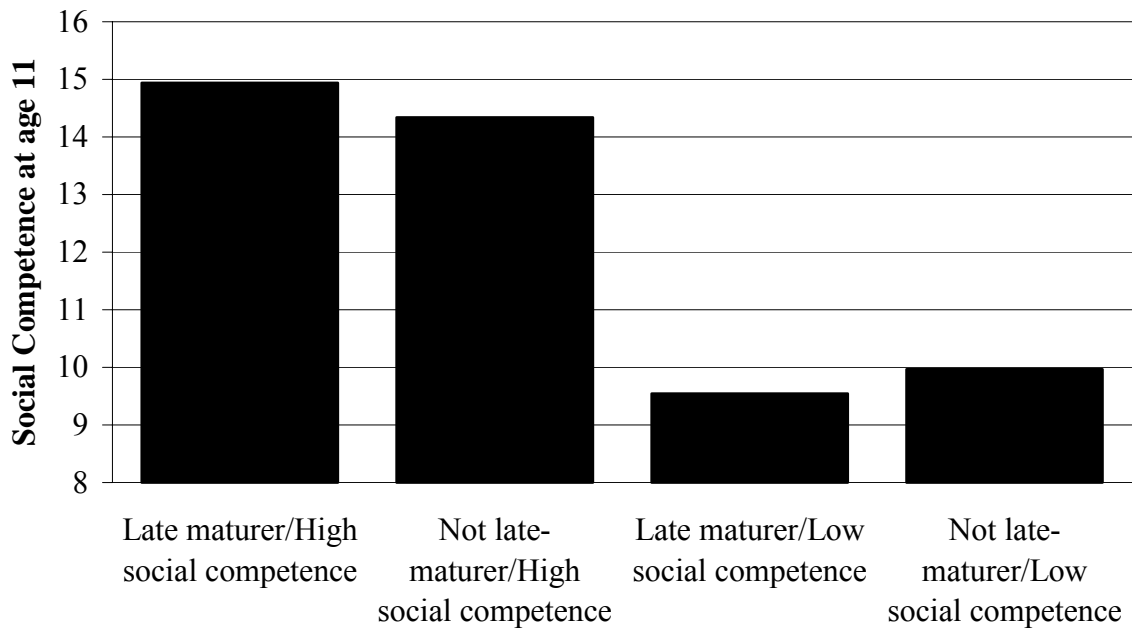


Figure 14. Impact of Late Pubertal Timing and Pre-Adolescent Social Competence on Trajectories of Social Competence Among Males

This pattern of results is consistent with the notion that early maturation accentuates individual differences in social competence. Although youth who were more competent as pre-adolescents evinced greater increases in social competence across time, early pubertal timing was unrelated to slope of social competence. After accounting for pubertal timing, significant heterogeneity remained in the intercept and slope coefficients among males, suggesting that early pubertal timing and social competence prior to adolescence do not account for all individual variability in social competence in adolescence.

In the next model, the impact of late-maturational timing on social competence was estimated among males (see Table 13). Similar to models examining early pubertal timing, there was a significant interaction between late-maturation and social competence trajectory on level of intercept of social competence (see Figure 14). Among competent males, late maturation was associated with greater pre-adolescent social competence, whereas among less competent males, late maturation was associated with lower pre-adolescent social competence. Again, this pattern is indicative of accentuation of pre-existing differences in social competence. Notably, however, there is no difference in how individuals develop social competence over time as a function of late pubertal timing, but those who were socially skilled in pre-adolescence demonstrated greater social competence over time (there were also no significant interactions between these two variables), suggesting that these differences are maintained over time. Significant individual heterogeneity remained around all coefficients, which indicates that late pubertal timing and relative pre-adolescent levels of social competence do not explain all individual variability in the intercept or slope of social competence among males.

Next, analyses tested the impact of early pubertal timing on social competence among females (see Table 14). In contrast to males, early pubertal timing was associated with lower social competence, and females with greater pre-adolescent social competence had higher intercept of social competence; again, this pattern is consistent with the stable trajectories found in person-centered analyses. Although the interaction between pubertal timing and relative social competence did not predict differences in pre-adolescent social competence, the interaction between pubertal timing and relative social competence did predict

Table 14. Growth Models of Pubertal Timing and Pre-Adolescent Social Competence Among Females

Effects	Females	Females
	Early Pubertal Timing	Late Pubertal Timing
	Coefficient (SE)	Coefficient (SE)
Fixed Effects		
Intercept (Mean)	12.38(.07)**	12.37(.07)**
Pubertal Timing (PT)	-.37(.23)**	-.12(.18)
Social Competence at age 11 (SC)	.77(.03)**	.76(.03)**
PT X SC	.09(.08)	.02(.07)
Linear slope	-.06(.03)**	-.06(.03)**
Pubertal Timing (PT)	-.24(.19)**	.16(.13)
Social Competence at age 11 (SC)	.06(.01)**	.06(.01)**
PT X SC	.16(.07)**	-.07(.05)
Quadratic slope	-.03(>.01)**	-.03(>.01)
Random effects		
Intercept	.50(.10)**	.51(.10)**
Linear slope	.04(.01)**	.04(.01)**
Level-1 error	2.21(.08)**	2.22(.08)**
Model Fit		
-2 Log Likelihood	8206.5	8212.4
AIC	8232.5	8238.4
BIC	8281.0	8286.9

⁺ $p < .10$. * $p < .05$. ** $p < .01$.

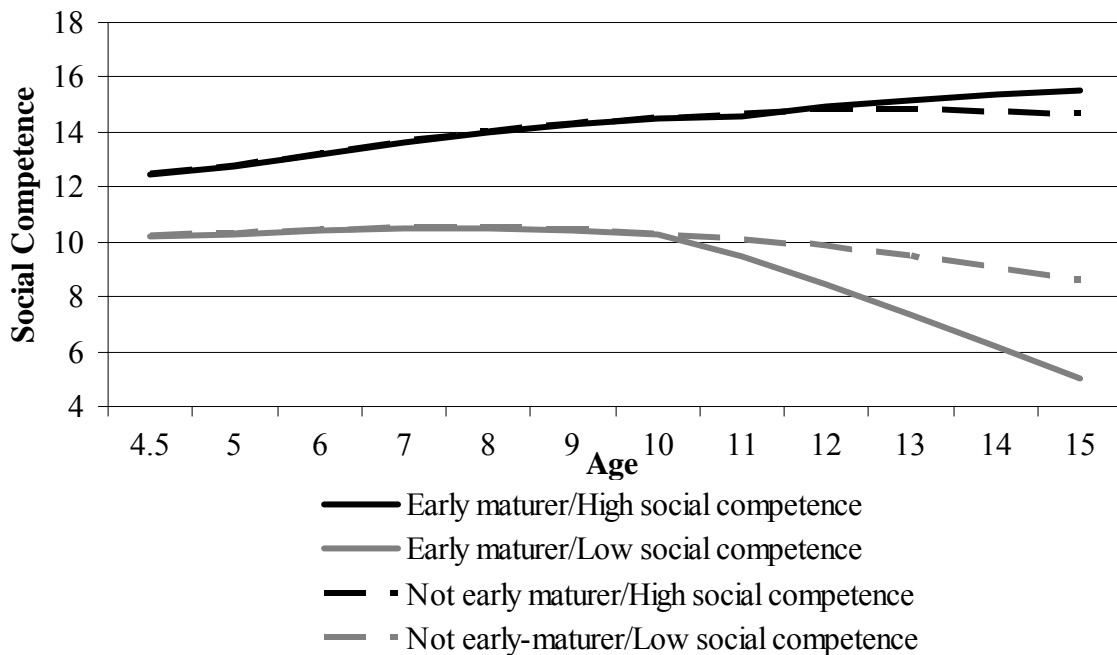


Figure 15. Impact of Early Pubertal Timing and Pre-Adolescent Social Competence on Trajectories of Social Competence Among Females

differences in the rate at which social competence developed over time (see Figure 15). Specifically, over time, individual differences in social competence were accentuated by early pubertal maturation. Among females who were less competent as pre-adolescents, early maturers decreased in social competence over time, whereas among more competent females, early maturation was associated with more rapid increases in social competence. After accounting for pubertal timing, significant variation remained in the intercept and linear slope terms among females, indicating significant variance around the parameters that could not be explained by early pubertal timing.

Among females, the next model tested late-pubertal timing and pre-adolescent social competence. In contrast to models examining early pubertal timing, there was no interaction

Table 15. Growth Models of School Transition and Pre-Adolescent Social Competence Among Males and Females

Effects	Males	Females
	Coefficient (SE)	Coefficient (SE)
Fixed Effects		
Intercept (Mean)	12.12(.08)**	12.47(.07)**
School Transition (ST)	-.06(.12)	-.44(.12)**
Social Competence at age 11 (SC)	.72(.03)**	.64(.03)**
ST X SC	.17(.05)**	.26(.04)**
Linear slope	-.10(.02)**	-.03(.02)*
School Transition (ST)	.03(.01)**	.03(.01)**
Social Competence at age 11 (SC)	.19(.05)**	-.17(.08)**
ST X SC	-.10(.02)**	>-.01(.03)
Quadratic slope	-.03(>.01)**	-.03(>.01)**
Random effects		
Intercept	.68(.10)**	.68(.09)**
Linear slope (Age)	.03(.01)**	.03(.01)**
Level-1 error	2.30(.08)**	2.29(.08)**
Model Fit		
-2 Log Likelihood	7889.9	9236.5
AIC	7915.9	9262.5
BIC	7962.7	9311.0

⁺ $p < .10$. * $p < .05$. ** $p < .01$.

between late-pubertal timing, relative pre-adolescent social competence on the intercept and slope of social competence (see Table 14). Furthermore, significant variance remained around both the intercept and slope parameters, suggesting that the covariates do not account for all individual variability in level and change in social competence over time.

A parallel set of analyses examined whether the impact of undergoing a school transition on social competence varied as a function of a youth's pre-adolescent level of social competence (see Table 15). Whereas there was no effect of school transition on social competence, there was a significant interaction between school transition and pre-adolescent

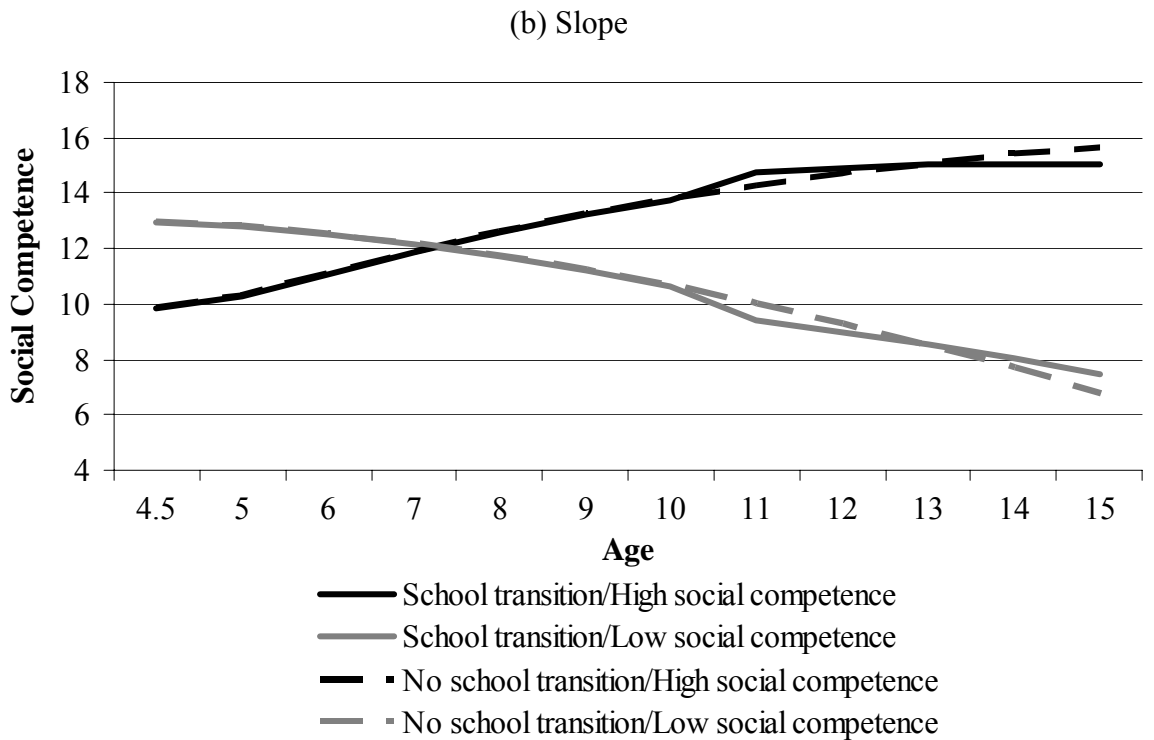
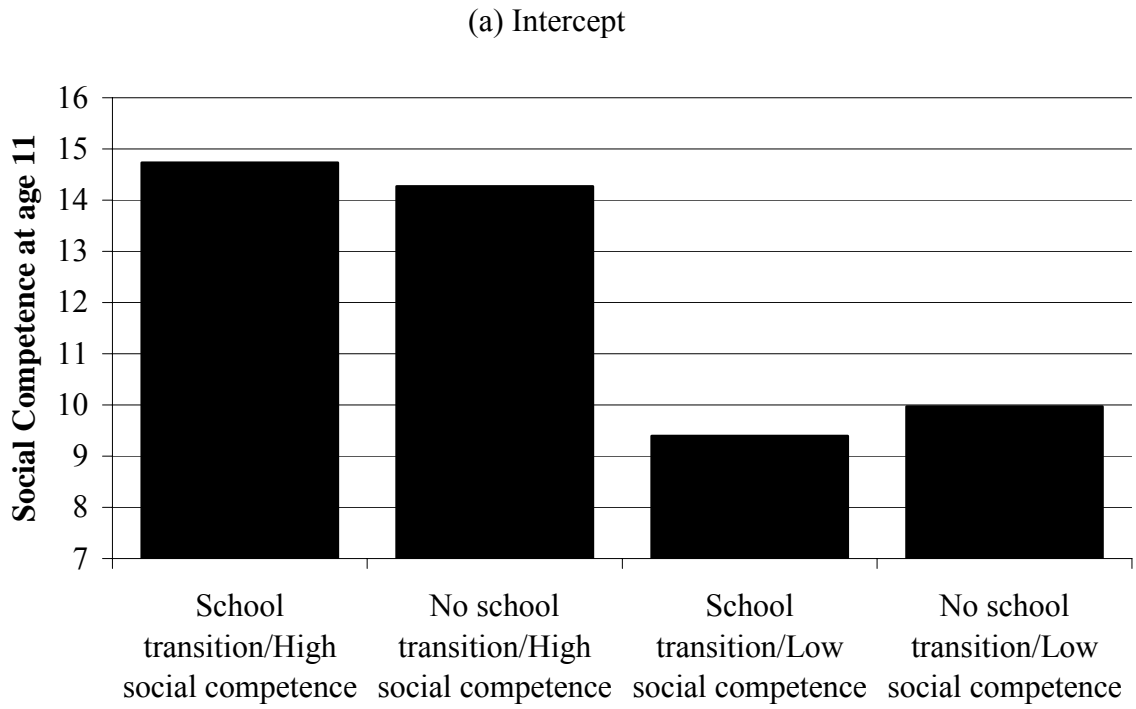


Figure 16. Impact of School Transition and Pre-Adolescent Social Competence on Trajectories of Social Competence Among Males

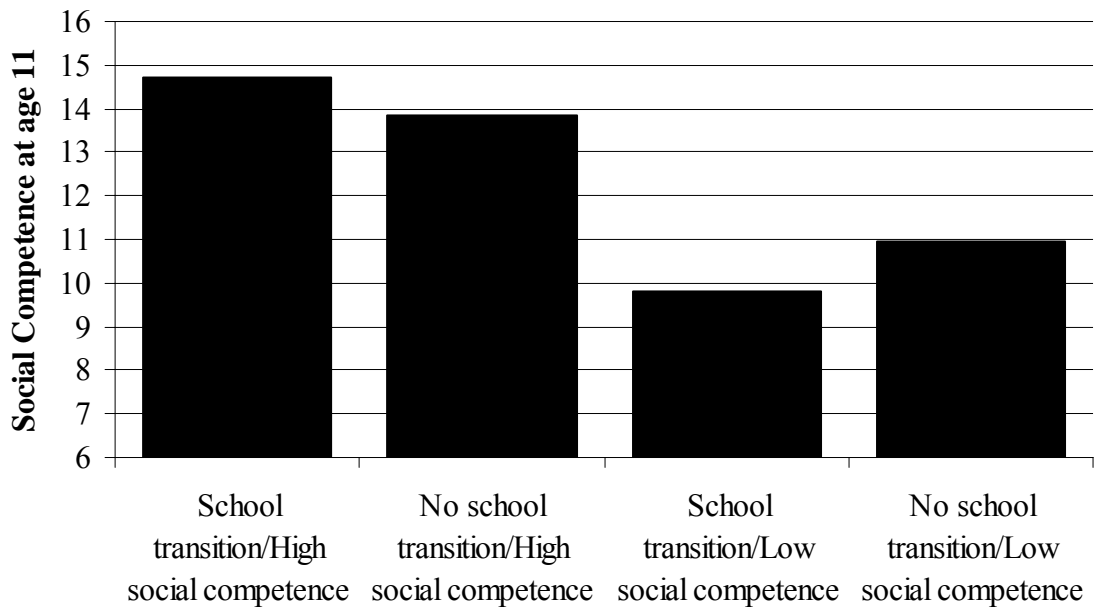


Figure 17. Impact of School Transition and Pre-Adolescent Social Competence on Trajectories of Social Competence Among Females

social competence predicting differences in the intercept and slope of social competence among males. Again, results support an accentuation of individual differences, with more competent males showing greater social competence after a school transition, and less competent males showing diminished social competence after a school transition (see Figure 16a). Importantly, however, these effects disappear over time, suggesting that the accentuation of individual differences in competence during a school transition is brief (see Figure 16b). After accounting for school transition and relative level of pre-adolescent social competence, significant variation remained in the intercept and linear slope terms of social competence among males, indicating that school transition does not account for all individual differences in social competence.

The results among females were somewhat different (see Table 15). Similar to males, there was a significant interaction between school transition and pre-adolescent social competence predicting differences in the level of social competence at age 11 (see Figure 17). Females with high social competence in pre-adolescence who experienced a school transition showed greater social competence. Among less competent females, however, school transition was associated with lower social competence. In contrast to males, these effects are maintained over time (e.g., the interaction between school transition and social competence at age 11 does not predict differences in slope of social competence). School transition and relative social competence at age 11 did not predict all individual variability in intercept and slope parameters.

A final set of models examined the cumulative impact of early pubertal timing and school transition on trajectories of social competence from a variable-centered perspective. Among males, results indicated that there were no cumulative effects of early maturational timing, school transition, and pre-adolescent social competence on the intercept or slope of social competence over time (see Table 16). There was no evidence of a cumulative impact of late maturation and school transition on males' social competence (see Table 16). Significant individual heterogeneity remained around all parameters.

The additive impact of early pubertal timing and school transition on social competence was examined among females (see Table 17). In contrast to the models examining males, there is a cumulative impact of early maturation and school transition among females (see Figure 18). Experiencing early maturation and undergoing a school transition at the same time was associated with decreased social competence over time, with stronger negative effects found among females who were less competent as pre-adolescents

Table 16. Growth Models of Pubertal Timing, School Transition, and Pre-Adolescent Social Competence Among Males

Effects	Males	Males
	(Early Puberty & School Transition)	(Late Puberty & School Transition)
	Coefficient (SE)	Coefficient (SE)
Fixed Effects		
Intercept (Mean)	12.11(.08)**	12.11(.08)**
Pubertal Timing (PT)	.20(.40)	-.17(.26)
School Transition (ST)	-.03(.15)	-.01(.15)
Social Competence at age 11 (SC)	.71(.04)**	.71(.04)**
PT X ST	-.25(.53)	.20(.40)
PT X SC	.37(.18)*	.09(.11)
ST X SC	.19(.06)**	.17(.06)**
PT X ST X SC	-.29(.22)	-.04(.16)
Linear slope	-.14(.03)**	-.13(.03)**
Pubertal Timing (PT)	.37(.30)	-.15(.23)
School Transition (ST)	.21(.07)**	.15(.07)*
Social Competence at age 11 (SC)	.03(.01)**	.03(.01)**
PT X ST	-.58(.86)	.68(.30)*
PT X SC	.17(.14)	-.08(.09)
ST X SC	-.09(.02)**	-.08(.02)**
PT X ST X SC	.52(.31)	-.02(.14)
Quadratic slope	-.04(>.01)**	-.04(>.01)
Random effects		
Intercept	.43(.10)**	.40(.10)**
Linear slope	.03(>.01)**	.03(.01)**
Level-1 error	2.27(.09)**	2.29(.09)**
Model Fit		
-2 Log Likelihood	6799.6	6801.5
AIC	6841.6	6843.5
BIC	6917.1	6919.1

** $p < .01$.

Table 17. Growth Models of Pubertal Timing, School Transition, and Pre-Adolescent Social Competence Among Females

Effects	Females	Females
	(Early Puberty & School Transition)	(Late Puberty & School Transition)
	Coefficient (SE)	Coefficient (SE)
Fixed Effects		
Intercept (Mean)	12.45(.08)**	12.44(.08)**
Pubertal Timing (PT)	-.45(.28)	-.18(.21)
School Transition (ST)	-.32(.13)*	-.36(.14)**
Social Competence at age 11 (SC)	.72(.03)**	.71(.03)**
PT X ST	.35(.50)	.22(.38)
PT X SC	.06(.12)	>.01(.09)
ST X SC	.19(.05)**	.19(.05)**
PT X ST X SC	-.03(.17)	.05(.15)
Linear slope	-.05(.03) ⁺	-.05(.03) ⁺
Pubertal Timing (PT)	-.31(.22)	.19(.13)
School Transition (ST)	-.02(.10)	-.01(.10)
Social Competence at age 11 (SC)	.05(.01)**	.05(.01)**
PT X ST	-1.62(.99)	-.77(.58)
PT X SC	.10(.09)	-.07(.05)
ST X SC	.01(.04)	.01(.04)
PT X ST X SC	1.17(.47)*	.35(.27)
Quadratic slope	-.03(>.01)**	-.04(>.01)**
Random effects		
Intercept	.51(.10)**	.51(.10)**
Linear slope (Age)	.04(.01)**	.04(.01)**
Level-1 error	2.16(.08)**	2.17(.08)**
Model Fit		
-2 Log Likelihood	8052.3	8059.6
AIC	8094.3	8102.0
BIC	8172.7	8180.0

⁺ $p < .10$. ** $p < .01$.

than among females who were more competent as pre-adolescents. After accounting for the covariates, significant heterogeneity remained in the intercept and slope coefficients.

Interestingly, when the same model is tested examining the impact of late pubertal timing among females, there is no relation between late pubertal timing, school transition, and relative social competence on level or rate of change in social competence over time (see Table 17). After accounting for these covariates, significant variability remained around both the intercept and slope of social competence among females, indicating that the covariates did not explain all sources of individual variability in social competence among females.

Summary of Part II Analyses

In general, results of group-based trajectory modeling and growth curve modeling

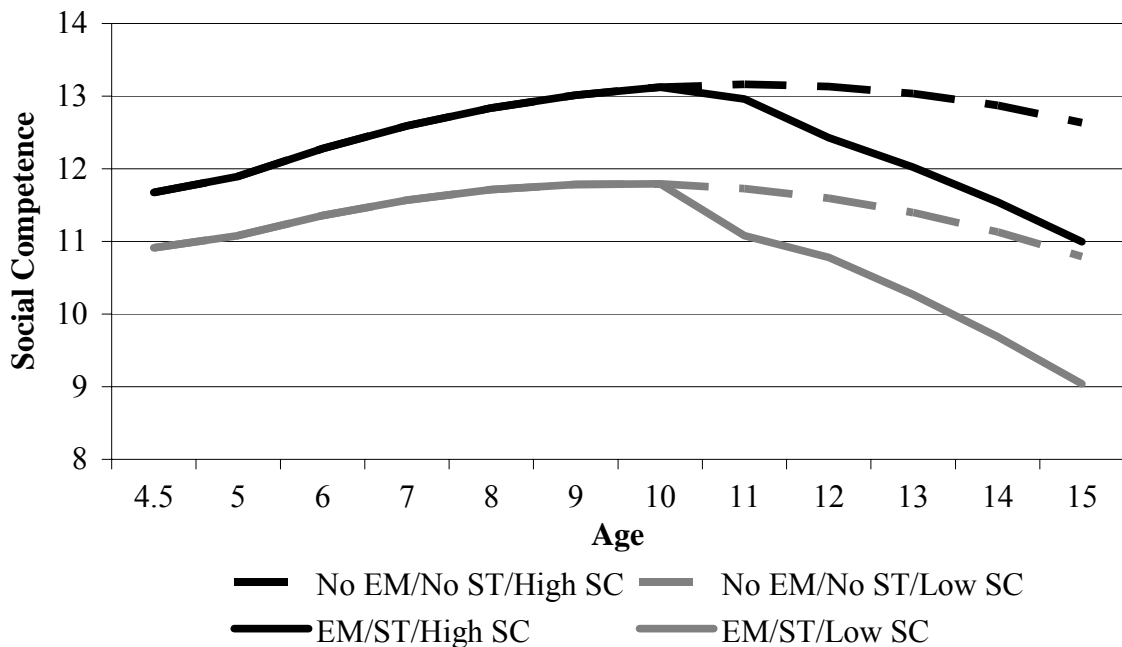


Figure 18. Impact of Early Pubertal Timing, School Transition, and Pre-Adolescent Social Competence on Trajectories of Social Competence Among Females
 Note: EM: Early Maturer. ST: School Transition. SC: Social competence.

yielded three main findings: (1) that social competence evinces a curvilinear pattern of growth over time, increasing throughout childhood and decreasing slightly into adolescence; (2) that higher social competence is predicted by greater maternal sensitivity in early childhood; and (3) that the impact of both pubertal change and undergoing a school transition differs as a function of the level of social competence a child has at the point of transition into adolescence. With regard to this last point, person-centered analyses indicate that pubertal timing has a negative impact on social competence among males who are low in competence across time, but a positive impact on males who are high in competence across time. There is no effect of late pubertal timing or school transition on social competence among males, and the effects of early pubertal timing do not change when school transition is accounted for in the same model. In contrast, early pubertal timing has a negative effect on more competent females (those in the moderate and high social competence trajectory groups), whereas undergoing a school transition negatively impacts those who are lowest in social competence across time. Once school transition is accounted for, there is no longer a negative effect of early pubertal maturation among females in the moderate social competence trajectory.

The variable-centered analyses indicate pubertal timing accentuates individual differences in social competence. Among males, early or late maturation accentuates individual differences evinced in pre-adolescent social competence. Among females, early pubertal timing is advantageous for more competent females, but disadvantageous for less competent females. Similarly, undergoing a school transition has a positive effect on level of social competence among more socially competent males and females, but a negative effect on their less competent peers. Finally, when examining timing of biological development and

contextual change in tandem, there are no positive or negative additive or interactive effects of these changes on males, whereas among females, experiencing both early maturation and school transition at the same time negatively affects individuals, with stronger effects evinced among females with low pre-adolescent social competence.

CHAPTER 4

DISCUSSION

One of the fundamental questions studied by developmental researchers concerns the nature of continuity and change across the lifespan. Because of its strong links to positive functioning (Clausen, 1991; Clingempeel, Henggeler, Pickrel, Brondino, & Randall, 2005; Denham & Holt, 1993; Griffin, Epstein, Botvin, & Spoth, 2001; Griffin, Nichols, Birnbaum, & Botvin, 2006; Reijntjes, Stegge, & Terwogt, 2006), understanding patterns of change in social competence is an important focus of research. Socially competent individuals are able to successfully engage in relationships with other people, and the skills that are required to forge and maintain social relationships become increasingly complex as individuals develop. Consequently, essential questions for developmental psychologists concern the dynamic nature and stability of social competence over time, the factors that promote socially competent behaviors, and the factors that disrupt, or cause instability, in trajectories of social competence. The present study began with an analysis of the continuity of social competence over time, identified predictors of social competence, and examined how two specific changes -- off-time pubertal maturation and moving to a new school -- impacted the continuity of social competence during the transition into adolescence.

Stability of Social Competence

Although past research has generally indicated that social competence is stable from early childhood to middle childhood (Campbell, Pierce, March, Ewing, & Szumowski, 1994; Cillessen & Bellmore 2002; Creasy, Jarvis, & Berk, 1998; Coie, Dodge, & Kupersmidt, 1990; Obradovic et al., 2006; Pianta, Sroufe, & Egeland, 1989; Sroufe, Egeland, & Kreutzer, 1990; Winsler et al., 2000) and somewhat unstable during adolescence (Obradovic et al.,

2006), the present study instead suggests that social competence is stable during middle childhood, but significantly less stable as youths transition into middle childhood (from early childhood) and as youths transition out of middle childhood (into adolescence). Importantly, this pattern of stability does not differ between males and females and is consistent whether or not individuals experience off-time pubertal maturation or a school transition.

Furthermore, this instability cannot be accounted for by disparity in time between assessment periods since the delineation between childhood and adolescence was a year long time interval (e.g., between Grade 5 and Grade 6), consistent with the spacing at prior assessments. Yet, although social competence is more variable at some points in development than others, the magnitude of this variation in any developmental period is small. Overall, there is generally high stability across time in social competence from early childhood to adolescence. Individuals who are high in social competence as preschoolers are likely to remain in this advantaged position, at least through age 15, whereas those who are low in competence are likely to remain so. Whether this pattern persists beyond middle adolescence is an important question for future study.

In general, the pattern of stability found in the current study is consistent with some of the literature on the social competence (Obradovic et al., 2006), but inconsistent with other work (Masten et al., 1995). There are two potential reasons for this disparity. First, the assessment of social competence varies across each study. While prior studies on the stability of social competence from childhood to adolescence have tended to use heterotypic measures of social competence (although age-specific indicators of social competence vary across studies), the present study uses a consistent measure of social competence over time that is notably weighted toward prosocial behaviors. It may be that if some other aspect of social

competence was emphasized, in either heterotypic or homotypic measures of social competence, different patterns of results would be derived. A second possible reason for disparate findings is the range of ages studied. Both Obradovic and colleagues (2006) and I examine patterns of competence from early childhood to middle adolescence. In contrast, Masten and colleagues (1995) examine social competence from childhood into late adolescence, and an important area of future research is to examine the construct from childhood into early adulthood.

While the pattern of stability found in the present study is consistent with Sullivan's (1953) claim that social competence is cumulative, although the same pattern might be attributable to other factors (e.g., stability in temperament, stability in context, enduring effects of infant attachment). To the degree that social competence is stable across time, and to the extent that its early manifestations are influenced by experience, it is particularly important to facilitate the development of social competence in earlier developmental periods. Although the development of social competence demands that youths continually acquire new skills to adapt to developmentally salient interpersonal challenges, the relatively strong links between social competence across time suggests that youths who are successful at adapting to the demands of the interpersonal environment when they are younger continue to be successful across development. Furthermore, given that the patterns of social competence are relatively stable across time, youths' ability to adapt relative to their peers also appears to remain consistent across time (e.g., children do not suddenly develop the ability to adapt to new social contexts).

Undoubtedly, some youths evince greater stability of social competence over time than their peers. However, contrary to the hypotheses of the present study, overall stability in

social competence is not impacted by two types of change thought to disrupt psychosocial functioning: pubertal timing and school transition. Although there is reason to expect that these factors might disrupt peer groups and thus impact the potential to acquire developmentally appropriate skills (Brooks-Gunn et al., 1985; Brooks-Gunn et al., 1987; Eccles et al., 1993; Entwistle, 1990; Savin-Williams, 1979, Simmons & Blyth, 1987), the present study finds no evidence that such factors mitigate stability in social competence, at least on average. Thus, although pubertal timing and school transition may have negative or positive effects on one's social network, individuals who go through puberty earlier or later than their peers, or who transition into new schools, are no more likely to evince instability in social competence than their age mates.

It is important to note, however, that these conclusions about the stability of social competence reflect effects that are averaged across individuals. Indeed, perhaps the most important finding to emerge in the present study, in addition to the fact that trajectories of social competence are highly stable between early childhood and middle adolescence, is that the impact of puberty or school transition on the stability of social competence varies among individuals as a function of the degree of social competence they exhibit when they enter adolescence. As I elaborate next, the challenges of coping with off-time physical maturation or changing schools are tougher on individuals who are low in social competence to begin with, but may further advantage individuals who have a history of interpersonal competence that precedes adolescence.

Trajectories of Social Competence

Evidence of the enduring nature of social competence, at least during the period of development studied in the present paper, is found in both the person-centered and variable-

centered analyses of developmental trajectories. Although it was hypothesized that four group-based trajectories of social competence would be found (increasing, decreasing, stable high, and stable low), I found that there are three trajectories: low, moderate, and high, all of which follow a fairly stable pattern over time. That is, although there are small changes in social competence over time, the relative differences between trajectory groups are maintained. Thus, the most competent preschoolers develop into the most competent children, who in turn become the most competent adolescents. By the same token, the least competent youths remain the least competent across development. Markedly, this pattern was also found in variable-centered analyses, which indicated that social competence at one time (pre-adolescence), was predictive of greater social competence.

As hypothesized, youths who received more sensitive parenting in early childhood are more likely to end up on trajectories of relatively higher social competence over time. Indeed, much research has documented that youths who receive high quality parenting are more likely to evince social competence (Baldwin, 1955; Baumrind, 1967; Baumrind, 1971; Bryant & Crockenberg, 1980; Eron, 1982; George & Main, 1979; Sroufe, England, Carlson, & Collins, 2005; Winder & Rau, 1962). The contribution of parenting to the stability of social competence across time can be explained by a number of theoretical orientations, including both Sullivanian theory and attachment theory. In Sullivan's framework, quality interactions with parents teach youth the skills needed to be able to engage in quality interactions with peers, facilitating later social success. Similarly, attachment theory (Bowlby, 1988) suggests that high quality interactions with parents alter how a child views the interpersonal world; children who feel secure in their relationship with their parents are more likely to explore and engage in healthy relationships with other individuals. The parent-

child relationship essentially acts as a template for other social interactions (e.g., through the individual's internal working model). For example, Kochanska and colleagues (2004) found that youths with secure attachment histories are more responsive to parental socialization attempts when they are toddlers, promoting positive development into the preschool years.

Drawing on the idea advanced by Caspi and others, that in times of change, individual differences are accentuated (Caspi & Bem, 1990; Caspi, Bem, & Elder, 1989; Caspi & Moffitt, 1991; Caspi & Moffitt, 1993), the present study also tested how pubertal timing and school transition impact individuals differentially as a function of their relative level of social competence. To the extent that social competence is a marker of positive development, it was expected that youths with low social competence would be more vulnerable to potential negative effects of pubertal timing and school transition. Interestingly, person-centered and variable-centered analyses explore this question from different analytic perspectives, yet provide largely consistent results.

The Effect of Off-Time Pubertal Maturation on Social Competence

With respect to the impact of timing of pubertal maturation and school transition among males, in the present study, person-centered analyses indicate that early pubertal maturation has a negative effect on males who are low in social competence before adolescence, but positive effects on males in the high social competence trajectory (late pubertal maturation did not impact social competence among males, regardless of their trajectory group). Importantly, the variable-centered analyses similarly indicate that off-time maturation accentuates individual differences in social competence. In the variable-centered analyses (growth curve models), I find evidence that early maturation leads to greater social competence among more competent males, but diminished social competence among less

competent males. Late maturation is associated with the same pattern of findings, and for both types of off-time maturation, the effects appear to remain across development (at least through age 15).

The present findings are consistent with previous studies indicating that early pubertal timing among males is linked to greater popularity and leadership ability (Savin-Williams, 1979; Simmons & Blyth, 1987), yet also linked to more hostile peer interactions, greater internalizing problems, and greater externalizing behavior among males (Ge, Brody, Conger, Simons, & Murray, 2002; Ge, Brody, Conger, & Simons, 2002). Indeed, early maturation appears to facilitate positive development among more competent males but to exacerbate the poor social skills of males in the low competence trajectory group, leading to even lower levels of competence; This pattern is suggestive of an accentuation of individual differences similar to that described by Caspi and colleagues (Caspi & Bem, 1990; Caspi, Bem, & Elder, 1989; Caspi & Moffitt, 1991; Caspi & Moffitt, 1993). This accentuation of differences in social competence as a result of off-time pubertal maturation suggests that youths with greater interpersonal skills are better able to adapt to the changing nature of social relationships that is concurrent with pubertal development. The fact that these effects are found for both early and late maturation suggests that highly competent youths may benefit from stressful experiences in general, whereas less competent youths become further fixed in low competence.

A similar pattern of findings emerge when examining females. In the person-centered analyses, where patterns of effects can vary across individuals, early pubertal timing is associated with a decrease in social competence, but only among females in the moderate and high social competence trajectories. Although the variable-centered analyses indicate no

impact of early pubertal maturation on the mean level of social competence (remember in these analyses effects are averaged across all individuals and only two of the three trajectory groups showed negative effects of early pubertal timing in the person-centered analyses), early pubertal timing does impact how social competence develops over time. Specifically, among more competent females, early pubertal timing is associated with more rapid increases in social competence during adolescence. In contrast, among less competent females, early pubertal timing is associated with rapid decreases in social competence across adolescence. Thus, early maturation further benefits youths with successful social interaction skills, yet further decreases social competence among females who lack interpersonal skills.

The notion that early pubertal timing negatively impacts females is consistent with the existing literature (Brooks-Gunn et al., 1987; Ge, Conger, & Elder, 1996; Stattin & Magnusson, 1990; Peskin, 1973), but the present study is the first to suggest that early pubertal maturation may differentially impact youths as a function of their pre-adolescent levels of social competence. Moreover, given that past research has indicated that the negative effects of early pubertal timing are socially mediated (Brooks-Gunn et al., 1987; Peskin, 1973), females who are more social, and more socially competent, may be more poised to benefit from early puberty. Because less competent youths are likely to have more difficulties with peers (e.g., Rubin, 1998; Rubin et al., 2006), the stress associated with early maturation may further impact their ability to successfully interact with other adolescents. Importantly, however, although early pubertal maturation may only confer *concurrent* risk on females with the greatest social competence, over time, early maturation is associated with further entrenchment of low social competence among less competent females and the accentuation of competence among more competent females.

The Effect of School Transition on Social Competence

I had hypothesized that experiencing a school transition would deflect trajectories of social competence downward or upward, accentuating individual differences. However, the analysis of group-based trajectories did not find a school transition effect among males. In contrast, growth curve models indicated that among highly competent males, those who experienced a school transition reported greater social competence than those who did not experience a transition, perhaps because the change of schools gave these males an opportunity to employ and practice their greater adaptive social skills. Notably, the opposite is also true: less competent males show diminished social competence after experiencing a school transition compared to males who do not change schools. This suggests a model wherein a normative stressor actually may be character-building among highly skilled youth. Indeed, given that high levels of social competence are associated with greater adaptation in the face of moderate stressors (Luthar, 1991; Luthar & Zigler, 1991; Masten & Coatsworth, 1998), more competent males may be primed for positive development across the transition to school, which is not necessarily a highly stressful experience. In contrast, males with lower social competence may be primed for negative development. However, the accentuation effects of a school transition appear to be short-lived, implying that after adjusting to a stressor, youths return to pre-transition levels of social competence.

A similar pattern is found among females. Group-based trajectory models suggest that among girls with high social competence, experiencing a school transition had no effect on social competence. Females in the low group based trajectory group, however, showed decreases in social competence after a school transition. In growth curve models, competent females further benefit from a school transition, whereas less competent females show

further declines in social competence. Unlike the case with males, these differences appear to be maintained through middle adolescence. Among both males and females, then, the directions of effect are consistent with the notion that developmental transitions accentuate individual differences.

The Cumulative Effect of Off-Time Pubertal Maturation and School Transition on Social Competence

I also asked whether the combination of off-time puberty and changing schools might confer special risk. Although, there are no such aggregated effects among males, there are among females. When effects are averaged across all individuals, the aggregate impact of early pubertal timing and experiencing school transition on less competent youths is stronger than the independent effects of either. Moreover, although the independent effects of pubertal timing and school transition were positive among more competent youths, when both events occur concurrently, these same females show decreases in social competence. This disparity across analyses might be explained by differences in independent versus additive impact of biological and contextual change. Indeed, it may be that a low amount of stress leads to the individual accentuation of differences, but that simultaneous exposure to multiple stressors is uniformly negative. The pattern that experiencing two stressful events at the same time confers more risk than experiencing the same events at disparate times is consistent with the model of cumulative stress (e.g., Sameroff, 2000), wherein multiple stressors experienced at one time create more risk than the same stressors experienced at different points. It is important to note, however, that the effects of cumulative risk may differ in samples of more at-risk youth. That is, among individuals who face more day-to-day stressors, the cumulative

impact of pubertal timing and school transition may differ and further research is needed to address this issue.

The overall pattern of results in the present study is consistent with the idea of accentuation of individual differences in periods of developmental change. It is noteworthy that positive effects of pubertal timing and school transition are typically more modest than the negative effects and that females may be especially vulnerable to cumulative risk. The literature on the effects on pubertal timing and school transition is mixed, with some studies documenting positive effects on psychosocial adjustment and others negative. The present study suggests a possible explanation of this apparent discrepancy: going through puberty or experiencing a school transition can have either positive or negative effects, depending on one's level of social competence prior to the biological or contextual transition.

Differences in Results by Analytic Technique

Different results from variable-centered and person-centered analyses are the product of the strengths, and weaknesses, of each analytic perspective. Person-centered analyses provide information about individual patterns of development over time, because they do not average effects across individuals but instead allow for variation across individuals (Magnusson, 2003). In group-based trajectory analyses, however, differences in individuals' level of social competence are examined, but there are no differences allowed among individuals in the *rate* at which social competence changes: youths who are assigned to the same trajectory group are all assumed to follow the same pattern of social competence over time (e.g., there are no random effects by age). Thus, group-based trajectory analysis can inform how the effects of off-time maturation and school transition differ among individuals within different social competence trajectory *groups*, but it cannot reveal if there are

differences in how off-time maturation and school transition impact how social competence develops across *individuals*.

Although effects are averaged across individuals in variable-centered analyses, growth curve modeling can examine the average impact of pubertal timing and school transition on both the intercept and slope of social competence over time. Hence, growth curve analyses can inform how pubertal timing and school transition, *on average*, impact the variation in the level of and rate of change in social competence. Furthermore, unlike group-based trajectory modeling, which describes trajectories based on the entire trajectory across all time points, growth curve modeling describes trajectories relative to a specific intercept (in the current study, the level of social competence at age 11) and allows for individual variation before and after that reference point (that can be predicted).

In summary, person-centered analyses and variable-centered analyses answer different analytic questions. Person-centered analyses essentially test if covariates impact an individual based on his or her entire trajectory across time. In contrast, variable-centered analyses examine the impact of covariates on an individual at a specific point in time and test if this relation changes across time. The findings derived from these two techniques are not mutually exclusive, and more research is needed that combines these analytic approaches and capitalizes on the strengths of each.

Caveats and Limitations

Although the present study is strengthened by use of advanced statistical methodology employing both person-centered and variable-centered analyses, it is nonetheless limited in several respects. Foremost, in general, youths in the sample evince very good social competence over time. Thus, the “low” competence trajectory is probably

more accurately described as “not high,” the moderate trajectory, “nearly high,” and the highest trajectory, “extremely high.” It is possible if the sample included more youths with poor social competence, results might differ. Indeed, given that males and females with low social competence seem to be at risk for poor development in the context of developmental transitions, it might be that if the sample included a larger number of less competent youths (and hence, more variability in social competence), observed effects might be stronger. However, I also find many positive and negative effects of pubertal timing and school transition among more competent youths, which alternatively might not have been found in a less competent sample.

Moreover, the present study relies on maternal report for assessments of social competence. Maternal report are known to be reliable and valid measures of social competence in early and middle childhood (Masten et al., 1995; Obradovic et al., 2006), and while there is no reason to suspect that maternal report in adolescence is especially biased, it is not commonly used to assess competence in adolescence (most researchers rely on adolescents’ self-report). The validation of the social competence measure with age-specific measures in adolescence and the moderate correlation between maternal report and adolescent self-report of social competence lend support to the idea that maternal reports of adolescents’ competence are valid. The magnitude of the correlation between maternal report and self-report is consistent with other research (Hussong et al., 2005). Notably, other research also suggests that maternal report and youth self-report of social competence show similar patterns of change over time (Hussong et al., 2005). Furthermore, the stability of social competence found in the present study mimic patterns of stability found in other studies (Obradovic et al., 2006). However, it is also true that I am examining stability of a

mother's perception of her child's social competence, and common source of assessments may artificially inflate the stability of the construct over time. Indeed, if teacher report (where a different teacher assesses social competence at each evaluation point) had been utilized, the pattern of results may have differed. Prior research suggests that teacher reported social competence shows different patterns of growth over time compared to maternal report and self-report of social competence (Hussong, et al., 2005). This is consistent with literature suggesting that parent and teacher reports of psychological constructs are often disparate (Achenbach, McConaughy, & Howell, 1987; De Los Reyes & Kazdin, 2005; Grills & Ollendick, 2002). Thus, while there is evidence to suggest that maternal reports of self-confident are valid and appropriate in the present study, it is important to acknowledge that the findings may have varied if different assessments of social competence were used.

The present study is further limited by the design of the NICHD SECCYD because ideally, analyses would follow youths through late adolescence. Indeed, it is possible that as youths develop, and patterns of social competence become more entrenched (through the process of accentuation I have discussed), differences may wash out between youths who experience particular developmental transitions and those who do not (and it does appear that the effects of school transition are beginning to fade by age 15 among males). That is, by the time individuals have reached late adolescence, their relative levels of social competence may be more or less impervious to contextual influence. However, this question cannot be answered in the current data, which were not collected past age 15. Although the findings of the present study certainly would lead one to hypothesize that social competence continues to show stability in late adolescence, this must remain speculation.

Finally, the present study is also limited in that it is unable to account for why social competence is stable. Specifically, social competence could demonstrate stability as the result of cumulative change, where competence in one period leads to experiences that beget competence in later periods (as Sullivan suggested; Sullivan, 1953). It is also possible, however, that social competence could be stable because of how individuals interact with others. From an attachment perspective, youths bring an internal working model to all social relationships (Bowlby, 1988), and to the extent that this model is healthy, it would be expected that it would facilitate continuity in social competence over time. Moreover, it could be that stability in an environment (e.g., Pianta, Sroufe, & Egeland, 1989; Sroufe et al., 2005) accounts for the strong continuity of social competence -- that the continuity found in social competence in the present study is the result of biological underpinnings (e.g., early developed brain systems that mediate the regulation of arousal and emotion; Schore, 1994; Siegel, 1999), or some combination of all of these factors (see Bohlin, Hagekull, & Andersson, 2005). Unfortunately, the present study cannot answer which of these models best accounts for continuity of social competence, but can only demonstrate that competence is relatively stable across development.

Conclusions and Future Directions of Research

In conclusion, results of the present study indicate that social competence is relatively stable across time and suggest that early development may be particularly crucial to setting youths on trajectories of relative success in social relationships. Rather than deflecting these developmental trajectories, developmental transitions such as puberty or switching schools accentuate individual differences, creating even more continuity in social competence than would otherwise exist. It is clear, given the effects found across multiple types of data

analyses, that the impact of developmental transitions on social competence differ among youths, especially as a function of their level of social competence at the time of the transition. Individual differences are accentuated across these transitions, benefiting more competent youths and placing less competent youths at risk. To the extent that this is a common effect, seen across other types of transitions not studied here, the very process of facing the challenges that require social competence may further separate competent individuals from their less competent peers. Thus the psychosocially rich become richer with time, while the psychosocially poor become poorer. Given the finding that a significant contributor to a child's psychosocial "bank account" is maternal sensitivity, it is important to study whether early parenting interventions can help set youths on trajectories of positive development that will persist as they mature into adolescence and beyond.

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ENDNOTES

¹Peer acceptance and friendships are not synonymous but the skills that contribute to friendships also contribute to acceptance, and better-accepted children have a greater number of friends and higher quality relationships with friends (Gest, Graham-Bermann, & Hartup, 2001).

²Less than 2% of potential study families were excluded for being located in a neighborhood deemed to dangerous to visit by local police.

³The best BIC value is selected by comparing across models tested. Thus, there is no absolute BIC value that determines the best model. Instead, model fit is determined by the lowest BIC value relative to other models that are tested.

⁴Across assessment time points, correlations are typically comparable across similar age differences. Two correlations are slightly weaker however. Within middle childhood, correlations range from .68 to .70 for both males and females. In contrast, the correlations between social competence at 54 months and Kindergarten ($r = .61$ for males and $r = .60$ for females) and between 5th grade and 6th grade (males: $r = .66$; females: $r = .65$) are more conservative. Given that these two time points are the key points delineating between early childhood and adolescence in AMOS models, it provides extra support for instability, albeit modest, from early childhood to middle childhood and middle childhood to adolescence.

APPENDIX A

AGE-INVARIANT ITEMS FROM SOCIAL SKILLS RATING SYSTEM

0 = Never 1 = Sometimes 2 = Very Often

1. Introduces herself or himself to new people without being told
2. Starts conversations rather than waiting for others to talk first
3. Responds appropriately when hit or pushed by other children
4. Controls temper when arguing with other children
5. Makes friends easily
6. Is self-confident in social situations such as parties or group outings
7. Joins group activities without being told
8. Is liked by others

APPENDIX B

FORMULAS FOR GROWTH CURVE MODELS

$$\text{Level 1: } Y_{ij} = \beta_0 + \beta_1(X_{ij} - 11) + r_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01}W_{ij} + \gamma_{02}(T_j - T_{\mu \text{ Age } 11}) + \gamma_{03}(W_{ij} * (T_j - T_{\mu \text{ Age } 11})) + U_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}W_{ij} + \gamma_{12}(T_j - T_{\mu \text{ Age } 11}) + \gamma_{13}(W_{ij} * (T_j - T_{\mu \text{ Age } 11})) + U_{1j}$$

Y = Social competence

X = Age

W = Biological change (early maturation or late maturation) or school transition

T = Social Competence at age 11

r = Between person-error

u = Within person-error

i = Time point

j = Individual