TIME USE AS A CAUSE AND CONSEQUENCE OF YOUTH DEVELOPMENT

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by

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ABSTRACT
Using multilevel modeling to take advantage of long-term, longitudinal data collected from two siblings and two parents from each of about 200 families, the three studies in this dissertation examined the developmental course and adjustment and family correlates of youths’ time with parents, time with peers, and time spent on leisure-time physical activity (LTPA) from middle childhood through adolescence. Study 1 focused on parent-child social (parent, child, and others present) and dyadic (only parent and child present) time. The results showed that social time with parents declined across adolescence, but dyadic time with mothers and fathers peaked in early and middle adolescence, respectively. Moreover, secondborns’ social time with parents declined more slowly than firstborns’, and gendered time use patterns were more pronounced in boys and in opposite-sex sibling dyads. Additionally, youths who spent more dyadic time with their fathers, on average, had higher general self-worth, and changes in social time with fathers were positively linked to changes in youths’ social competence. Study 2 focused on time with opposite- and same-sex peers. The results indicated that girls’ and boys’ time with opposite-sex peers increased beginning in middle childhood and early adolescence, respectively, and that youths’ time with same-sex peers peaked in mid-adolescence. Moreover, changes in unsupervised (no adults present) time with opposite-sex peers positively predicted changes in youths’ problem behaviors and depressive symptoms by the following year, and changes in supervised (adults present) time with opposite-sex peers positively predicted changes in youths’ school performance by the following year. Study 3 focused on time spent on LTPA (e.g., sports, water activities, hiking and camping). The results suggested that LTPA increased during middle childhood and declined across adolescence, and this decline was more pronounced for girls than for boys. Moreover, on occasions when mothers and fathers spent proportionally more time on
LTPA with youths than usual, youths also spent more total time on LTPA than usual. Taken together, these studies highlight the importance of contextualizing the study of youth development and alert interventionists about the role of both mothers and fathers in promoting youth exercise participation and physical health.
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CHAPTER 1

Introduction
Introduction

Daily activities are both a cause and a consequence of youth development (Bronfenbrenner, 1979). As a cause, they constitute important contexts that reinforce close relationships and establish individual competence; as a consequence, they reflect the affordances and constraints in the environments that structure the everyday routines of youths. Consistent with this view, considerable evidence suggests that whom youths spend time with and what activities youths engage in are associated with psychosocial adjustment and family socialization. For example, youths who spend more time with their parents feel closer to their families and have higher academic achievement and fewer emotional problems (Crouter & Crowley, 1990; Hofferth & Sandberg, 2001), and those who spend more unsupervised time with peers are more prone to peer pressure and report more delinquency and substance use (Greene & Banerjee, 2009; Osgood, Wilson, O’Malley, Bachman, & Johnston, 1996). Other work shows that youths with more physically active parents spend more time on sports and outdoor activities and are less likely to be depressed and overweight (Fredricks & Eccles, 2005; Pugliese & Tinsley, 2007).

Given the critical role of daily activities, continued investigations are needed to illuminate how youths’ time use patterns change across developmental periods and how these changes are linked to individual and family characteristics. Most prior studies on youths’ time use, however, have relied on cross-sectional designs and focused on between-person differences, and have been limited in their ability to capture longitudinal changes and within-person variation. The three studies in this dissertation are intended to fill some of these gaps in the literature by examining the developmental course of youths’ time with parents, time with peers, and time spent on leisure-time physical activity (LTPA) from middle childhood through adolescence and the within- and between-person associations between these time use measures.
and youth outcomes and family processes.

**Study Goals**

Studies 1 and 2 focus on the contextual dimension of time use. It has long been hypothesized that adolescents are motivated to gain independence from their parents and become more involved in peer relationships (Grotevant & Cooper, 1986). Few longitudinal studies, however, have tested how youths’ time with parents and with peers develops as youths make the transition from childhood to adolescence. Larson and Verma (1999) argues that, because a given socializing agent marks a particular set of social experiences, time with different socializing agents should be linked to distinct youth outcomes. Indeed, as reviewed above, there is evidence that time with parents conveys benefits to, but that unsupervised time with peers increases risks for, youths’ psychosocial adjustment. Nevertheless, the role of the larger embedding contexts in which parent and peer activities take place, such as whether individuals other than the parent and the child are present and the gender constellation of the peer group, remains underexplored. A new direction for research in this area is thus to move beyond a focus on a particular companion (e.g., the mother) or group of companions (e.g., peers) to examine more closely the composition of the social context of youths’ time use.

Studies 1 and 2 contribute to the theoretical literature by addressing important research questions. Study 1 uses a positive adjustment framework, and examines longitudinal changes in social (i.e., time with parents in the presence of other people) versus dyadic time (i.e., time with just the single parent) with mothers and fathers and the within- and between-person associations between these four types of time and youths’ general self-worth and social competence. Study 2 uses an internalizing/externalizing framework, and examines longitudinal changes in unsupervised and supervised time with mixed/opposite-sex and same-sex peer groups and the
within- and between-person associations between these four types of time and youths’ problem behaviors, depressive symptoms, and school performance.

Study 3 focuses on the content dimension of youths’ time use. Specifically, it concerns a category of activities that are often playful and involve a vigorous physical component, such as sports, dancing, and outdoor play. Longitudinal studies have shown that youth physical activity declines across adolescence (Dumith, Gigante, Domingues, & Kohl, 2011). A number of theorists argue that the decline reflects a normal selection process in which youths replace active leisure with other activities that they find more enjoyable or important, such as socializing with peers and studying (Hofferth & Cutrin; 2003; Larson & Verma, 1999). Given the physical and psychological benefits of physical activity (Ströhle, 2009; Warburton et al., 2006), however, it is crucial for researchers to find effective ways to encourage an active lifestyle among children and adolescents. Parents have been theorized to influence youth physical activity through role modeling, direct instruction and encouragement, and provision of informational, material, and emotional support (Fredricks & Eccles, 2005; Taylor, Baranowski, & Sallis, 1994). Consistent with this view, empirical evidence shows that parents’ socialization efforts are associated with their offspring’s involvement in sports and outdoor activities. Nevertheless, this work is mostly based on between-person comparisons, and thus the results may be subject to the influence of stable confounding variables that are not accounted for in the analyses (Curran & Bauer, 2011).

Study 3 examines longitudinal changes in LTPA and the within- and between-person associations between parent-youth joint involvement in LTPA and youths’ overall participation in LTPA. Parent-child joint involvement is calculated as the percentages of time youths spend with their mothers and fathers on sports and outdoor activities. Because the use of time-varying covariates treats each individual as his or her own control and partials out the possible influence
of stable, third variables (Curran & Bauer, 2011), it contributes to the applied literature by providing for stronger inferences about the relation between parental socialization and youths’ physical activity involvement.

**Common Features**

These three studies share several methodological strengths. First, they use a daily diary approach to measure youths’ activities. Unlike the most commonly used questionnaires, daily diaries are less affected by memory and response biases and show strong convergence with other objective measures of activities, such as experience sampling (Larson & Verma, 1999) and physiological sensors (Kohl, Fulton, & Caspersen, 2000). Second, they use a multilevel modeling strategy to take advantage of a data set with longitudinal data collected from two different-age siblings from each of about 200 families. The multiple waves of data collection and age difference between siblings mean that there are enough data points to capture longitudinal changes at each chronological age from middle childhood to late adolescence. Third, these studies not only model individual and family characteristics as time-varying covariates of youths’ time use, but also include important time-varying controls to rule out alternative explanations. Although definitive conclusions about causal relations cannot be made based on correlational data, by controlling for stable individual differences (Curran & Bauer, 2011) and the influence of other family subsystems (Parke & Buriel, 2006) and child characteristics (Rutter, 2007), these studies are able to examine relatively unconfounded associations of youth activities with psychosocial adjustment and family socialization.

Aside from their common methodological features, the three foci of this dissertation – time with mothers versus fathers, time with mixed/opposite-sex versus same-sex peer groups, and time spent on sports and outdoor activities – are all gendered in some important ways. For
example, both parents spend more time with children of their own sex, especially when they have a daughter and a son in the family (Harris & Morgan, 1991). Youths adhere to rigid gender boundaries and avoid unnecessary interactions with opposite-sex peers since childhood until early adolescence, and they form distinct interaction styles within same-sex peer groups (Maccoby 1990). As compared to boys, girls participate in fewer sports and outdoor activities, and research shows that the rate of decline in physical activity during adolescence is different for girls versus boys (Dumith et al., 2011).

Given the gendered nature of youths’ daily activities, theories of gender, along with other theories of youth development (e.g., Bronfenbrenner, 1979) and time use (e.g., Larson & Verma, 1999), are used to guide the hypotheses in these studies. For example, gender intensification theory (Hill & Lynch, 1983) predicts that adolescents will experience increasing social pressure to conform to traditional gender roles and spend more time with their same-sex parents. Maccoby’s (1990) observation that individuals act differently depending on the gendered nature of the social context directs attention to the potential role of peer group gender constellation in understanding the implications of time with peers for youth adjustment. The belief that girls should be delicate and gentle and boys should be tough and active (Galambos, Beranbaum, & McHale, 2009) lends support to the conceptualization LTPA as a gender stereotypical behavior.

Conclusions

In sum, the overarching goal of this dissertation is to examine daily activities as both a cause and a consequence of youth development (Bronfenbrenner, 1979). The first two studies examine time with parents and with peers as important social contexts that establish self-concepts and develop skills. They contribute to the theoretical literature by exploring how time with a given socializing agent changes across developmental periods and how social
companionship is linked to psychosocial adjustment. The third study treats time spent on sports and outdoor activities as a result of parental socialization. Its focus on the behavioral aspect of parental influences has important implications for interventions that are aimed at promoting the physical health and psychological well-being of youths.
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CHAPTER 2

Parent-Child Shared Time From Middle Childhood to Late Adolescence:

Developmental Course and Adjustment Correlates
Abstract

The development and adjustment correlates of parent-child social (parent, child, and others present) and dyadic time (only parent and child present) from age 8 to 18 were examined. Mothers, fathers, and firstborns and secondborns from 188 White families participated in both home and nightly phone interviews. Social time declined across adolescence, but dyadic time with mothers and fathers peaked in early and middle adolescence, respectively. Additionally, secondborns’ social time declined more slowly than firstborns’, and gendered time use patterns were more pronounced in boys and in opposite-sex sibling dyads. Finally, youths who spent more dyadic time with their fathers, on average, had higher general self-worth, and changes in social time with fathers were positively linked to changes in social competence.

Keywords: birth order; gender; parent-child relationships; psychosocial adjustment; social context; time use
Parent-Child Shared Time From Middle Childhood to Late Adolescence: Developmental Course and Adjustment Correlates

Although parent-child shared time is theorized to play a critical role in youth development (Bronfrenbrenner, 1979), surprisingly little research is available on how it develops as youths make the transition from childhood to adolescence or on whether changes in parent-child shared time are linked to changes in youth adjustment. Moreover, most prior work has not differentiated between social time (i.e., time with parents in the presence of others) and dyadic time (i.e., time with just the single parent), although these two types of time may have different developmental course and correlates (Larson & Richards, 1991; 1994). Most prior work has also ignored important contextual factors, such as the presence and gender of siblings, which may have implications for mother- and father-child involvement (McHale, Kim, & Whiteman, 2006).

In this study, the two eldest siblings from each family provided data across a 7-year period on their time use and psychosocial adjustment, presenting a unique opportunity to examine: (a) the developmental course of parent-child shared time from middle childhood to late adolescence; (b) whether changes in parent-child time varied as a function of youths’ birth order and gender and the sibling dyad gender composition; and (c) whether changes in parent-child shared time were associated with changes in youths’ general self-worth and social competence.

Developmental Course of Parent-Child Shared Time

To capture how parent-child shared time develops requires a design that draws information from parents or youths on multiple occasions over a substantial period of time. However, to date there has been only one short-term longitudinal study conducted with a US sample on how parent-child shared time changes with age (Larson, Richards, Moneta, Holmbeck, & Duckett, 1996). Larson et al.’s (1996) study found declines in parent-child shared time across
age. However, because it included only two occasions of measurement, more complex patterns of change could not be detected. Using a long-term longitudinal design, the first goal of our study was to expand upon this work to examine the developmental course of youths’ social and dyadic time with their mothers and fathers from middle childhood to late adolescence.

According to an individuation hypothesis, at the transition to adolescence, youths are motivated to gain independence from their parents and become more involved in peer relationships (Grotevant & Cooper, 1986). Indeed, time use data suggest that youths become behaviorally less engaged with their parents across adolescence. Buhrmester and Furman (1987), for example, administered a questionnaire to children and young adolescents and showed that total time with parents decreased with age. Montemayor and Brownlee (1987) used a phone diary approach, calling participants on multiple days and asking them to recount their previous day’s experiences, and found that youths spent proportionally less time with their parents in early than in middle adolescence. Larson and Richards (1991) used an experience sampling approach, beeping participants at random times and asking them to report on current experiences, and documented a decline in social time with parents across adolescence. Although a follow-up of about half of their sample further confirmed that adolescents’ social time with parents declined longitudinally (Larson et al., 1996), the study design did not allow for an examination of curvilinear changes. Given that youths’ individuation begins in early adolescence and gains momentum in middle and late adolescence (Grotevant & Cooper, 1986), in this study, we tested whether the developmental course of parent-child social time was best described as quadratic, remaining stable in middle childhood and decreasing gradually from early to late adolescence.

A continued connectedness hypothesis contrasts with an individuation hypothesis in that, despite their efforts to gain independence, youths also seek to maintain close relationships with
their parents (Grotevant & Cooper, 1986). Because the presence of others may make the parent and the child less aware of and attentive to each other than they would be when alone (Crouter & Crowley, 1990), parent-child dyadic time, as opposed to social time, may best reflect reciprocal interest. Larson and colleagues (Larson & Richards, 1991; Larson et al., 1996) were among the few researchers to distinguish between social and dyadic time with parents. Their cross-sectional and longitudinal analyses showed that, although social time with parents declined across adolescence, dyadic time remained unchanged. The authors interpreted the findings to mean that parents and youths choose to maintain their more intimate interactions and forgo their less intimate ones in a way that serves youths’ needs for both connectedness and autonomy. Although Larson et al. (1996) provided a rare glimpse into how parent-child dyadic time changed over time, their study design only allowed for a test of a linear pattern of change. If youths strategically spend dyadic time with their parents to compensate for a decline in social time, a more fine-grained longitudinal analysis may reveal that its change pattern is complementary to that of social time, that is, that dyadic time remains stable in middle childhood and increasing gradually from early through late adolescence.

**Developmental Course of Parent-Child Shared Time by Birth Order and Gender**

Although individuation and continued connectedness hypotheses are useful for predicting the average development of parent-child shared time, they consider parent-child relationships without reference to their embedding contexts. Increasing evidence suggests that siblings establish their own niches within the family and may interact with their parents in complementary ways (McHale et al., 2006). However, nearly all studies of parent-child shared time are based on between-family comparisons of youths from different families, and very little is known about how the presence and gender of siblings may influence parent-child involvement.
Using a within-family comparison design, the second goal of our study was to examine whether the developmental course of parent-child shared time varied as a function of youths’ birth order and gender and the gender composition of the sibling dyad.

A learning-from-experience hypothesis posits that parents become more experienced after parenting their firstborn child and thus better able to maintain a close relationship with their later born children across adolescence (Whiteman, McHale, & Crouter, 2003). Short-term longitudinal data, for example, showed that, when compared at the same age, parents had less conflict with and greater knowledge about their secondborn than firstborn child (Whiteman et al., 2003). Longitudinal data further suggested that the decline in parent-child intimacy (Shanahan, McHale, Crouter, & Osgood, 2007) and the increase in parent-child conflict (Shanahan, McHale, Osgood, Crouter, 2007) were less pronounced for secondborns than for firstborns. Research exploring the impact of birth order on parent-child shared time is rare, but one study (Harris & Morgan, 1991) used cross-sectional questionnaire data from two adolescent siblings from the same family to show that later born siblings perceived higher levels of involvement with their fathers than did earlier born siblings. Although such findings are consistent with a learning-from-experience hypothesis, birth order and age were confounded in that later born siblings were also chronologically younger than earlier born siblings. Given that older youths spend less time with their parents in general (e.g., Buhrmester & Furman, 1987; Montemayor & Brownlee, 1987), a longitudinal design that compares siblings at the same age is needed to isolate birth order differences from developmental changes. Based on theory and the limited research available, we expected that, when compared at the same age, secondborns would spend more social and dyadic time with their parents than firstborns, and that declines in parent-child shared time would be less pronounced for secondborns than for firstborns.
There is evidence that parents, especially fathers, are more involved with their same- than opposite-sex offspring (Raley & Bianchi, 2006). Paternal differential involvement may be related to their awareness of peer demands for boys to be masculine and their institutionalized roles in socializing sons to become men (Maccoby, 2003); boys’ physically tougher and more competitive styles of play may also contribute to their preferences of fathers as social companions (Parke & Buriel, 2006). Inconsistent findings do exist, however. For example, some questionnaire studies found that both mother- and father-child involvement was gendered (Maccoby, 2003), whereas others found that parents did not differentiate between daughters and sons in time use (e.g., Almeida & Galambos, 1991; Montemayor & Brownlee, 1987). The discrepancies among these studies may be due to their neglect of important contextual factors, such as the presence and gender of siblings. As observed by McHale et al. (2006), only parents with both a daughter and a son have the opportunity to spend more time with a same- than an opposite-sex child. Indeed, in the already cited study by Harris and Morgan (1991), a gender difference favoring boys in perceived involvement with fathers was observed in opposite-, but not same-, sex sibling pairs. Based on this work, we expected that girls and boys would spend more time with their mothers and fathers, respectively, especially when they had an opposite-sex sibling. Few studies are available on whether parent-child shared time changes differently for girls and boys, but a gender intensification hypothesis (Hill & Lynch, 1983) predicts that, at the transition to adolescence, youths face increased pressure to conform to traditional gender roles, and some longitudinal research is consistent with this hypothesis, particularly in the case of boys (e.g., Crouter, Whiteman, McHale, & Osgood, 2007; Galambos, Almeida, & Petersen, 1990). Therefore, we expected that youths’ time use would become increasingly gendered over time, especially for boys and in families with both a daughter and a son.
Parent-Child Shared Time and Youths’ General Self-Worth and Social Competence

Compared to the limited research on patterns of change, we know more about the role of parent-child involvement in youth development. In much of this work, however, researchers have collapsed across multiple aspects of parent-child relationships to create a general index, and it remains unclear whether social and dyadic time with parents, in itself, have implications for youths. Moreover, nearly all prior studies have focused on between-person associations, which can be easily confounded with stable, third variables that are not controlled for in the analyses (Raudenbush & Bryk, 2002). Testing social and dyadic time with mothers and fathers as time-varying covariates, the third goal of our study was to examine the within-person associations between parent-child shared time and youths’ general self-worth and social competence.

A self-conception hypothesis asserts that youths establish their self-concepts by observing the consequences of their behaviors (Gecas & Schwalbe, 1986): When youths’ actions are greeted with parents’ participation and interest, for example, they will make positive attributions about themselves and develop positive self-concepts. Numerous studies have combined both temporal and emotional dimensions of parent-child relationships to show that youths with higher levels of psychological well-being have more involved and intimate relationships with their parents (e.g., Ackard, Neumark-Sztainer, Story, & Perry, 2006; Kerr, Capaldi, Pears, & Owen, 2009), and a handful have used questionnaire time use data to show that time with parents, per se, is positively correlated with general self-worth among adolescents (Demo, Small, & Scavin-Williams, 1987; Bulanada & Majumdar, 2009). Nearly all of these studies, however, have focused on between-person variation; a focus on within-person variation represents a notable extension of prior research, because it examines whether changes (i.e., deviations from an individual’s own norm) in parent-child involvement are linked to changes in
psychosocial adjustment, and thereby rules out stable confounding variables as alternative explanations (Raudenbush & Bryk, 2002). Based on prior theory and research, we predicted that parent-child shared time would be positively linked to youths’ general self-worth. Further, to the extent that dyadic time with parents marks reciprocal interest (Crouter & Crowley, 1990) and closeness in parent-child relationships (Larson & Richard, 1991; Larson et al., 1996), dyadic time may be more tightly related to general self-worth than is social time.

According to a socialization hypothesis, parent-child relationships afford opportunities for social skill learning, provide emotional resources for social exploration, and create cognitive scripts that direct peer interactions (Hartup, 1989). Studies that have operationalized parent-child relationships as an aggregate construct document that engaging and dynamic interactions with a parent build the rudiments of positive social expectations and behaviors, such as social interest and reciprocity, that other youths find attractive (e.g., Kerns, Klepac, & Cole, 1996; Simpkins et al., 2009). Researchers have rarely directly examined the inter-relation between parent-child shared time, per se, and youths’ social competence, but youths who spend more unsupervised time with peers are more prone to peer pressure and delinquency (Flannery, Williams, & Vazsonyi, 1999), and data collected using questionnaires (Duncan, Duncan, & Strycker, 2000) and phone diaries (Crouter, Tucker, Head, & McHale, 2004) showed that adolescents who spent more time with their families reported fewer delinquent behaviors over time. Considered together, existing theory and research suggest that parent-child shared time may be positively linked to youths’ social competence. Further, to the extent that social time with parents includes interactions with others, social time may afford more opportunities for parents to coach their children on their social skills, and for children to observe their parents’ social behaviors. As such, social time may be more tightly related to social competence than is dyadic time.
The Present Study

This study examined the developmental course and adjustment correlates of parent-child shared time from middle childhood to late adolescence. Guided by individuation and continued connectedness hypotheses (Grotevant & Cooper, 1986), we expected that social time with parents would remain stable through middle childhood and then gradually decline across adolescence, but that dyadic time would show a complementary pattern, remaining stable in middle childhood and increasing gradually from early through late adolescence. Additionally, a learning-from-experience hypothesis (Whiteman et al., 2003) led us to predict that, when compared at the same age, secondborns would spend more time with their parents than firstborns and that changes in parent-child shared time would be less pronounced for secondborns than for firstborns; a gender intensification hypothesis (Hill & Lynch, 1983) led us to predict that youths would spend more time with the same-sex parent, that their time use would become more gender stereotypical across adolescence, and that these patterns would be more salient for boys and in families with opposite-sex sibling dyads. Finally, self-conception (Gecas & Schwalbe, 1986) and socialization (Hartup, 1989) hypotheses led to the expectations that parent-child shared time would be positively linked to youths’ general self-worth and social competence, with dyadic and social time more closely linked to general self-worth and social competence, respectively.

Method

Participants

Data came from five waves of a longitudinal study exploring family relationships and youth development. We only used waves that included the time use measure of interest, and waves 1, 2, 3, 6, and 7 are referred to as Times 1 through 5 hereafter. Recruitment letters explaining the purpose of the research project were sent home to all families with 4th and 5th
grade children within 16 school districts of a northeastern state. Families interested in participating returned self-addressed postcards. Families were eligible if the parents were married and the firstborn child was in the 4th or 5th grade with a sibling 1-4 years younger. Over 90% of families that returned postcards were eligible and participated. The retention rate was notably high: At Time five, 95% of parents and children remained in the study.

Of the 203 families that originally agreed to participate, two families dropped out after Time 1, and 13 families experienced parental divorce or the death of a father in the interval between Times 1 and 5. We deleted these 15 families, and based our results on the remaining 188 families. This sample included almost exclusively European American, working- and middle-class families living in small cities, towns, and rural communities. At Time 1, the average level of education was 14.62 years (SD = 2.14) for mothers and 14.73 years (SD = 2.41) for fathers, where a score of 12 signified a high school graduate. About 60% of the families included four members when they first entered our study. The sample came close to capturing the racial background of families from the region where the study was conducted (> 85% European American), but it included parents who were better educated than the average parents in the region (US Census Bureau, 2000). Sibling dyads were divided almost equally among the four possible gender compositions. At Time 1, the average age was 10.86 years (SD = .53) for firstborns and 8.28 years (SD = .94) for secondborns; at Time 5, the average age was 17.35 years (SD = .80) for firstborns and 14.79 years (SD = 1.15) for secondborns. The age difference between siblings and multiple waves of data collection meant that there were at least 80 youths who provided data for the analyses at each year of age from about age 8 (i.e., ages 7.5-8.5) to about age 18 (i.e., ages 17.5-18.5). The data from the younger and older ends of the age range, however, were mainly provided by secondborns and firstborns, respectively.
Procedures

Data were collected through home and phone interviews. Trained interviewers conducted home interviews with mothers, fathers, and the two target siblings. Informed consent was obtained at the beginning of the interview and the family received $100-200 (depending on the wave of data collection) for compensation. Family members then completed questionnaires individually on family relationships and personal characteristics. In the 2 to 3 weeks following the home interviews, youths completed seven (5 weekdays, 2 weekend days) nightly phone interviews. Trained interviewers called youths individually in their homes, guided them through a list of 70 activities (see categories in Table 1), and probed for the duration and social contexts (i.e., with whom the youths engaged in the activities) of any completed activities.

Measures

Parent-child shared time was measured in phone interviews at Times 1 through 5. Social and dyadic time with mothers and fathers was, respectively, measured by summing the minutes each sibling reported spending with each parent in the presence of others and with only the target parent across all activities and across the seven calls. To assess reliability, we calculated the correlations between the two siblings’ reports of their shared time. The results suggested that, even though siblings received no prior training, their reports were highly correlated (average $r = .72$). To correct for skewness, square root transformations were used in the analyses. For ease in interpretation, however, nontransformed scores were presented in the figures.

Youths’ general self-worth was measured in home interviews using the 5-item subscale from the Self-Perception Profile (Harter, 1988). At Times 1 through 5, youths used a 4-point scale to rate how well such statements as, “Some kids don’t like the way they are leading their life but other kids do like the way they are leading their life,” described them. Item ratings were
averaged, with higher scores indicating higher levels of general self-worth. Cronbach’s alphas averaged $\alpha = .79$ for firstborns and $\alpha = .72$ for secondborns.

Youths’ social competence was measured in home interviews using the 5-item subscale from the Self-Perception Profile (Harter, 1988). At Times 1 through 5, youths used a 4-point scale to rate how well such statements as, “Some kids find it hard to make friends but other kids find it pretty easy to make friends,” described them. Item ratings were averaged, with higher scores indicating higher levels of social competence. Cronbach’s alphas averaged $\alpha = .76$ for firstborns and $\alpha = .67$ for secondborns.

**Control Variables**

When examining the developmental course of parent-child shared time, we controlled for the age of youths at Time 1 to separate longitudinal developmental changes from cross-sectional age differences; this also meant that any observed birth order differences could not be attributed to the fact that the siblings entered the study at different ages. In addition, because socioeconomic resources place limits on parents’ and youths’ time use options (Crouter & Crowley, 1990) and sibship size can affect parents’ investments in each of their children (Raley & Bianchi, 2006), we controlled for parents’ average levels of education and family size at Time 1. When examining the adjustment correlates of parent-child shared time, we further controlled for parents’ psychological and marital characteristics to rule out two alternative explanations of the associations: Although the modeling of parent-child shared time as time-varying covariates partialed out the possible influence of stable individual differences, within-person variation might still be affected by time-varying factors (Raudenbush & Bryk, 2002). At times when parents feel more stressed or less satisfied with their marriages, for example, they may be more likely to withdraw from their children and compromise the psychosocial development of their
offspring in different ways (Parke & Buriel, 2006). Therefore, we measured parents’ role overload using the 13-item measure by Reilly (1982) and marital love using the 9-item measure by Braiker and Kelley (1979) in the home interviews at Times 1 through 5, and included these as time-varying controls in the analyses. Mothers’ and fathers’ reports of marital love were moderately correlated (average $r = .50$), and thus were averaged at each time point. To correct for skewness, log transformations of parents’ marital love were used in the analyses.

Results

Descriptive Statistics

Across Times 1 through 5, social time with mothers averaged 479.08 minutes per 7 days ($SD = 177.98$) for firstborns and 507.94 minutes per 7 days ($SD = 177.40$) for secondborns, and social time with fathers averaged 429.71 minutes per 7 days ($SD = 176.42$) for firstborns and 450.54 minutes per 7 days ($SD = 171.96$) for secondborns; dyadic time with mothers averaged 75.47 minutes per 7 days ($SD = 53.16$) for firstborns and 97.13 minutes per 7 days ($SD = 65.48$) for secondborns, and dyadic time with fathers averaged 64.76 minutes per 7 days ($SD = 51.61$) for firstborns and 65.96 minutes per 7 days ($SD = 52.11$) for secondborns. Also, for descriptive purposes, we examined the nature of activities youths engaged in with their parents by following Larson and Verma (1999) and grouping the 70 activities measured in the phone interviews into 5 categories: Work (e.g., housework, homework), media use (e.g., watching TV, reading magazines and newspapers), leisure (e.g., sports, outdoor play, hanging out), eating meals, and other entertainments (e.g., going to a movie, going to a party). Table 1 shows the cross-time average percentages of social and dyadic time with parents in these categories of activities. To explore mother-father differences, we conducted a 2 (Social Context) x 2 (Birth Order) x 2 (Parent) mixed model ANOVA for each activity category. Social Context x Parent interactions
were significant for work, \( F(1, 186) = 25.33, \ p < .01 \), media use, \( F(1, 186) = 19.50, \ p < .01 \), and eating meals, \( F(1, 186) = 6.93, \ p < .01 \), with follow-up tests showing that, whereas mothers spent proportionally more dyadic time on working and eating, fathers spent proportionally more dyadic time on media use, with their offspring. A significant Social Context x Birth Order x Parent interaction, \( F(1, 186) = 6.24, \ p < .05 \), in combination with follow-up tests, indicated that, fathers, as compared to mothers, spent proportionally more social time with firstborns and more dyadic time with secondborns on leisure activities.

**Analysis Plan**

Given the nested (i.e., correlated residual errors) and unbalanced nature (i.e., variable measurement spacing) of our data, we used multilevel modeling (MLM) as the analytic strategy (Raudenbush & Bryk, 2002). A major strength of MLM is that it accommodates missing data and effectively reduces biases in the estimation of parameters and standard errors (Schafer, 1997), although only about 5% of our data were missing across variables, persons, and time points. We estimated a series of 3-level models using the MIXED procedure in SAS 9.0. Level 1 (within-sibling) included time-varying variables (i.e., youths’ ages, time-varying covariates and time-varying controls); Level 2 (between-sibling or within-family) included time-invariant variables that differed across siblings (i.e., youths’ birth order and gender, cross-time averages of time-varying covariates, and ages at Time 1); Level 3 included time-invariant variables that were common to both siblings (i.e., sibling dyad gender composition, parents’ levels of education and family size).

We conducted the analyses in two parts. The first part of the analyses examined the developmental course of social and dyadic time with mothers and fathers and whether the course varied by youths’ birth order and gender and sibling dyad gender composition. To begin with, we
controlled for youths’ ages at Time 1, and tested the linear and quadratic effects of youths’ ages on parent-child shared time. Youths’ ages were centered at age 13 (the mean age across all youths and across all time points), such that the intercept represented the sample mean at age 13. To identify the best error structure, we compared a series of nested models that differed only in the random effects of interest. We used deviance tests (instead of parameter estimates as in the case of fixed effects) to determine the statistical significance of the random effects (Raudenbush & Bryk, 2002). Because the difference between two nested models in their deviances (i.e., -2 log likelihood) was chi-squared distributed, it indicated whether adding the random variance components constituted a better error structure. Next, we controlled for parents’ educational levels and family size, and tested the interactions between linear and quadratic age effects and youths’ birth order and gender and sibling dyad gender composition. The reference groups for birth order, gender, and sibling dyad gender composition were firstborns, girls, and same-sex sibling dyads, respectively. Parents’ educational levels were centered at 12 (i.e., a high school graduate) and family size was centered at 4 (i.e., a family of four).

The second part of the analyses examined whether changes in parent-child shared time were linked to changes in youths’ psychosocial adjustment. We began by examining the developmental course of youths’ psychosocial adjustment. Specifically, we tested the effects of youths’ ages on general self-worth and social competence and the interactions between these age effects and youths’ birth order and gender. Next, we controlled for time-varying parents’ role overload and marital love, and tested whether changes in social and dyadic time with mothers and fathers were linked to changes in youth adjustment. To distinguish within- from between-person variation, each of the four time-varying covariates was indicated by two variables. At Level 1, the covariate was indicated by a time-varying, group-mean centered (i.e., centered at
each individual’s cross-time average) variable; at Level 2 the covariate was indicated by the
grand-mean centered (i.e. centered at the sample mean), cross-time average. Because the cross-
time average of the covariate at Level 2 captured all the between-person variation, the time-
varying version of the covariate at Level 1 was limited to explaining within-person variation and
indicated youths’ deviations from their own cross-time averages at each time point. The time-
varying controls, however, were grand-mean centered without including the cross-time averages,
as we did not intend to distinguish the within- and between-person effects of these factors. For
both parts of the analyses, we only included significant interactions, because retaining
nonsignificant interaction terms tends to increase standard errors (Aiken & West, 1991).

**Developmental Course of Parent-Child Shared Time by Birth Order and Gender**

MLM models were estimated separately for each type of time and for each parent. Baseline empty models partitioning variance into between- and within-person variance indicated that there was significant variance to explain in the development of social and dyadic time with mothers ($\sigma^2_{social} = 31.89, p < .01; \sigma^2_{dyadic} = 17.01, p < .01$) and fathers ($\sigma^2_{social} = 31.95, p < .01; \sigma^2_{dyadic} = 18.48, p < .01$). Table 2 presents the parameter estimates for the final models.

The analyses of *social time with mothers* revealed a significant fixed linear effect, $\gamma = - .72, t = -10.48, p < .01$, and a significant random linear effect at Level 3, $\chi^2(2) = 67.30, p < .01$. The average developmental course (for all youths in the sample) was characterized by a steady decline from middle childhood through adolescence (see Figure 1). Interaction analyses further revealed a significant Birth Order x Linear interaction, $\gamma = .47, t = 5.06, p < .01$. Follow-up tests suggested that, although the linear effect was significant for both firstborns and secondborns, it was stronger for firstborns, $\gamma = -.95, t = -11.51, p < .01$, than for secondborns, $\gamma = -.48, t = -5.77, p < .01$. As Figure 1 shows, mother-firstborn social time declined more rapidly than did mother-
secondborn social time. There was also a significant gender difference, indicating that girls, on average, spent more social time with mothers than did boys, $\gamma = -1.40, t = -4.18, p < .01$.

The analyses of social time with fathers revealed significant fixed linear, $\gamma = -.54, t = -7.74, p < .01$, and quadratic, $\gamma = -.088, t = -5.34, p < .01$, effects, and a significant random linear effect at Level 3, $X^2(2) = 68.90, p < .01$. The average developmental course was characterized by stability between ages 8 and 12 and a steady decline thereafter (see Figure 2). Interaction analyses further revealed significant Birth Order x Linear, $\gamma = .34, t = 2.14, p < .05$, and Birth Order x Quadratic, $\gamma = -.11, t = -2.13, p < .05$, interactions. Follow-up tests suggested that, although the linear effect was significant for both firstborns and secondborns, it was stronger for firstborns, $\gamma = -.84, t = -6.70, p < .01$, than for secondborns, $\gamma = -.50, t = -4.25, p < .01$.

Moreover, the quadratic effect was significant only for secondborns, $\gamma = -.092, t = -2.65, p < .01$, but not for firstborns. As Figure 2 shows, father-firstborn social time declined more rapidly than did father-secondborn social time and, whereas father-firstborn social time showed a linear decline, father-secondborn social time remained stable between ages 8 and 12 and declined steadily thereafter. There was also a significant gender difference, indicating that boys, on average, spent more social time with fathers than did girls, $\gamma = .81, t = 2.32, p < .05$.

The analyses of dyadic time with mothers revealed a significant fixed quadratic effect, $\gamma = -.046, t = -3.55, p < .01$, and a significant random linear effect at Level 3, $X^2(2) = 14.3, p < .01$. The average developmental course had a shallow, inverted-U shape, characterized by a slight increase between ages 8 and 12, flattening out between ages 12 and 14, and a slight decrease between ages 14 and 18 (see Figure 3). Interaction analyses further revealed a significant Gender x Linear interaction, $\gamma = -.16, t = -2.05, p < .05$. Follow-up tests suggested that, although the linear effect was nonsignificant for girls, it was negative and significant for boys, $\gamma = -.13, t = -
As Figure 3 shows, whereas mother-daughter dyadic time followed the average, inverted-U pattern, mother-son dyadic time increased steadily between ages 8 and 11 and declined thereafter. A significant Gender x Gender Composition interaction, $\gamma = -1.87, t = -3.28, p < .01$, in combination with follow-up tests, indicated that girls spent more dyadic time with mothers than did boys at age 13, but the effect was stronger in opposite-,$\gamma = -3.24, t = -8.83, p < .01$, than in same-sex,$\gamma = -1.37, t = -3.12, p < .01$, sibling dyads.

The analyses of dyadic time with fathers revealed a significant fixed quadratic effect, $\gamma = -.075, t = -5.29, p < .01$, and a significant random linear effect at Level 2, $X^2(2) = 15.7, p < .01$. The average developmental course was an inverted U-shape, characterized by a steady increase between ages 8 and 12, flattening out between ages 12 and 14, and a steady decrease between ages 14 and 18. Interaction analyses further revealed significant Birth Order x Linear, $\gamma = .27, t = 2.04, p < .05$, and Gender x Linear, $\gamma = .20, t = 2.45, p < .05$, interactions. Separate follow-up tests suggested that a positive linear slope was significant for secondborns, $\gamma = .20, t = 2.50, p < .05$, but not for firstborns, and for boys, $\gamma = .16, t = 2.68, p < .01$, but not for girls. As Figure 4 shows, whereas dyadic time with fathers followed the average, inverted-U pattern for firstborns and for girls, it increased steadily between ages 8 and 15 and then leveled off for secondborns and for boys. A significant Gender x Gender Composition interaction, $\gamma = 2.67, t = 4.84, p < .01$, in combination with follow-up tests, indicated that boys in opposite-, $\gamma = 3.35, t = 9.34, p < .01$, but not same-sex, sibling dyads spent more dyadic time with fathers than did girls at age 13.

**Adjustment Correlates of Parent-Child Shared Time**

MLM models were estimated separately for each adjustment variable. Results for the developmental course of general self-worth (Lam & McHale, 2011) and social competence (Kim, McHale, Crouter, & Osgood, 2007) were reported elsewhere, and thus are not discussed.
here. Instead, we focus on the within- and between-person effects of parent-child shared time on youths’ psychosocial development. Table 3 presents the parameter estimates for the final models.

The analyses of general self-worth revealed a significant between-person effect of father-child dyadic time. The cross-time average of father-child dyadic was linked to the cross-time average of youths’ general self-worth, indicating that youths who spent more dyadic time with their fathers, on average, had higher levels of general self-worth, $\gamma = .017, t = 2.14, p < .05$.

The analyses of social competence revealed a significant within-person effect of father-child social time. Changes in father-child social time were positively linked to changes in social competence, indicating that, at times when youths spent more social time with fathers than usual, they also reported higher levels of social competence than usual, $\gamma = .0057, t = 1.99, p < .05$.

**Discussion**

Using a long-term longitudinal design and within-family comparisons, this study expanded upon prior cross-sectional and short-term longitudinal studies to examine the developmental course of parent-child shared time from middle childhood to late adolescence and whether the course varied as a function of youths’ birth order and gender and sibling dyad gender composition. In addition, with a focus on within-person variation, we examined whether changes in parent-child shared time were linked to changes in youths’ psychosocial adjustment.

On the most general level, our results offer a three-part take-home message that underscores the importance of contextualizing the study of child development. First, although the average change pattern of social time with parents was one of decline, those of time with mothers and with fathers were characterized by temporary rises in early and middle adolescence, respectively. Such findings suggested that, while adolescents individuated from the family, they continued to have one-on-one opportunities to maintain close relationships with their parents.
(Larson & Richards, 1991; Larson et al., 1996). Future researchers should take into account the composition of the immediate social context (i.e., whether others are present) when studying parent-child interactions. Second, the decline in social time with parents was less drastic for secondborns than for firstborns, and both mothers and fathers spent more dyadic time with children of their own sex when they had both a daughter and a son. Most studies on parent-child relationships are grounded in an implicit assumption that developmental processes are similar for all children in a family, but our work shows that the structure of the family (i.e., whether it includes a sister or a brother) may foster differential experiences for youths in the same family, highlighting the importance of considering within-family differences in developmental research. Third, youths who spent more dyadic time with their fathers, on average, reported higher levels of general self-worth, and changes in social time with fathers were positively related to changes in social competence. Consistent with Bronfenbrenner’s (1979) observation that youths’ activities have different implications depending on which element of the microsystem (i.e., whether the mother or the father) is involved, at least in two-parent families, time with fathers, but not mothers, appeared to convey psychosocial benefits to youths. An important direction for future studies is to examine the distinct roles of mothers versus fathers and how non-scripted parental behaviors, such as high involvement of fathers in childrearing, are linked to youth adjustment. Below, we elaborate on each of these themes and discuss the limitations of our study.

**Developmental Course of Parent-Child Shared Time**

Consistent with an individuation hypothesis, that youths shift their dependence from their parents to peers at the transition to adolescence (Grotevant & Cooper, 1986), and previous cross-sectional (e.g., Buhrmester & Furman, 1987; Montemayor & Brownlee, 1987) and short-term longitudinal (Larson et al., 1996) studies, the average developmental course of social time with
parents was one of decline. However, although the decline in social time with mothers was persistent from middle childhood through adolescence, the decline in social time with fathers did not begin until early adolescence. It is well-established that mothers are more involved in childrearing than fathers (Larson & Verma, 1999). Because youths spend so much time with their mothers in early childhood, the change in social time with mothers may be linked to other developmental processes, such as the transition to school and establishment of peer relationships, which take place before youths reach adolescence. More research is needed to explore the development of social time with parents from toddlerhood through early childhood and its links to the developmental themes of these periods.

Turning to the average developmental course of dyadic time with parents, our results supported a continued connectedness hypothesis, that adolescents continue to rely on their parents for intimacy and support (Grotevant & Cooper, 1986). Consistent with Larson et al.’s (1996) findings that parent-child dyadic time did not decline linearly across adolescence, our analyses revealed that dyadic time with mothers and with fathers changed in a curvilinear way, showing temporary rises in early and middle adolescence, respectively. These increases may be compensatory to the decline in social time with parents (Larson & Richards, 1991; Larson et al., 1996). To balance the needs of youths for connectedness and autonomy, parents and youths who are experiencing fewer opportunities for joint activities may increase their dyadic involvement. The rises in dyadic time with both parents were nevertheless modest and temporary, indicating that the majority of parent-child dyads in our sample adjusted quickly to the adolescent transition. It has been proposed that, with their growing cognitive and socioemotional capacities, youths transform their relationships with their parents in a direction of increasing reciprocity and mutuality, and such a process involves a temporary period of intense exchanges and realignment.
of expectations (Zimmer-Gembeck & Collins, 2003). A time-limited increase in dyadic time with parents may be part of such transitional state of relational re-negotiation.

**Developmental Course of Parent-Child Shared Time by Birth Order and Gender**

Although a Birth Order x Quadratic change interaction was significant for social time with fathers, it was not interpreted because the data from the younger end of the age range were mainly provided by secondborns, and the result might merely reflect our lack of data to capture the stable period of father-firstborn social time. The developmental course of parent-child shared time, however, did differ for firstborns versus secondborns in other important ways. Specifically, despite the fact that secondborns did not spend more time with their parents at age 13 than did firstborns, secondborns’ social time with parents declined less drastically than firstborns’.

Moreover, whereas father-firstborn dyadic time followed the average inverted-U pattern, father-secondborn dyadic time actually increased over time.

One potential mechanism underlying the birth order differences in parent-child shared time is that parents learn from their experiences with their firstborns (Whiteman et al., 2003), and thus are more motivated and more able to maintain involvement with their later born children. Once firstborns become more involved in the world beyond the family, parents may begin to pay more attention to the secondborn; the secondborn may also collaborate in this process by taking advantage of newfound opportunities for parental time and attention. This pattern was most clearly illustrated by our finding that secondborns, but not firstborns, spent increasingly more dyadic time with their fathers over time. Considering that the interests and needs of later born children may not be best served by a status quo that proscribes status and privileges for firstborns (Sulloway, 1996), secondborns may be motivated to alter family alliances when the opportunity arises. More generally, these results imply that children’s interactions with parents are shaped
not only by their own, but also by their siblings’, development. Future studies should investigate how parental socialization vis a vis one child is influenced by other children in the family.

The developmental course of parent-child shared time also varied by youths’ gender and sibling dyad gender composition. On average, girls spent more social time with their mothers, and both girls and boys spent more dyadic time with their same-sex parents at age 13. These gender differences, as predicted, were more pronounced in families with opposite-sex sibling dyads. Prior research based on between-family comparisons reveals few overall differences in how mothers and fathers treat their daughters versus sons (Leaper, 2002). However, studies using within-family comparisons, including ours, have demonstrated that the extent to which parents and youths use their time in a gendered way is constrained by the family structure, namely, whether there is both a daughter and a son in the family (McHale et al., 2006). These results, again, speak to the role of the family composition in shaping parent-child dynamics and to the importance of sampling more than one child from each family to understand how families operate as inter-linked socialization systems (McHale et al., 2006).

Our longitudinal analyses further revealed that, although girls’ dyadic time with their parents followed the average quadratic pattern, boys’ dyadic time with their mothers and their fathers decreased and increased over time, respectively. Prior theory (Hill & Lynch, 1983) and research (e.g., Crouter et al., 2007; Galambos et al., 1990) have shown that youths, especially boys, become more gender stereotyped at the transition to adolescence. One possible reason for such findings is that violation of gender role norms is less tolerated in boys than in girls. Moreover, girls tend to profit from gender equality, whereas boys, privileged by traditional attitudes and roles, do not. Researchers have just begun to examine patterns of change in gendered characteristics with multi-wave, longitudinal data, and this work suggests that different
dimensions of gender change in different ways across childhood and adolescence (Martin & Ruble, 2010). Given the implications of gender for youths’ psychosocial adjustment and achievement orientation (Martin & Ruble, 2010), the development of gendered characteristics merits continued investigations.

**Parent-Child Shared Time and Youths’ General Self-Worth and Social Competence**

As predicted by self-conception (Gecas & Schwalbe, 1986) and socialization (Hartup, 1989) hypotheses, youths who spent more dyadic time with their fathers, on average, had higher levels of general self-worth, and increases and decreases in social time with fathers were linked to increases and decreases in social competence. On a methodological level, our reliance on different methods to measure youths’ time use and psychosocial adjustment reduced potential biases due to common methods variance. Moreover, our use of time-varying covariates and inclusion of time-varying controls allowed us to rule out several important alternative explanations of the observed association between father-child dyadic time and social competence, including stable individual differences and parents’ psychological stress and marital dynamics. On a theoretical level, although ample research based on aggregate measures of parent-child relationships has shown that youths who consider themselves worthy and who feel accepted by peers also have involved and intimate relationships with their parents (e.g., Kerr et al., 2009; Simpkins et al., 2009), our study contributes to the literature by showing that parent-child shared time, in itself, has implications for youth development. Perhaps even more importantly, paternal involvement in a dyadic versus a social setting manifested unique links to adolescents’ psychosocial adjustment. Dyadic time with fathers, which is thought to indicate reciprocal interest (Crouter & Crowley, 1990) and a close parent-child relationship (Larson & Richards, 1991; Larson et al., 1996), was linked to general self-worth. In contrast, social time with fathers,
which may provide opportunities for parents to coach their offspring and for youths to observe their parents’ interpersonal behavior, was linked to social competence. Because our time use measure did not tap onto the emotional or cognitive aspect of parent-child shared time and little prior research is available for comparison purposes, our findings, though consistent with our predictions, should be treated as hypothesis generating. Replications of these results are needed, and the future challenge is to go beyond theoretically-grounded speculations and test whether parent-child interactions in a social versus a dyadic setting actually vary in relational intimacy and opportunity affordances for social skill development.

There are a number of potential explanations of the null findings on mother-child shared time. First, at least in two-parent families, the mother’s role as caregiver is so scripted that her involvement can easily go unnoticed and unacknowledged (Coltrane, 1989). In contrast, a father’s role as the family provider does not highlight shared activities with offspring, and thus high levels of paternal involvement may be especially salient. Youths with fathers who spend dyadic time with them may develop higher general self-worth because their fathers go beyond social expectations to devote undivided attention to them. Second, as observed by Larson and Richards (1994), fathers’ interactions with their children often involve joking, teasing, and other playful interactions; as indicated by our descriptive statistics and previous research (Larson & Verma, 1999), fathers, as compared to mothers, were more involved in leisure activities with their offspring. The peer-like interaction style as well as high involvement in leisure activities by fathers may be particularly conducive to egalitarian exchanges, and thus crucial for youth social development (Parke & Buriel, 2006). Third, fathers’ parenting is, in general, more affected by child characteristics than mothers’ (Raley & Bianchi, 2006). Fathers’ greater involvement with better adjusted youths, therefore, may be interpreted as fathers being drawn to youths who, for
reasons of mastery or other elements of attractiveness, have higher self-worth and social competence. Fourth, mother-child shared time may be linked to other domains of adjustment that were not included in this study. In fact, boys who spent more dyadic time with their mothers, but not with their fathers, were found to be less depressed in Larson and colleagues’ (Larson & Richards, 1994) experience sampling study. Clearly, the unique contributions of mothers versus fathers to specific aspects of youth adjustment need to be further explored.

Limitations and a Final Note

Our study had several limitations. First, our sample was not representative of the diversity of families in the US. Given that how youths spend their time varies greatly across cultures (Larson & Verma, 1999), the findings need to be replicated in more diverse samples. Second, because of the complexity of our models, we focused on examining social and dyadic time with mothers and fathers. A number of studies have shown that the types of activities that parents and children engage in can have unique developmental implications (Crouter et al., 2004; Larson & Verma, 1999). Future researchers should explore how the time parents and youths spend on different activities changes over time and has implications for youth adjustment. Third, although our use of time-varying covariates and time-varying controls helped rule out alternative explanations, causal inferences cannot be made based on a correlational study like this one. Experimental interventions that manipulate parent-child involvement may be particularly useful for disentangling the causal paths underlying parent-child shared time and its psychosocial implications. Despite these limitations, our study’s focus on social and dyadic time with parents and its use of a long-term longitudinal design, within-family comparisons, and time-varying covariates provide new insights about how parent-child relationships unfold across adolescence, and underscore the importance of contextualizing the study of child development.
References


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Table 2.1.

Cross-Time Mean Percentages (and Standard Deviations) of Social and Dyadic Time With Mothers and Fathers in Activity Categories for Firstborns (FBs) and Secondborns (SBs)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Social time</th>
<th>Dyadic time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mothers</td>
<td>Fathers</td>
</tr>
<tr>
<td>Work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBs</td>
<td>10.00 (6.69)\textsubscript{a}</td>
<td>9.44 (8.86)\textsubscript{a}</td>
</tr>
<tr>
<td>SBs</td>
<td>9.50 (6.95)\textsubscript{a}</td>
<td>9.07 (7.90)\textsubscript{a}</td>
</tr>
<tr>
<td>Media use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBs</td>
<td>12.54 (10.76)\textsubscript{a}</td>
<td>12.74 (10.50)\textsubscript{a}</td>
</tr>
<tr>
<td>SBs</td>
<td>11.96 (9.62)\textsubscript{a}</td>
<td>12.15 (9.93)\textsubscript{a}</td>
</tr>
<tr>
<td>Leisure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBs</td>
<td>26.56 (12.86)\textsubscript{a}</td>
<td>29.51 (14.99)\textsubscript{b}</td>
</tr>
<tr>
<td>SBs</td>
<td>29.42 (13.25)\textsubscript{a}</td>
<td>30.70 (15.60)\textsubscript{a}</td>
</tr>
<tr>
<td>Eat meals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBs</td>
<td>42.77 (14.58)\textsubscript{a}</td>
<td>41.93 (15.00)\textsubscript{a}</td>
</tr>
<tr>
<td>SBs</td>
<td>41.03 (13.28)\textsubscript{a}</td>
<td>41.11 (15.24)\textsubscript{a}</td>
</tr>
<tr>
<td>Other entertainment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBs</td>
<td>8.13 (7.16)\textsubscript{a}</td>
<td>6.38 (6.60)\textsubscript{a}</td>
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<tr>
<td>SBs</td>
<td>8.10 (6.63)\textsubscript{a}</td>
<td>6.25 (6.31)\textsubscript{a}</td>
</tr>
</tbody>
</table>

Note. \textsubscript{a,b,c} Scores with different subscripts within each row are significantly different, \( p < .05 \).
Table 2.2.

*Gamma Coefficients (γ) and t-Ratios for Multi-level Models of Social and Dyadic Time With Mothers and Fathers*

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>Social time</th>
<th></th>
<th></th>
<th>Dyadic time</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mothers</td>
<td>Fathers</td>
<td></td>
<td>Mothers</td>
<td>Fathers</td>
</tr>
<tr>
<td></td>
<td>γ</td>
<td>t-ratio</td>
<td>γ</td>
<td>t-ratio</td>
<td>γ</td>
<td>t-ratio</td>
</tr>
<tr>
<td>Linear and quadratic age effects and age at Time 1</td>
<td></td>
<td>22.49</td>
<td>26.28**</td>
<td>19.97</td>
<td>22.06**</td>
<td>8.35</td>
</tr>
<tr>
<td>Intercept</td>
<td>-</td>
<td>-</td>
<td>0.02</td>
<td>0.41</td>
<td>-0.05</td>
<td>-3.91**</td>
</tr>
<tr>
<td>Linear effect</td>
<td>-</td>
<td>-</td>
<td>0.24</td>
<td>0.87</td>
<td>-0.13</td>
<td>-0.63</td>
</tr>
<tr>
<td>Birth order, gender, sibling dyad gender composition and parental education and family size</td>
<td></td>
<td>0.28</td>
<td>0.41</td>
<td>0.96</td>
<td>1.20</td>
<td>1.06</td>
</tr>
<tr>
<td>Birth order x Linear effect</td>
<td>0.47</td>
<td>5.06**</td>
<td>0.34</td>
<td>2.14*</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Birth order x Quadratic effect</td>
<td>-</td>
<td>-</td>
<td>-0.11</td>
<td>-2.13*</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gender</td>
<td>-1.40</td>
<td>-4.18**</td>
<td>0.81</td>
<td>2.32*</td>
<td>-1.37</td>
<td>-3.12**</td>
</tr>
<tr>
<td>Gender x Linear effect</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.16</td>
<td>-2.05*</td>
</tr>
</tbody>
</table>
Table 2.2.

*Gamma Coefficients (γ) and t-Ratios for Multi-level Models of Social and Dyadic Time With Mothers and Fathers (Cont’d)*

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>Social time</th>
<th>Dyadic time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mothers</td>
<td>Fathers</td>
</tr>
<tr>
<td></td>
<td>γ  t-ratio</td>
<td>γ  t-ratio</td>
</tr>
<tr>
<td>Gender composition</td>
<td>0.09 0.16</td>
<td>-0.11 -0.20</td>
</tr>
<tr>
<td>Gender x Gender composition</td>
<td>- -</td>
<td>- -</td>
</tr>
<tr>
<td>Parents’ levels of education</td>
<td>0.03 0.20</td>
<td>-0.01 -0.05</td>
</tr>
<tr>
<td>Family size</td>
<td>0.31 0.83</td>
<td>0.42 1.10</td>
</tr>
</tbody>
</table>

*Note.* †p < .10; *p < .05; **p < .01.
Table 3.3.

*Gamma Coefficients (γ) and t-Ratios for Multi-level Models of Youths’ General Self-Worth and Social Competence*

| Fixed effects | General self-worth | | | Social competence | | |
|---------------|-------------------|---|---|-------------------|---|
|               | γ                 | t-ratio | γ | t-ratio |
| Linear, quadratic, and cubic age effects and age at Time 1 | | | | |
| Intercept     | 3.215             | 35.75** | 3.209 | 35.02** |
| Linear effect | 0.009             | 0.62    | 0.024 | 2.65** |
| Quadratic effect | -0.010 | -4.00** | -0.008 | -3.35** |
| Cubic effect  | -0.000            | -0.56   | -   | - |
| Age at Time 1 | 0.002             | 0.07    | 0.002 | 0.08 |
| Birth order, gender, sibling dyad gender composition and parental education and family size | | | | |
| Birth order   | -0.036            | -0.43   | 0.006 | 0.06 |
| Birth order x Linear effect | -0.045 | -2.77** | -0.020 | -1.37 |
| Gender        | 0.059             | 1.16    | 0.018 | 0.35 |
| Gender x Linear effect | 0.027 | 2.43* | - | - |
| Gender composition | -0.020 | -0.42 | 0.023 | 0.47 |
| Parents’ levels of education | 0.034 | 2.96** | 0.019 | 1.64 |
| Family size   | 0.045             | 1.30    | 0.015 | 0.41 |
| Social and dyadic time with parents and parents’ role overload and marital love | | | | |
| BP social time with mothers | -0.000 | -0.02 | -0.001 | -0.16 |
| WP social time with mothers | 0.000 | 0.09 | -0.001 | -0.31 |
| BP social time with fathers | 0.007 | 0.74 | 0.013 | 1.45 |
Table 3.3

*Gamma Coefficients (γ) and t-Ratios for Multi-level Models of Youths’ General Self-Worth and Social Competence (Cont’d)*

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>General self-worth</th>
<th>Social competence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>γ</td>
<td>t-ratio</td>
</tr>
<tr>
<td>WP social time with fathers</td>
<td>0.005</td>
<td>1.55</td>
</tr>
<tr>
<td>BP dyadic time with mothers</td>
<td>-0.004</td>
<td>-0.47</td>
</tr>
<tr>
<td>WP dyadic time with mothers</td>
<td>0.004</td>
<td>1.18</td>
</tr>
<tr>
<td>BP dyadic time with fathers</td>
<td>0.017</td>
<td>2.14*</td>
</tr>
<tr>
<td>WP dyadic time with fathers</td>
<td>0.002</td>
<td>0.75</td>
</tr>
<tr>
<td>Mothers’ role overload</td>
<td>-0.001</td>
<td>-0.74</td>
</tr>
<tr>
<td>Fathers’ role overload</td>
<td>0.000</td>
<td>0.10</td>
</tr>
<tr>
<td>Parents’ marital love</td>
<td>-0.020</td>
<td>-0.41</td>
</tr>
</tbody>
</table>

*Note.* BP = between-person; WP = within-person.

*p < .05; **p < .01.
Figure 2.1. Developmental course of social time with mothers by birth order.
Figure 2.2. Developmental course of social time with fathers by birth order.
Figure 2.3. Developmental course of dyadic time with mothers by gender.
Figure 2.4. Developmental course of dyadic time with fathers by birth order and gender.
CHAPTER 3

Time With Peers From Middle Childhood to Late Adolescence:

Developmental Course and Adjustment Correlates
Abstract

This study examined the developmental course and adjustment correlates of time with peers from age 8 to 18. On 7 occasions over 8 years, the two eldest siblings from 201 White, working- and middle-class families participated in home and nightly phone interviews. Multilevel models revealed that girls’ time with opposite-sex peers increased beginning in middle childhood, but boys’ time increased beginning in early adolescence. For both girls and boys, time with same-sex peers peaked in mid-adolescence and then declined. At the within-person level, unsupervised time with opposite-sex peers negatively predicted and supervised time with opposite-sex peers positively predicted adjustment in the following year. Findings highlight the importance of social context in understanding peer involvement and its implications for youth development.

Keywords: adolescence; adjustment; gender segregation; middle childhood; social context; time with peers
Time with Peers From Middle Childhood to Late Adolescence: Developmental Course and Adjustment Correlates

Adolescence is a developmental period when youths strive to gain independence from their families and become more engaged with their peers (Rubin, Bukowski, & Parker, 2006). It is also a period when youths begin to rethink their relationships with the opposite sex and when peer group gender segregation declines (Maccoby, 1990; Mehta & Strough, 2009). Although a number of cross-sectional (Buhrmester & Furman, 1987; Csikszentmihalyi & Larson, 1984) and short-term longitudinal (Richards, Crowe, Larson, & Swarr, 1998) studies have documented age-related differences in peer involvement, little long-term longitudinal data are available to document how time with peers develops as youths make the transition from childhood to adolescence. The developmental significance of peer companionship also remains a question of debate in the literature: Whereas some research reveals negative associations with adjustment in showing, for example, that adolescent delinquency and substance use almost always occur in the company of peers (Albert & Steinberg, 2011), other research establishes that peers provide important opportunities for promoting egalitarian relationships and prosocial behaviors (Bukowski, Buhrmester, & Underwood, 2011).

An ecological perspective directs attention to the social contexts within which peer experiences take place (Bronfenbrenner & Crouter, 1983). Unsupervised time with peers, in particular, has been found to be associated with a range of problem behaviors (Greene & Banerjee, 2009; Osgood, Wilson, O’Malley, Bachman, & Johnston, 1996; Pettit, Bates, Dodge, & Meece, 1999). Less well understood, however, is the potential influence of unsupervised peer involvement on adjustment in other domains of youth functioning, such as internalizing symptoms or academic achievement. A body of work has emerged that gendered social contexts
elicit distinct kinds of behavior (Maccoby, 1990), but whether peer group gender composition has implications for youth adjustment remains underexplored. Using long-term longitudinal data from a family study of siblings, this investigation was designed to address some of these gaps in the literature by examining the developmental course of time spent with peers from middle childhood to late adolescence and the within-person associations between time with peers and youths’ problem behaviors, depressive symptoms, and school performance. We focused on two exclusive categories of peer time: Time with a same-sex peer or peer group, referred to as same-sex peer time, and time with an opposite-sex peer or a peer group that included at least one opposite-sex peer, referred to as mixed/opposite-sex peer time.

**Developmental Course of Time With Peers**

The process of individuation in adolescence includes negotiating independence from parents and developing egalitarian relationships with peers (Rubin et al., 2006). The individuation process also coincides with the transition into puberty, which often marks an increased sensitivity to and interest in the opposite sex (Maccoby, 1990; Mehta & Strough, 2009). Indeed, evidence suggests that youths become more involved with their peers, especially opposite-sex peers, across adolescence. Buhrmester and Furman (1987), for example, administered a questionnaire to children (2nd and 5th graders) and young adolescents (8th graders), and showed that although older youths spent more time with opposite-sex peers, only older girls spent more time with same-sex peers. Csikszentmihalyi and Larson (1984) used an experience sampling approach, beeping high school students at random times and asking them to report on current experiences, and found that older youths spent more time in the company of peers. Moreover, whereas 9th and 10th graders most often met in same-sex settings, 11th and 12th graders most often met in settings that included an opposite-sex peer. Richards et al. (1998) collected
experience sampling data from 5th and 8th graders, and demonstrated that time with one opposite-
sex peer increased linearly over a 4-year period, especially for girls, but that time with same-sex
peers remained relatively unchanged. The two-wave design of Richard et al.’s (1998) study,
however, did not allow for an examination of possible curvilinear patterns of change. A handful
of studies used three or more waves of longitudinal data to show that the proportion of self-
reported opposite-sex friends increased linearly across adolescence and that such an increase was
more pronounced for girls than for boys (Connolly, Furman, & Konarski, 2000; Poulin &
Pedersen, 2007). Nevertheless, the focus of these studies was on peer group structure rather than
peer group involvement. Further, the reliance on youths’ self reports to measure friendship
networks also meant that the results might be subject to mono-reporter bias (Haynie,
Steffensmeier, & Bell, 2007) or recency and primacy effects (Eagle, Pentland, & Lazer, 2009).

Using five waves of phone diary data, the first aim of this study was to examine the
developmental course of time with same-sex peers and with mixed/opposite-sex peers from
middle childhood to late adolescence. By using a multilevel modeling (MLM) analytic
framework and paying equal attention to two different-age siblings (who were about 2.5 years
apart in age) in each family, we were able to expand the age range of interest and cover the years
from age 8 to 18. Given that the individuation process (Rubin et al., 2006) and the breakdown of
peer group gender segregation (Maccoby, 1990; Mehta & Strough, 2009) begin in early
adolescence and gain momentum in middle and late adolescence, we expected that time with
mixed/opposite-sex peers would change in a quadratic manner, remaining low and stable in
middle childhood and increasing gradually from early to late adolescence. Based on the limited
longitudinal research available (Connolly et al., 2000; Poulin & Pedersen, 2007; Richards et al.,
1998), we expected that such changes would be more pronounced for girls than for boys.
Predictions about time with same-sex peers are less clear: If interactions with mixed/opposite-sex peers do not come at the cost of interactions with same-sex peers (Buhrmester & Furman, 1987; Richards et al., 1998), time with same-sex peers may also increase across adolescence. If trade-offs occur between involvement with mixed/opposite-sex versus same-sex peers (Csikszentmihalyi & Larson, 1984), however, time with same-sex peers may follow a complementary pattern of change, remaining high and stable in middle childhood and declining gradually from early to late adolescence.

**Adjustment Correlates of Time With Peers**

Peer relationships have great potential to contribute to healthful development, as they afford opportunities for youths to practice egalitarian social exchanges and acquire behavioral and emotional competencies (Bukowski et al., 2011). On the other hand, peer relationships can be a major source of risks, especially when peers exhibit anti-social attitudes and behaviors, such as rule breaking and delinquency (Albert & Steinberg, 2011). An ecological perspective posits that the consequences of a developmental process are often dependent on the embedding social context (Bronfenbrenner & Crouter, 1983). One contextual factor that has received considerable research attention is the presence of a supervising adult in peer activities. As elaborated by Osgood et al. (1996), time spent with peers can increase the likelihood of deviant behaviors by making these behaviors easier to carry out and more stimulating. The lack of an immediate authority figure may further increase the chance of deviance by reducing the social pressure to behave in prosocial manners and minimizing expectations of punishment. Consistent with such views, studies based on questionnaire data have shown that middle (Greene & Banerjee, 2009) and high (Osgood et al., 1996) school students who spent more unsupervised time with peers reported more delinquency and substance use. Findings based on phone diary data also indicated
that unsupervised peer involvement in grade 6 was predictive of problem behaviors in grade 7 (Pettit et al., 1999). Less is known about whether unsupervised time with peers has negative implications for emotional and school functioning, but conduct problems, psychological distress, and academic difficulties often co-occur and tend to share common causes (Angold, Costello, & Erkanli, 1999; Roeser, Eccles, & Strobel, 1998). Moreover, self reports of friends’ deviant behaviors have been found to predict increases in depressive symptoms and decreases in school performance in both early and late adolescence (Battin-Pearson et al., 2000; Fergusson, Wanner, Vitaro, Horwood, & Swain-Campbell, 2003; Fuligni, Eccles, Barber, & Clements, 2001). For these reasons, we expected that unsupervised involvement with peers would be linked to problem behaviors, internalizing symptoms, and academic declines.

Although structured activities – activities that are routinely scheduled and organized around building skills and competencies and involve at least distal supervision and guidance of adults – have been found to convey psychosocial benefits to youths (Eccles, Barber, Stone, & Hunt, 2003; Mahoney, Larson, Eccles, & Lord, 2005), it is unclear whether supervised time with peers, in itself, has a positive influence on youth adjustment. The presence of an adult, though it provides some supervision and monitoring (Osgood et al., 1996), does not necessarily mean that scaffolding of activities or facilitation of peer interactions will be provided to optimize youth learning and well-being (Mahoney & Stattin, 2000). However, parents, coaches, and other adults are often expected to play an active and/or supportive role in youth development (Scales, 2003). They can also serve as positive role models for youths in applying different socioemotional and intellectual skills (Larson & Verma, 1999). As such, we expected that adult supervised peer time would be associated with more adequate functioning and fewer adjustment problems.

One intriguing, yet underexplored, question is whether time spent with mixed/opposite-
sex versus same-sex peers has different implications for youth adjustment. There are a number of reasons to expect that the answer is yes. First, analyses of social network data showed that, among young adolescents (8th graders), same-sex peer groups were more stable (i.e., retain more of the same members over time) than mixed-sex peer groups and that such instability was positively linked to group-level delinquency and negatively linked to group-level attachment to conventional institutions (Kreager, Rulison, & Moody, 2010). Moreover, middle school students who listed an opposite-sex peer as one of their three best friends (Arndorfer & Stormshak, 2008) and high school girls (but not boys) who receive and give friendship nominations to more opposite-sex peers (Haynie et al., 2007; Mrug, Borch, & Cillessen, 2011) exhibited greater increases in problem behaviors over time. Second, possibly due to an emerging interest in romantic relationships (Mehta & Strough, 2009), adolescents reported feeling more excited and being more attentive in the company of an opposite-sex peer versus same-sex peer group (Richards et al., 1998). It is well-established in the motor-learning literature that arousal and motivation intensify experiences, whether pleasant or unpleasant, and magnify their influences on individuals (Domjan, 2010). Applying such findings to peer involvement, we would expect that time with mixed/opposite-sex peers may be particularly arousing and thus powerful in affecting, both favorably and adversely, youth adjustment.

In an effort to advance understanding of the adjustment implications of peer time, the second aim of this study was to use a time-lagged design to examine the within-person associations between unsupervised and supervised time with mixed/opposite-sex and same-sex peers and youths’ problem behaviors, depressive symptoms, and school performance. A focus on within-person variation extends previous research, because it allowed us to examine whether changes (i.e., deviations from youths’ own norms) in peer involvement predicted changes in
youth adjustment over time. By treating each respondent as her or his own control, within-person associations help to eliminate stable, third variables as alternative explanations and provide for stronger inferences (Curran & Bauer, 2011). It is important to note that within-person variation may still be affected by other time-varying factors. Given our goal to develop a contextual (versus dispositional) explanation of youth adjustment, of particular interest is the active role of youths in selecting their peers and creating their own social environments (Rutter, 2007). On occasions when youths feel more socially competent than usual, for example, they may also spend more time with their peers and regard themselves more positively than usual (Bukowski et al., 2011; Rubin et al., 2006), creating a spurious within-person association between peer involvement and youth adjustment. Thus, we included youths’ self reports of their social competence as a time-varying control in the analyses. Based on previous research on adult supervision (e.g., Greene & Banerjee, 2009; Osgood et al., 1996; Pettit et al., 1999) and peer group gender composition (e.g., Arndorfer & Stormshak, 2008; Haynie, et al., 2007; Richards et al., 1998), we expected that unsupervised and supervised time with peers, especially with mixed/opposite-sex peers, would be negatively and positively linked to youth adjustment, respectively. We also examined potential gender differences in the implications of peer involvement and tested for interactions between time with peers and youths’ gender, but proposed no specific hypotheses, given that gender differences in peer influences have been documented in some studies (e.g., Haynie et al., 2007; Mrug et al., 2011), but not others (e.g., Arndorfer & Stormshak, 2008; Battin-Pearson et al., 2000; Fergusson et al., 2003; Fuligni et al., 2001).

The Present Study

In sum, this study examined the developmental course and adjustment correlates of time
with peers from middle childhood to late adolescence. Guided by theories of adolescent 
individuation (Rubin et al., 2006) and peer group gender segregation (Maccoby, 1990; Mehta & 
Strough, 2009), we expected that time with mixed/opposite-sex peers would remain stable in 
middle childhood and increase gradually across adolescence, but that time with same-sex peers 
would increase or show a complementary pattern, remaining stable in middle childhood and 
decreasing gradually across adolescence. Moreover, given that peers afford different social 
experiences and learning opportunities in different contexts (Bronfenbrenner & Crouter, 1983), 
we expected that unsupervised time with peers, especially with opposite-sex peers, would have a 
negative influence on youth adjustment, but that supervised time with peers, especially with 
opposite-sex peers, would have a positive influence.

Method

Participants

Data were drawn from the 1st, 2nd, 3rd, 4th, 6th, 7th and 8th years (referred to as Times 1 
through 7 hereafter) of a longitudinal study exploring family relationships and youth 
development. Recruitment letters were sent home from schools to all families with 4th and 5th 
graders within 16 school districts of a northeastern state. Families were eligible if parents were 
married and employed, and the two eldest siblings were in early adolescence or middle 
childhood and were 1-4 years apart in age. Over 90% of families that returned postcards were 
eligible and eventually participated. Attrition was low; at Time 7, 95% of parents and siblings 
still remained in the study. We deleted two families that dropped out after Time 1, and based our 
analyses on the remaining 201 families. At Time 1, the average age was 10.87 years (SD = 0.54; 
range = 9.45-12.59) for firstborns and 8.26 years (SD = 0.93; range = 6.05-10.30) for 
secondborns. Because of the age difference between siblings and multiple waves of data
collection, between 92 and 270 youths provided data at each chronological age from 8 (i.e., ages 7.5-8.5) to 18 (i.e., ages 17.5-18.5) years. Sibling dyads were divided almost equally among the four possible gender compositions. Reflecting the ethnic background of families from the state where the study was conducted (85% White; US Census Bureau, 2000), the sample included almost exclusively European American families living in small cities, towns, and rural communities. Moreover, reflecting the educational (> 80% of adults completed high school) and financial (median income = $55,714 for married-couple families) backgrounds of the targeted population (US Census Bureau, 2000), at Time 1, the average education level was 14.57 years ($SD = 2.15; range = 12-20) for mothers and 14.67 years ($SD = 2.43; range = 10-20) for fathers (where a score of 12 signified a high school graduate), and the median family income was $55,000 ($SD = 28,613; range = 21,000-207,000). The wide ranges of parental education and family income levels, however, indicated that the sample was diverse in socioeconomic status and primarily included working- and middle-class families.

**Procedure**

Data were collected from mothers, fathers, and the two siblings via two methods. First, trained interviewers visited families to conduct annual home interviews. Families gave informed consent and received an honorarium at the beginning of the home interviews, and family members completed standardized questionnaires independently. Second, in the 2 to 3 weeks following the home interviews, trained interviewers called siblings individually to conduct seven (5 weekdays, 2 weekend days) nightly phone interviews. In each of these calls, the sibling was guided through a list of 70 activities (e.g., household tasks, hobbies, sports and outdoor activities) and probed for the duration and social contexts (i.e., with whom the siblings engaged in the activities) of any activities completed outside of regular school hours. We focused on free time
activities, because they are more likely to be reflective of youths’ own preferences with regard to peer companionship (Maccoby, 1990; Larson & Verma, 1999).

Measures

Background information collected in the home interviews with mothers at Time 1 included family members’ age and ethnicity and youths’ gender and birth order.

Youths’ time with peers was measured in the phone interviews at Times 1, 2, 3, 5, and 6. Time with peers was measured by summing the minutes youths reported spending with peers across all activities and across the seven calls. Based on whether an adult (i.e., parents or other individuals who were 21 years or older) and whether an opposite-sex peer (i.e., non-sibling individuals who were younger than 21 years) was involved, time with peers was further divided into unsupervised and supervised time with opposite/mixed-sex versus same-sex peers. Adults were counted as involved by engaging in the activities with the youths, coaching the youths, or simply watching the youths participate in the activities. To assess reliability, we calculated the correlations between the two siblings’ reports of their shared time. The results suggested that, even with no prior training, siblings’ reports were highly correlated (average $r = .72$). To correct for skewness, square root transformations were used in the analyses.

Youths’ problem behaviors were measured in the home interviews at Times 2, 3, 4, 6, and 7 using the 18-item Risky Behavior Scale (Eccles & Barber, 1990). Youths used a 4-point scale to rate how often they had engaged in 18 different problem behaviors, such as drinking, smoking, skipping school, in the past year. Item ratings were summed, and higher scores represented more problem behaviors. Cronbach’s alphas ranged from .85 to .90. To correct for skewness, log transformations were used in the analyses. Because data were not available from the younger siblings at Times 2 and 3, their scores were coded as missing at these time points. As
recommended by Hedeker and Gibbons (1997), however, a pattern-mixture approach was used to test the potential influence of this missing data pattern on the substantive conclusions (detailed below).

Youths’ depressive symptoms were measured in the home interviews at Times 2, 3, 4, 6, and 7 using the 26-item Children’s Depression Inventory (Kovacs, 1985). For each item, youths chose one from among three statements, such as “I am sad once in a while,” “I am sad many times,” or “I am sad all of the time,” that best described themselves. Item ratings were summed, and higher scores represented more depressive symptoms. Cronbach’s alphas ranged from .74 to .88. To correct for skewness, log transformations were used in the analyses.

Youths’ school performance was measured in the home interviews at Times 2, 3, 4, 6, and 7 using the grades in four subject areas (i.e., English, math, science, and social studies) from youths’ most recent report cards. Letter grades were converted into numerical scores (A = 4.0, B = 3.0, C = 2.0, D = 1.0, E = 0). Grade scores were averaged, and higher scores represented better school performance. To correct for skewness, square root transformations were used in the analyses.

Control variables. Youths’ social competence was measured in the home interviews at Times 1, 2, 3, 5, and 6 using the 5-item Peer Competence Subscale from the Self-Perception Profile (Harter, 1988). Youths used a 4-point scale to rate how well statements, such as “some kids find it hard to make friends but other kids find it pretty easy to make friends,” and “some kids have a lot of friends but other kids don’t have very many friends,” described them. Item ratings were summed, and higher scores represented higher social competence. Cronbach’s alphas ranged from .63 to .81.

Mothers’ and fathers’ levels of education were measured in the home interviews at Time
1. As a general index of family socioeconomic status, parents’ educational levels were averaged and included as a time-invariant control in the analyses.

**Results**

**Analysis Plan**

Given the nested (i.e., correlated residual errors) and unbalanced nature (i.e., variable measurement spacing) of our data, we used MLM as the analytic strategy (Raudenbush & Bryk, 2002). A major strength of MLM is that it accommodates missing data and effectively reduces biases in the estimation of parameters and standard errors (Schafer & Graham, 2002), although only about 5% of our data were missing. We estimated a series of 3-level models using the MIXED procedure in SAS 9.0. Level 1 (within-individual) included time-varying variables (i.e., youths’ age, time-varying predictors, and time-varying control); Level 2 (between-individual) included time-invariant variables that differed between siblings (i.e., youths’ gender and birth order, cross-time averages of time-varying predictors); Level 3 (between-family) included one time-invariant variable that was common to both siblings, parents’ educational levels.

We conducted the analyses in two parts. We first examined the developmental course of unsupervised and supervised time with mixed/opposite-sex and same-sex peers from age 8 to 18 and tested whether the trajectories were different for girls and boys. We began by testing the linear and quadratic effects of youths’ age on time with peers. Youths’ age was centered at 13 years (the mean age across all youths and across all time points), such that the intercept estimated the sample mean for youths at age 13. To identify the best error structure, we compared a series of nested models that differed only in the random effects of interest. We used deviance tests (instead of parameter estimates as in the case of fixed effects) to determine the statistical significance of the random effects (Raudenbush & Bryk, 2002). Because the difference
between two nested models in their deviances (i.e., -2 log likelihood) is chi-squared distributed, it indicated whether adding the random variance components constituted a better error structure. Next, we controlled for youths’ birth order and parents’ educational levels, and tested the interactions between the linear and quadratic terms and youths’ gender. The reference groups for birth order and gender were older sibling and girl, respectively. Parents’ education levels were centered at 12 years (i.e., high school graduate).

The second part of the analyses examined the time-lagged, within-person associations between peer involvement and youth adjustment. We began by examining the developmental course of the three indices of youth adjustment. Specifically, we tested the effects of youths’ age on problem behaviors, depressive symptoms, and school performance and the interactions between these polynomial terms and youths’ gender. Next, we controlled for youths’ birth order and parents’ educational levels (as time-invariant controls) and youths’ social competence (as a time-varying control), and tested whether changes in time with peers longitudinally predicted changes in youth adjustment. Because the time variables were measured a year prior to each of the five measurements of the adjustment variables, they were included as lagged, time-varying predictors. To distinguish within- from between-person variation, each of the four time-varying predictors was indicated by two variables: At Level 1, the predictor was indicated by a time-varying, group-mean centered (i.e., centered at each individual’s cross-time average) variable; at Level 2, the predictor was indicated by the grand-mean centered (i.e. centered at the sample mean), cross-time average. Whereas the time-varying variable captured within-person variation and indicated how youths deviated from their own cross-time averages at each time point, the cross-time average captured between-person variation and indicated how youths’ cross-time averages were different from the rest of the sample. Because youths’ social competence was
measured a year prior to each of the five measurements of the adjustment variable, it was included as a lagged, time-varying control. Youths’ social competence, however, was grand-mean centered without including the cross-time average, as we did not intend to distinguish the within- and between-person effects of this factor. Finally, we tested the interactions between time with peers and youths’ gender to explore whether peer involvement had different implications for girls and boys. For all analyses, we only included significant interactions in the final models, because retaining nonsignificant interactions tends to increase the standard errors (Aiken & West, 1991).

**Developmental Course of Time With Peers**

Separate analyses were conducted for unsupervised and supervised time with mixed/opposite-sex and same-sex peers. Parameter coefficients can be found in Table 1.

The analysis of *unsupervised time with mixed/opposite-sex peers* revealed significant linear and quadratic effects of time. A significant main effect of gender and a significant Linear Time × Gender interaction further indicated that, at age 13 (the age at which our time variable was centered), the gender difference in unsupervised time with mixed/opposite-sex peers was significant and the positive linear effect was significantly stronger for girls, $\gamma = 1.37$, $t = 16.26$, $p < .01$, than for boys, $\gamma = 0.68$, $t = 7.94$, $p < .01$. As Figure 1 shows, girls’ unsupervised time with mixed/opposite-sex peers increased steadily beginning at age 8 and continued to increase, though at a faster pace, toward the end of adolescence. On the other hand, boys’ unsupervised time with mixed/opposite-sex peers remained stable from age 8 to about age 10 and then increased. The analysis of *unsupervised time with same-sex peers* also revealed significant linear and quadratic effects of time, but the main and interaction effects involving gender were not significant. As Figure 1 shows, for both girls and boys, unsupervised time with same-sex peers increased from
age 8 to about age 14 and then declined.

Findings were consistent for supervised time with peers: The analysis of *supervised time with mixed/opposite-sex peers* revealed significant linear and quadratic effects of time. A significant Linear Time × Gender interaction indicated that, at age 13, the positive linear effect was significantly stronger for girls, $\gamma = 1.21$, $t = 10.84$, $p < .01$, than for boys, $\gamma = 0.83$, $t = 7.27$, $p < .01$. As Figure 2 shows, girls’ supervised time with mixed/opposite-sex peers increased steadily from about age 9 and continued to increase, though at a faster pace, toward the end of adolescence, but boys’ supervised time with mixed/opposite-sex peers remained stable from age 8 to about age 10 and then increased. The analysis of *supervised time with same-sex peers* also revealed significant linear and quadratic effects of time, although the interaction effects involving gender were not significant. As Figure 2 shows, for both girls and boys, supervised time with same-sex peers increased steadily from age 8 to about age 14 and then declined.

**Adjustment Correlates of Time With Peers**

Separate analyses were conducted for each adjustment variable. Results for the developmental course of problem behaviors (Solmeyer, McHale, & Crouter, 2012), depressive symptoms (Kim, McHale, Crouter, & Osgood, 2007), and school performance (Dotterer, McHale, & Crouter, 2009) were reported elsewhere, and are not discussed here. Instead, we focused on the between- and within-person effects of time with peers on youth adjustment. Parameter coefficients can be found in Table 2.

The analysis of *problem behaviors* revealed significant between-person effects of unsupervised time with mixed/opposite-sex and same-sex peers as well as supervised time with mixed/opposite-sex peers: *On average*, youths who spent more unsupervised time with peers and more supervised time with mixed/opposite-sex peers engaged in more and fewer risky behaviors,
respectively. The within-person effect of unsupervised time with mixed/opposite-sex peers was also significant: On occasions when youths spent more unsupervised time with mixed/opposite-sex peers than usual, youths also engaged in more problem behaviors than usual in the following year. Because data on problem behaviors were not available from the younger siblings at Times 2 and 3, we used a pattern-mixture approach (Hedeker & Gibbons, 1997) to probe whether the missing data pattern had any influences on the substantive conclusions. Specifically, we included the interactions between the between- and within-person terms of the time variables and youths’ birth order to test whether the missing data patterns moderated the effects of these predictors. None of these interactions reached significant, and thus they were all removed from the final model.

The analysis of depressive symptoms revealed a significant between-person effect of supervised time with mixed/opposite-sex peers and a significant within-person effect of unsupervised time with mixed/opposite-sex peers: Youths who spent more supervised time with mixed/opposite-sex peers, on average, reported fewer depressive symptoms, and on occasions when youths spent more unsupervised time with mixed/opposite-sex peers than usual, they also experienced more depressive symptoms than usual in the following year.

The analysis of school performance revealed significant between-person effects of unsupervised time with mixed/opposite-sex and same-sex peers as well as supervised time with mixed/opposite-sex and same-sex peers: On average, youths who spent more unsupervised time and more supervised time with peers had worse and better school performance, respectively. The within-person effect of supervised time with mixed/opposite-sex peers was also significant: On occasions when youths spent more supervised time with mixed/opposite-sex peers than usual, they also had better school performance than usual in the following year.
For each adjustment variable, we also included the interactions between unsupervised and supervised time with peers and youths’ gender to explore whether peer involvement had different implications for girls versus boys. None of these interactions reached significant, and thus they were all removed from the final models.

**Discussion**

Using a 5-wave, longitudinal design, the aims of this study were to chart the developmental course of time with peers from age 8 to 18 and to examine the time-lagged, within-person associations between time with peers and youth adjustment. Our results demonstrated that, although boys’ time with mixed/opposite-sex peers did not change until early adolescence, girls’ time with mixed/opposite-sex peers increased beginning in middle childhood, indicating that peer group gender segregation (Maccoby, 1990; Mehta & Strough, 2009) faded earlier and faster among girls than among boys. For both girls and boys, time with same-sex peers peaked in mid-adolescence and then declined, suggesting that youths also became more engaged with same-sex peers during adolescence (Rubin et al., 2006), although a trade-off seemed to occur eventually between involvement with mixed/opposite-sex versus same-sex peers (Csikszentmihalyi & Larson, 1984). Moreover, controlling for time-varying social competence, changes in unsupervised time with mixed/opposite-sex peers positively predicted changes in youths’ problem behaviors and depressive symptoms by the following year. Interestingly, changes in supervised time with mixed/opposite-sex peers also were positive predictors of changes in youths’ school performance by the following year. Consistent with an ecological perspective (Bronfenbrenner & Crouter, 1983), depending on the social contexts within which peer interactions take place, peers can afford distinct social experiences and learning opportunities, which may adversely (Albert & Steinberg, 2011) or favorably (Bukowski et al.,
2011) affect youth adjustment. Below, we elaborate on each of these themes and their theoretical and applied implications, and then discuss the limitations of our study.

**Developmental Course of Time with Peers**

One widely observed developmental phenomenon is that children avoid cross-sex friendships and even casual encounters with opposite-sex peers (Maccoby, 1990). Particularly in middle childhood and especially for boys, even showing a slight interest in playing with opposite-sex peers is perceived to be inappropriate and is often punished by peer rejection and harassment (Mehta & Strough, 2009). Gender segregation begins to break down in adolescence, when romantic involvement is legitimized and gradually becomes normative (Carver, Joyner, & Udry, 2003). Despite the pervasiveness of peer group gender segregation, only limited evidence exists to show that older adolescents spend more time with opposite-sex peers (Buhrmester & Furman, 1987; Csikszentmihalyi & Larson, 1984) and that cross-sex interactions increase linearly over time (Connolly et al., 2000; Poulin & Pedersen, 2007; Richard et al., 1998).

Our study expanded upon this work by using a MLM analytic framework – which allowed us to incorporate five waves of longitudinal data collected from two different-age siblings in the same model and cover the years from middle childhood to late adolescence – to test for possible curvilinear change patterns. Instead of the most commonly used questionnaires, we also used a daily diary approach – which has been shown to be less susceptible to memory and report biases (Larson & Verma, 1999) – to measure youth time use. Our results indicated that time with mixed/opposite-sex peers was best characterized by a quadratic pattern of change. However, although girls’ involvement with mixed/opposite-sex peers showed a positive linear increase well in middle childhood, boys’ involvement with mixed/opposite-sex peers did not change until early adolescence. This is not structurally impossible, because adolescent girls tend
to have opposite-sex friends who are older than them (Poulin & Pedersen, 2007). This is not completely surprising either, given that boys often face stronger social pressure to be gender typical (Mehta & Strough, 2009) and that, when compared at the same age, girls are often socioemotionally more advanced than boys (Rose & Rudolph, 2006). Nevertheless, the finding that girls began to spend increasingly more unsupervised time with opposite-sex peers starting at age 8 suggested that, at least among girls, peer group gender segregation may not be as rigid as some researchers have proposed (Maccoby, 1990). Considering the positive links between unsupervised time with mixed/opposite-sex peers and youths’ problem behaviors and depressive symptoms, girls’ comparatively high levels of and rapid increases in unsupervised peer time across adolescence have important implications for parents and practitioners. Strategies that promote adult involvement, including direct participation in and supervision and monitoring of, youth activities may constitute an important focus of parent education, prevention programs, and school policies.

Consistent with the idea that adolescents are motivated to gain independence from their families and develop more egalitarian relationships with their peers (Buhrmester & Furman, 1987; Richards et al., 1998; Rubin et al., 2006), time with same-sex peers also increased from middle childhood to mid-adolescence. This increasing trend reversed at about age 14, however, suggesting that time with mixed-sex peer groups and with opposite-sex peers may come at the cost of time with same-sex peers (Csikszentmihalyi & Larson, 1984). A trade-off interpretation seems particularly plausible, given that about 50% of a representative sample of youths in the US reported having had a “special romantic relationship” by age 15 (Carver et al., 2003) and that adolescent dating often follows a progression from same-sex friendships to mixed-sex group activities and then to dyadic romantic relationships (Connolly, Craig, Goldberg, & Pepler, 2004).
On a more general level, these findings highlight the importance of conducting research over a sufficient length of time to capture curvilinear changes in youth development: Had we only collected data in early adolescence, for example, only the increasing trend in time with same-sex peers would have been apparent and we would have missed the subsequent decline that appeared to mark the emerging importance and potentially competing nature of involvement with mixed/opposite-sex peers later in adolescence.

**Adjustment Correlates of Time With Peers**

A number of studies have shown that unsupervised peer involvement is conducive to delinquency and substance use (e.g., Greene & Banerjee, 2009; Pettit et al., 1999). Affiliations with deviant peers also have been found to contribute to emotional distress and academic declines (e.g., Fergusson et al., 2003; Fuligni et al., 2001). On the other hand, much evidence indicates that structured activities, which by definition involve some direction and guidance from an adult, can facilitate positive outcomes (Eccles et al., 2003; Mahoney et al., 2005). Reflecting these more typically studied individual differences, our findings showed that, on average, youths who spent more unsupervised time with peers exhibited more deviant behaviors and had worse school grades and those who spent more supervised time with peers reported fewer behavioral and emotional problems and performed better in school.

The unique contribution of our study, however, lies in the discovery that, even controlling for youths’ time-varying social competence, on occasions when youths spent more unsupervised time with their peers than usual, they engaged in more problem behaviors and experienced more depressive symptoms than usual in the following year, and that on occasions when youths spent more supervised time with their peers than usual, they showed better school performance than usual in the following year. These within-person associations represent an extension of prior
work, because they focused on time-lagged relations and excluded multiple alternative explanations. As Cook and Campbell (1979) argued, inferences about a causal relation require that researchers document a statistically significant covariance between the two variables of interest, demonstrate that the presumed cause temporally precedes the presumed outcome, and eliminate other reasonable explanations of the covariance. Without the use of a randomized experimental design, it would not be possible to rule out every alternative explanation of our results. However, by considering the possible influences of stable individual differences (i.e., focusing on within-person variation; Curran & Bauer, 2011), youths’ active roles in selecting their peers (i.e., controlling for time-varying social competence; Rutter, 2007), and common method biases (i.e., using different methods to measure youth time use and adjustment), our study provided for much stronger inferences about the influence of peer involvement on youth adjustment. From the perspectives of parents and program providers, the continuing presence of adults in youth activities is an important factor to consider. This is not to say youths require relentless coaching and instruction; developing autonomy has long been known to be a crucial developmental task during adolescence (Rubin et al., 2006). The strategy to increase adult involvement in youth activities should be chosen judiciously: Adults who know how and when to be present without being intrusive, for example, may be selected as key players in promoting youth adjustment in the context of peer activities.

Our study also adds to the literature by illustrating the role of peer group gender composition in understanding peer interactions and their implications. Consistent with earlier reports that youths with more opposite-sex friends engage in more rule breaking behaviors (Arndorfer & Stormshak, 2008; Haynie et al., 2007; Mrug et al., 2011), our results suggested that changes in time with mixed/opposite-sex (but not same-sex) peers predicted changes in youth
adjustment. One possible explanation for such findings is that, compared to same-sex peer
groups, mixed-sex peer groups have more transitive ties and thus provide lower levels of social
control for their members (Kreager et al., 2010). During the early years of gender segregation,
girls and boys tend to have distinct experiences with their same-sex peers and develop different
styles of interaction (Maccoby, 1990). Not surprisingly, initial cross-sex interactions can be
volatile and difficult to understand for some adolescents (Mehta & Strough, 2009). Programs
designed to educate youths about how gender-typical interaction styles may affect cross-sex
relationships (Fabes, Hanish, & Martin, 2010) have the potential to strengthen the cohesiveness
and thus internal monitoring and control of mixed-sex peer groups.

Another possible explanation is that, when interacting with opposite-sex than with same-
sex peers, adolescents feel more aroused and attentive (Richards et al., 1998) and are more
susceptible to peer influences (Domjan, 2010). This explanation is supported by our findings
that, depending upon whether or not an adult was present, involvement with mixed/opposite-sex
peers was predictive of both positive and negative outcomes. Because little prior research is
available for comparison, our results should be treated as hypothesis generating. Further
validation work is needed to test whether involvement with mixed/opposite-sex peers is more
powerful than involvement with same-sex peers in affecting other positive (e.g., self-esteem,
prosocial behaviors) and negative (e.g., risky sexual behaviors, hostility and aggression) aspects
of youth adjustment. More generally, our findings point to the importance of contextualizing the
study of youth development: Like many other developmental processes (Bronfenbrenner &
Crouter, 1983), the impact of peer involvement is not uniform, but dependent on multiple
dimensions of the embedding social context, such as the presence of an adult and the presence of
opposite-sex peers. A new direction for research in this area is to move beyond a focus on a
particular companion (e.g., an adult) or group of companions (e.g., peers) to examine more closely the composition of the social context within which youth activities take place.

We found few gender differences with regard to the developmental significance of peer companionship. This should not be interpreted, however, to mean that the same social influence processes are operative among girls and boys. Unsupervised time with mixed/opposite-sex peers, for example, may increase girls’ problem behaviors by exposing them to a more deviant (e.g., that of older male friends) norm (Haynie et al., 2007; Poulin & Pedersen, 2007) and increase boys’ problem behaviors by motivating them toward hypermasculine behaviors in an effort to attract girls’ interest (Arndorfer & Stormshak, 2008). More research is needed to explore different mechanisms that link peer involvement to youth adjustment.

Limitations and a Final Note

Our study is not without limitations. First, although our sample reflected some population characteristics of married-couple families from the state where the study was conducted (US Census Bureau, 2000), it was ethnically homogeneous and was not representative of the diversity of youths in the US. Given that how youths spend their time varies greatly across cultures (Larson & Verma, 1999), our findings need to be replicated in more diverse samples. Second, many of our hypotheses were derived under the assumption that the respondents were heterosexual and were romantically attracted to opposite-sex peers. Because patterns of peer group gender segregation (Mehta & Strough, 2009) and sexual/emotional excitability (LeVay, 2011) differ for sexual minority versus heterosexual youths, future researchers should explore how sexual minority youths’ experiences with opposite- and same-sex peers change over time and how these experiences may affect their adjustment. Third, our time use measure did not tap into the structural dimensions of youth activities. Although activity structure and social context
are conceptually distinct, in practice they are often confounded (Eccles et al., 2003; Mahoney & Stattin, 2000). Future studies should include more fine-grained measures of youth activities, such as the extent to which they are routinized, whether they provide opportunities to develop skills and evaluate performance, and the degree and quality of adult supervision and guidance, in order to separate the effects of social context from activity structure. Finally, despite the methodological and statistical strengths of our study, definitive conclusions about causal relations cannot be made based on correlational data (Cook & Campbell, 1979). Experimental or intervention studies that use randomized designs to, for example, manipulate adult supervision and peer group gender composition are required to disentangle the causal paths underlying the associations documented here. In the face of these limitations, our study’s use of multiple-wave, phone diary data and lagged, time-varying predictors and efforts to exclude multiple alternative explanations provide new insights about the developmental course and adjustment correlates of peer involvement. On an applied level, our findings also highlight the vulnerability of youths, especially girls, during adolescence and the importance of engaging adults in promoting youth adjustment in the context of peer activities.
References


Potential trade-offs for the emotional and behavioral development of girls and boys.


*Psychological Methods, 7*, 147-177. doi: 10.1037/1082-989X.7.2.147


Table 3.1.

Parameter Coefficients (γ) and t-Ratios for Multi-Level Models of Unsupervised and Supervised Time With Mixed- or Opposite-Sex and Same-Sex Peers

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>Unsupervised time</th>
<th>Supervised time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MOS peers</td>
<td>SS peers</td>
</tr>
<tr>
<td>Intercept</td>
<td>8.34</td>
<td>17.94**</td>
</tr>
<tr>
<td>Linear effect</td>
<td>1.37</td>
<td>16.26**</td>
</tr>
<tr>
<td>Quadratic effect</td>
<td>0.09</td>
<td>5.76**</td>
</tr>
<tr>
<td>Gender</td>
<td>-2.72</td>
<td>-6.98**</td>
</tr>
<tr>
<td>Linear x Gender</td>
<td>-0.69</td>
<td>-6.49**</td>
</tr>
<tr>
<td>Birth order</td>
<td>0.74</td>
<td>2.12*</td>
</tr>
<tr>
<td>Parental education</td>
<td>-0.11</td>
<td>-1.08</td>
</tr>
</tbody>
</table>

Note. MOS = mixed- or opposite-sex; SS = same-sex.

*p < .05; **p < .01.
Table 3.2.

Parameter Coefficients ($\gamma$) and t-Ratios for Multi-Level Models of Problem Behaviors, Depressive Symptoms, and School Performance

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>Problem behaviors</th>
<th></th>
<th>Depression</th>
<th></th>
<th>School grades</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\gamma$</td>
<td>t-ratio</td>
<td>$\gamma$</td>
<td>t-ratio</td>
<td>$\gamma$</td>
<td>t-ratio</td>
</tr>
<tr>
<td><strong>Age effects, gender, and interaction terms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>3.076</td>
<td>193.62**</td>
<td>0.890</td>
<td>16.55**</td>
<td>3.306</td>
<td>81.31**</td>
</tr>
<tr>
<td>Linear effect</td>
<td>0.049</td>
<td>13.24**</td>
<td>0.084</td>
<td>5.63**</td>
<td>-0.077</td>
<td>-9.51**</td>
</tr>
<tr>
<td>Quadratic effect</td>
<td>-</td>
<td>-</td>
<td>0.004</td>
<td>1.70</td>
<td>0.002</td>
<td>1.25</td>
</tr>
<tr>
<td>Cubic effect</td>
<td>-</td>
<td>-</td>
<td>-0.002</td>
<td>-3.51**</td>
<td>0.002</td>
<td>3.30**</td>
</tr>
<tr>
<td>Gender</td>
<td>0.086</td>
<td>5.88**</td>
<td>-0.200</td>
<td>-3.89**</td>
<td>-0.133</td>
<td>-3.88**</td>
</tr>
<tr>
<td>Linear x Gender</td>
<td>-0.012</td>
<td>-2.45**</td>
<td>-0.098</td>
<td>-4.71**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Quadratic x Gender</td>
<td>-</td>
<td>-</td>
<td>-0.005</td>
<td>-1.20</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cubic x Gender</td>
<td>-</td>
<td>-</td>
<td>0.003</td>
<td>2.84**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Time with peers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP unsupervised MOSPT</td>
<td>0.009</td>
<td>4.69**</td>
<td>0.003</td>
<td>0.51</td>
<td>-0.010</td>
<td>-2.30*</td>
</tr>
<tr>
<td>WP unsupervised MOSPT</td>
<td>0.002</td>
<td>2.98**</td>
<td>0.008</td>
<td>3.24**</td>
<td>0.002</td>
<td>1.34</td>
</tr>
<tr>
<td>BP unsupervised SSPT</td>
<td>0.003</td>
<td>2.05*</td>
<td>0.000</td>
<td>0.03</td>
<td>-0.017</td>
<td>-4.29**</td>
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<tr>
<td>WP unsupervised SSPT</td>
<td>0.001</td>
<td>1.14</td>
<td>0.002</td>
<td>1.06</td>
<td>-0.001</td>
<td>-0.48</td>
</tr>
<tr>
<td>BP supervised MOSPT</td>
<td>-0.003</td>
<td>-2.11*</td>
<td>-0.011</td>
<td>-2.19*</td>
<td>0.016</td>
<td>4.24**</td>
</tr>
<tr>
<td>WP supervised MOSPT</td>
<td>-0.000</td>
<td>-0.26</td>
<td>0.002</td>
<td>0.85</td>
<td>0.003</td>
<td>2.19*</td>
</tr>
<tr>
<td>BP supervised SSPT</td>
<td>0.000</td>
<td>0.28</td>
<td>-0.007</td>
<td>-1.51</td>
<td>0.008</td>
<td>2.34*</td>
</tr>
<tr>
<td>WP supervised SSPT</td>
<td>-0.001</td>
<td>-1.73</td>
<td>-0.002</td>
<td>-0.77</td>
<td>0.001</td>
<td>0.73</td>
</tr>
</tbody>
</table>
Table 3.2.

*Parameter Coefficients (γ) and t-Ratios for Multi-Level Models of Problem Behaviors, Depressive Symptoms, and School Performance (Cont’d)*

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>Problem behaviors</th>
<th>Depressive Symptoms</th>
<th>School grades</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>γ</td>
<td>t-ratio</td>
<td>γ</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth order</td>
<td>0.013</td>
<td>0.98</td>
<td>-0.008</td>
</tr>
<tr>
<td>Parental education</td>
<td>-0.010</td>
<td>-2.51*</td>
<td>-0.032</td>
</tr>
<tr>
<td>Social competence</td>
<td>-0.001</td>
<td>-0.49</td>
<td>-0.032</td>
</tr>
</tbody>
</table>

Note. BP = between-person; WP = within-person; MOSPT = mixed- or opposite-sex peer time; SSPT = same-sex peer time.

*p < .05; **p < .01.*
**Figure 3.1.** Developmental course of unsupervised time with mixed- or opposite-sex (MOS) and same-sex (SS) peers
Figure 3.2. Developmental course of supervised time with mixed- or opposite-sex (MOS) and same-sex (SS) peers
CHAPTER 4

Developmental Patterns and Family Correlates of Youth Leisure-Time Physical Activity
Abstract

Objective: This study examined how leisure-time physical activity (LTPA) changed from middle childhood through adolescence and whether within-person variation in the proportions of father- and mother-youth joint involvement in LTPA was linked to within-person variation in youths’ overall involvement in LTPA. Methods: Participants were fathers, mothers, and the two eldest siblings from 201 White, working- and middle-class families. On 5 occasions across 7 years, the duration and social context of youths’ LTPA were measured using multiple nightly phone interviews. Parent and youth characteristics that were hypothetically linked to youths’ LTPA, including interest in physical activity, were measured using questionnaires. Results: Multilevel models revealed that youth LTPA followed a quadratic pattern of change, increasing during middle childhood and then declining across adolescence, and that the decline in adolescent LTPA was more pronounced for girls than for boys. Moreover, controlling for youths’ time-varying interest in physical activity, when fathers and mothers spent proportionally more time on sports and outdoor activities with youths than usual, youths also spent more total time on these activities than usual. Conclusions: Findings highlight the importance of maintaining youths’, especially girls’, physical activity levels across adolescence and targeting both fathers’ and mothers’ behavioral involvement in interventions to promote youth physical activity.

Keywords: adolescence; longitudinal changes; parental involvement; physical activity; within-person variation
Developmental Patterns and Family Correlates of Youth Leisure-Time Physical Activity

The benefits of physical activity are well-documented. Children and adolescents who are more involved in sports and outdoor activities are physically healthier (Warburton, Nicol, & Bredin, 2006) and psychologically better adjusted (Ströhle, 2009). To promote youth physical activity requires understanding of how it changes over time and what social and individual factors may explain these changes. However, previous studies exploring the pattern of change in physical activity have mostly relied on questionnaires, and their results may be subject to memory and response biases (Kohl, Fulton, & Caspersen, 2000). Moreover, prior work examining parental influences on youth physical activity has mostly focused on between-person differences and neglected important alternative explanations, such as selection factors and child effects (Rutter, 2007), and is limited in the ability to draw causal inferences. Using multiple-wave, phone diary data collected from two siblings from each family, testing paternal and maternal involvement as time-varying covariates, and including youths’ interest in physical activity as a time-varying control, this study was designed to examine how leisure-time physical activity (LTPA) changed from middle childhood through adolescence and whether within-person variation in the proportions of father- and mother-youth joint involvement in LTPA was linked to within-person variation in youths’ overall involvement in LTPA.

Developmental Patterns

Dumith, Gigante, Domingues, and Kohl (2011) conducted a pooled analysis of 26 studies on longitudinal changes in physical activity across adolescence (ages 10-19), and found that it declined linearly over time. A consistent gender difference in the rate of change was not evident, however, possibly due to the use of different measures across studies. Indeed, most of these 26 studies used questionnaires to measure physical activity, and methodological research has shown
that, compared to objective physiological sensors and daily diary measures, questionnaires are particularly susceptible to memory distortion (Ferrari, Friedenreich, & Matthews, 2007) and social desirability biases (Adams et al., 2005). Interestingly, the results of the small number of longitudinal studies that used physiological sensors or daily diaries to capture changes in adolescent physical activity were mixed, with some indicating that physical activity did not change over time (Garcia, Pender, Antonakos, & Donis, 1998; Morgan, Graser, & Pangrazi, 2008), some suggesting that physical activity declined for both boys and girls (Nader, Bradley, Houtss, MacRitchie, & O’Brien, 2008; Pate et al., 2009), and some documenting a decline for boys, but not for girls (Raustorp, Svenson, & Perlinger, 2007). Fewer studies have used non-questionnaire methods to examine changes in physical activity across middle childhood (ages 5-10), and their findings are equally inconclusive. There is evidence, for example, that physical activity remains stable over time (Telford, Cunningham, & Telford, 2009), that physical activity decreases for both boys and girls (Basterfield et al., 2011; Cleland et al., 2008), and that physical activity increases for boys, but not for girls (Janz et al., 2009). Despite these inconsistent findings, theories of youth time use (Hofferth & Curtin, 2005; Larson & Verma, 1999) argue that active leisure should follow a curvilinear pattern of change, increasing during middle childhood (when play is often thought to be the “work” of youths) and then decreasing across adolescence (when youths spend increasingly more time socializing with peers). Gender theories further predict that, because sport is stereotypically masculine, girls’ declines in LTPA may reflect the intensified social pressure for youths to conform to traditional gender roles during adolescence (Galambos, Berenbaum, McHale, 2009; Slater & Tiggemann, 2010).

The first aim of this study was to examine the pattern of change in LTPA using five waves of longitudinal data collected via multiple nightly phone interviews. We focused on
LTPA, because in industrialized countries, such as the US, where manual labor and self-powered transportation are minimal and sedentary activities are common (Brownson, Boehmer, & Luke, 2005), voluntary involvement in sports and outdoor activities represents a ripe target for interventions. Based on theory (e.g., Larson & Verma, 1999; Galambos et al., 2009) and some prior findings (Dumith et al., 2011; Janz et al., 2009; Telford et al., 2009), we expected that LTPA would increase or remain relatively stable during middle childhood and then decline across adolescence and that changes in LTPA would be more pronounced for girls than for boys.

**Family Correlates**

Parents have been theorized to influence youth physical activity through role modeling, direct instruction and encouragement, and provision of informational, material, and emotional support (Fredricks & Eccles, 2005; Taylor, Baranowski, & Sallis, 1994). Studies in support of this view have amassed (Edwardson & Gorely, 2010; Pugliese & Tinsley, 2007), and their findings indicate that parents’, especially fathers’ (Edwardson & Gorely, 2010), involvement in physical activity and socialization efforts are linked to their offspring’s involvement in physical activity. Nearly all of these studies, however, have focused on between-person associations, which can be easily confounded with stable characteristics or selection factors that are not controlled for in the analyses. A focus on within-person variation extends prior research, because it examines whether changes in parental influences are linked to changes in youths’ physical activity. By treating each individual as his or her own control, within-person associations help to eliminate stable, third variables as alternative explanations and provide for stronger inferences (Curran & Bauer, 2011). It is important to note, however, that within-person variation may still be affected by other time-varying factors. At times when youths feel more interested in sports and outdoor activities than usual, for example, they may participate in more of these activities
and motivate their parents to become more involved in these activities than usual.

The second aim of this study was to examine the within-person associations between the proportions of father- and mother-youth joint involvement in LTPA and youths’ overall involvement in LTPA, controlling for parents’ general and youths’ time-varying interest in physical activity. We focused on the behavioral aspect of parental involvement, because identifying putative contextual causes, especially those that are concretely defined and malleable, constitutes an important step in developing effective interventions to promote physical activity (Brug, Oenema, & Ferreira, 2005). On the basis on theory (Fredricks & Eccles, 2005; Taylor et al., 1994) and previous findings (Edwardson & Gorely, 2010; Pugliese & Tinsley, 2007), we expected that the proportion of parent-youth joint involvement in LTPA would be positively linked to youths’ overall involvement in LTPA.

Method

Participants

Data were drawn from the 1st, 2nd, 3rd, 6th, and 7th years (referred to as Times 1 through 5 hereafter) of a longitudinal study exploring youth development and family relationships. Recruitment letters were sent home from schools to all families with 4th and 5th grade children within 16 school districts of a northeastern state. Families were eligible if parents were married and employed, and the two eldest siblings were in early adolescence or middle childhood and were 1-4 years apart in age. The number of families that met our criteria but failed to volunteer was not known, but over 90% of families who contacted our office were eligible and eventually participated. Data collection began in 1995/1996. Two families that dropped out after Time 1 were deleted, and the current analyses were based on the remaining 201 families. Attrition was notably low; at Time 5, 95% of parents and siblings still remained in the study.
At Time 1, the average age was 10.87 years ($SD = 0.54$; range = 9.45-12.59) for
firstborns and 8.26 years ($SD = 0.93$; range=6.05-10.30) for secondborns. Because of the age
difference between siblings and multiple waves of data collection, between 40 and 270 youths
provided data at each chronological age from 7 (i.e., ages 6.5-7.5) to 18 (i.e., ages 17.5-18.5)
years. Sibling dyads were divided almost equally among the four possible gender compositions.
Reflecting the ethnic background of families from the state where the study was conducted (85%
White; US Census Bureau, 2000), the sample included almost exclusively European American
families living in small cities, towns, and rural communities. Moreover, reflecting the
educational (> 80% of adults completed high school) and financial (median income = $55,714
for married-couple families) backgrounds of the targeted population (US Census Bureau, 2000),
at Time 1, the average education level was 14.57 years ($SD = 2.15$; range = 12-20) for mothers
and 14.67 years ($SD = 2.43$; range = 10-20) for fathers (where a score of 12 signified a high
school graduate), and the median family income was $55,000 ($SD = 28,613$; range = 21,000-
207,000). The wide ranges of parental education and family income levels, however, indicated
that the sample was diverse in socioeconomic status and primarily included working- and
middle-class families. This study was approved by the university’s Institutional Review Board.

**Procedure and Measures**

Data were collected from mothers, fathers, and the two siblings via two methods. First,
trained interviewers visited families to conduct annual home interviews. Families gave informed
consent and received an honorarium at the beginning of the home interviews, and family
members completed standardized questionnaires independently. Second, in the 2 to 3 weeks
following the home interviews, trained interviewers called siblings individually to conduct seven
(5 weekdays, 2 weekend days) nightly phone interviews. The sibling was guided through a list of
70 activities (e.g., household tasks, hobbies, sports and outdoor activities) and probed for the duration and social contexts (i.e., with whom the sibling engaged in the activities) of any activities completed outside of school.

**Measures**

Background information collected in the home interviews with parents at Time 1 included family members’ ages and ethnic backgrounds and parents’ levels of education.

*Interest in physical activity* was measured in the home interviews with parents at Time 1 and with youths at Times 1 through 5. Parents and youths used a 4-point scale to rate their interest in seven sports and outdoor activities, including sports, water activities, gymnastics, dancing, hiking and camping, biking and skating, and hunting and fishing. Items were summed, and higher scores indicated higher interest. Stability coefficients averaged $r = .54$ for firstborns and $r = .49$ for secondborns.

*Youths’ height and weight* were reported by mothers at Times 2 through 4. Based on the body mass index percentiles issued by Centers for Disease Control and Prevention (2000), youths’ height and weight were converted into binary, age and gender specific variables that indicated whether they were overweight. Stability coefficients averaged $r = .60$ for firstborns and $r = .33$ for secondborns. A general binary index was created to indicate whether youths were overweight at any of the three time point.

*Youths’ physical health* was measured in the home interviews with mothers at Times 2 through 4. Mothers used a 5-point scale to rate their firstborn and secondborn children’s physical health. Stability coefficients averaged $r = .46$ for both firstborns and secondborns. A general health index was created by averaging the ratings across the three time points, and higher scores indicated better health.
Youths' LTPA was measured in the phone interviews at Times 1 through 5. Youths reported how much time (in minutes) they spent on eight sports and outdoor activities, including sports, water activities, gymnastics, dancing, hiking and camping, biking and skating, hunting and fishing, and outdoor play. LTPA was measured as the total duration of time across the seven phone interviews. To correct for skewness, square-root transformations were used in the analyses. Stability coefficients averaged \( r = .38 \) for firstborns and \( r = .40 \) for secondborns. The proportions of father- and mother-youth joint involvement were calculated by dividing the duration of time youths spent on sports and outdoor activities with their fathers and with their mothers, respectively, by the total duration of time youths spent on these activities. Parents were counted as involved by engaging in the activities with their children, coaching their children, or simply watching their children participate in the activities. The average proportions of paternal and maternal involvement were .17 and .13, respectively, for firstborns; the average proportions of paternal and maternal involvement were .20 and .18, respectively, for secondborns.

**Results**

**Analytic Strategy**

Given the nested (i.e., youths from the same family were repeatedly assessed) and unbalanced (i.e., the assessments were unevenly spaced) nature of the data, we used multilevel modeling as the analytic strategy (Raudenbush & Bryk, 2002). A major strength of multilevel modeling is that it accommodates missing data and effectively reduces biases in the estimation of parameters and standard errors (Schafer & Graham, 2002), although only about 5% of our data were missing. A series of three-level models was estimated using the MIXED procedure in SAS Version 9.1. At Level 1 (within-individual), we included time-varying variables. We used youths’ ages as the metric of time, and included the polynomial (i.e., linear, quadratic) terms to
describe the development of LTPA. Youths’ ages were centered at age 13 (the approximate mean age across siblings and across time points). We also included the time-varying covariates (i.e., the proportions of mother- and father-youth joint involvement in LTPA) and the time-varying control (i.e., youths’ interest in physical activity) at this level. To separate within- from between-person variations, each time-varying covariate was indicated by two variables: At Level 1, the covariate was indicated by a time-varying, group-mean centered (i.e., centered at each sibling’s cross-time average) variable; at Level 2 (between-individual), the covariate was indicated by the grand-mean centered (i.e. centered at the sample mean), cross-time average. Because the cross-time average of the covariate captured all the between-person variation, the Level 1 version of the covariate was limited to explaining within-person variation beyond stable individual differences. The time-varying control was grand-mean centered without including the cross-time average, however, as we did not intend to distinguish the within- versus between-person effects of this factor. At Level 2, we also included other time-invariant variables that were different for the two siblings, including youths’ gender, birth order, overweight status, and physical health. The reference groups for gender, birth order, and overweight status were boys, firstborns, and non-overweight youths, respectively. Physical health was grand-mean centered. Level 3 (between-family) included time-invariant variables that were the same for the two siblings, including grand-mean centered, fathers’ and mothers’ physical activity interest. An index of socioeconomic status was created by averaging fathers’ and mothers’ levels of education at Time 1. Parental education was centered at 12 years (i.e., high school graduate).

To address our two aims, we conducted the analyses in three steps: First, we tested a general change model (Model 1) to examine the overall pattern of change in LTPA from middle childhood to late adolescence. To identify the best error structure, we compared a series of
nested models that differed only in the random effect of interest (Raudenbush & Bryk, 2002). Because the difference between two nested models in their deviances (i.e., -2 log likelihood) was chi-squared distributed, it indicated whether adding a particular random variance component constituted a significantly better error structure. Second, we tested a gender-specific change model (Model 2) to examine whether, controlling for parental education and youths’ birth order, overweight status, and physical health, the pattern of change in LTPA varied by youths’ gender. Third, we tested a parental influence model (Model 3) to examine whether, controlling for fathers’ and mothers’ general interest and youths’ time-varying interest in physical activity, within-person variation in the proportions of father- and mother-youth joint involvement in LTPA was linked to within-person variation in youths’ overall involvement in LTPA.

**Multilevel Models**

The deviance tests revealed that the best error structure included random intercepts at Levels 2 and 3 and random linear and quadratic slopes at Level 3. Coefficients for fixed effects can be found in Table 1. Model 1 revealed a significant quadratic effect of time. Overall, LTPA increased steadily from age 8 to about age 12 and then declined. Model 2 revealed a significant main effect for gender, indicating that, at age 13 (the age at which the time variable was centered), the difference in LTPA between boys and girls was significant. A significant Linear Time × Gender interaction further indicated that, at age 13, the negative linear effect was stronger for girls, \( \gamma = -0.67, t = -6.34, p < .01 \), than for boys, \( \gamma = -0.37, t = -3.39, p < .01 \). As Figure 1 shows, boys in general participated in more LTPA than girls, and girls’ declines in LTPA occurred one year earlier in adolescence and were more pronounced than boys’. The interaction between Quadratic Time × Gender was not significant and was removed from the model, because retaining nonsignificant interactions increases standard errors (Aiken & West,
Model 3 revealed a significant between-person effect of father-youth joint involvement, indicating that youths whose fathers spent proportionally more time on sports and outdoor activities with them, on average, spent more total time on these activities. Significant within-person effects of father- and mother-youth joint involvement further indicated that, on occasions when fathers and mothers spent proportionally more time on sports and outdoor activities with youths than usual (i.e., compared to the cross-time averages), youths also spent more total time on these activities than usual.

Discussion

Developmental Patterns

Our study showed that LTPA followed a quadratic pattern of change, increasing during middle childhood and then declining across adolescence, and that the decline in adolescent LTPA was more pronounced for girls than for boys. These findings, though consistent with theories of youth time use (Hofferth & Curtin, 2005; Larson & Verma, 1999) and gender development (Galambos et al., 2009; Slater & Tiggemann, 2010), both support (Dumith et al., 2011; Janz et al., 2009; Telford et al., 2009) and contrast with (Basterfield et al., 2011; Cleland et al., 2008; Garcia et al., 1998; Morgan et al., 2008) those of previous studies. Due to differences in sample sizes, measures of physical activity, and data analytic strategies (especially how developmental time was operationalized), direct comparisons between these and our studies are difficult. Long-term, longitudinal investigations that use both physiological sensors and daily diaries to measure youth physical activity are needed to reconcile these and our findings. Nevertheless, given the benefits of physical activity (Ströhle, 2009; Warburton et al., 2006), interventions designed to maintain adolescents’ earlier levels of physical activity should be given a high priority. In adolescence, many of youths’ activities move toward specialization and
require increasingly more expertise, as “tryouts” and other forms of screening by adult
gatekeepers set limits on who can be involved (Hofferth & Curtin, 2005). At the same time, a
growing orientation to peer relationships may mean that youths will become less inclined to
spend time on activities that do not include their circle of friends (Larson & Verma, 1999).
Programs that involve the peer group in more informal, social kinds of activities (e.g., coed
softball, dances) may help to maintain youths’ earlier levels of physical activity across
adolescence (Jago, 2011). Given girls’ more pronounced declines in LTPA, such efforts are
especially important for them. It is worth noting that youths’ overweight status and physical
health were controlled for in the analyses, and thus the observed patterns of change were unlikely
to be medically justified. Moreover, gender differences in the level of and rate of change in
LTPA remained significant when youths’ time-varying interest in physical activity was included
in the model, suggesting that these differences were not solely attributable to adolescent girls
being less interested in physical activity over time. An important direction for future research is
to examine how gender-related factors, such as social pressure to conform to traditional gender
roles and fear of appearing “masculine” (Galambos et al., 2009; Slater & Tiggemann, 2010), may
limit the opportunities of adolescent girls to participate in LTPA.

Family Correlates

Consistent with theory (Fredricks & Eccles, 2005; Taylor et al., 1994) and prior research
(Edwardson & Gorely, 2010; Pugliese & Tinsley, 2007), our findings showed that youths with
fathers who spent proportionally more time on sports and outdoor activities with them, on
average, spent more total time on these activities. The unique contribution of our study, however,
lies in its focus on within-person variation: Controlling for stable individual differences and
youths’ time-varying interest in physical activity, on occasions when fathers and mothers spent
proportionally more time on sports and outdoor activities with youths than usual, youths also spent more total time on these activities than usual. By considering multiple alternative explanations, including stable selection factors and child effects, we were able to make stronger inferences about the relations between parent-youth joint involvement and youth LTPA (Rutter, 2007). By distinguishing within- from between-person variations, we also avoided misattributing an aggregate relation to the level of the individual and reduced the risk of the ecological fallacy (Curran & Bauer, 2011).

A body of longitudinal work has shown that paternal, but not maternal, characteristics are linked to youth physical activity (Edwardson & Gorely, 2010), lending support to a common belief that fathers drive the active leisure of other family members. In fact, in partial support of this view, our analyses revealed that fathers’, but not mothers’, interest in physical activity was associated with youths’ overall involvement in LTPA. However, our results on parents’ behaviors also indicated that, beyond parental interest and paternal involvement, maternal involvement explained unique variance in youth LTPA. Although youth involvement in physical activity is likely to be dependent on multiple social and individual factors, strategies that encourage fathers’ and mothers’ behavioral involvement, such as participating in sports and outdoor activities with their children, coaching their children in sport, or just watching their children play and practice, may constitute an important focus of interventions.

Limitations and Conclusion

This study is not without limitations. First, although our sample reflected some population characteristics of married-couple families from the state where the study was conducted (US Census Bureau, 2000), it was ethnically homogeneous and not representative of all youths in the US. Given that youths’ time use patterns vary across cultures (Larson & Verma,
1999), our findings need to be replicated in more diverse samples. Second, our last wave of data collection took place in 2002/2003. Although Nelson, Neumark-Stzainer, Hannan, Sirard, and, Story (2006) found no indication of a secular trend for the development of physical activity from 1999 to 2004 in two independent cohorts of adolescents, historical and longitudinal changes in youth physical activity await further investigations using more recently collected data. Third, our use of time-varying covariates and inclusion of multiple controls allowed us to examine relatively non-confounded associations (Curran & Bauer, 2011), and yet definitive conclusions about causal relations cannot be made based on correlational data. Experimental interventions that manipulate parent-youth joint involvement are needed to disentangle the underlying causal paths. Finally, daily diary measures are sufficiently sensitive to detect the duration and social contexts, but not the intensities, of physical activity (Kohl et al., 2000). Considering that physical activity of different intensities may have different developmental patterns (Dumith et al., 2011) and correlates (Edwardson & Gorely, 2010), future researchers should combine both accelerometers or heart-rate monitors and daily diaries to capture the temporal, contextual, and intensity dimensions of youth physical activity. Despite these limitations, our study’s use of multiple-wave, phone diary data from two different-age siblings from each family and focus on the behavioral aspect of parental involvement provide new insights about the developmental patterns and family correlates of LTPA. On an applied level, our findings also highlight the importance of maintaining earlier levels of physical activity during adolescence, particularly for girls, and targeting both fathers and mothers in interventions to promote youth physical activity.
References


opportunity to reflect on intervention design and key research gaps. *International Journal of Epidemiology, 40*, 699-700. doi: 10.1093/ije/dyr034


Table 4.1.

**Coefficients (γ) and t-Ratios for Multilevel Models of Leisure-Time Physical Activity**

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<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
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<tr>
<td></td>
<td>γ</td>
<td>t-ratio</td>
<td>γ</td>
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<tr>
<td>Intercept</td>
<td>17.67</td>
<td>44.18**</td>
<td>19.95</td>
</tr>
<tr>
<td>Linear time</td>
<td>-0.48</td>
<td>-5.64**</td>
<td>-0.37</td>
</tr>
<tr>
<td>Quadratic time</td>
<td>-0.17</td>
<td>-8.56**</td>
<td>-0.16</td>
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<tr>
<td>Gender (0 = boys)</td>
<td>-2.82</td>
<td>-5.87**</td>
<td>-2.63</td>
</tr>
<tr>
<td>Linear time × Gender</td>
<td>-0.30</td>
<td>-2.37*</td>
<td>-0.35</td>
</tr>
<tr>
<td>Parental education</td>
<td>-0.11</td>
<td>-0.61</td>
<td>-0.00</td>
</tr>
<tr>
<td>Birth order (0 = firstborns)</td>
<td>-0.93</td>
<td>-2.36*</td>
<td>-0.62</td>
</tr>
<tr>
<td>Overweight status (0 = non-overweight)</td>
<td>-0.56</td>
<td>-1.03</td>
<td>-0.31</td>
</tr>
<tr>
<td>Physical health</td>
<td>0.95</td>
<td>1.92</td>
<td>1.23</td>
</tr>
<tr>
<td>BP father-youth joint involvement</td>
<td></td>
<td></td>
<td>6.96</td>
</tr>
<tr>
<td>WP father-youth joint involvement</td>
<td></td>
<td></td>
<td>2.69</td>
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<tr>
<td>BP mother-youth joint involvement</td>
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<td>-0.17</td>
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Table 4.1.

Coefficients ($\gamma$) and $t$-Ratios for Multilevel Models of Leisure-Time Physical Activity (Cont’d)

<table>
<thead>
<tr>
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<td>$t$-ratio</td>
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<td>$t$-ratio</td>
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<td>WP mother-youth joint involvement</td>
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<td>5.41**</td>
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<td>Fathers’ interest in physical activity</td>
<td>0.32</td>
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<td>3.62**</td>
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<td>Mothers’ interest in physical activity</td>
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<td>Youths’ interest in physical activity</td>
<td>0.39</td>
<td></td>
<td>6.82**</td>
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Abbreviations: BP, between-person; WP, within-person.

Parent-youth joint involvement: Proportional scores calculated by dividing the duration of time youths spent on LTPA with their parents by the total duration time youths spent on LTPA.

*p < .05; **p < .01.
Figure 4.1. Predicted (solid lines) and observed (dotted lines) means of leisure-time physical activity by gender. Predicted curves controlled for parental education and youths’ birth order, overweight status, and physical health.
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