EFFECTS OF PUBERTY AND PARENTING ON ADOLESCENT PSYCHOSOCIAL
MATURITY AND RISKY BEHAVIOR

Adrianne Gilbert Pettiford

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Approved by:

Martha J. Cox

Margaret Burchinal

Deborah Jones

Beth Kurtz-Costes

Antonio Morgan-Lopez

Lilly Shanahan

ABSTRACT

Adrianne Gilbert Pettiford: Effects of Puberty and Parenting on Adolescent Psychosocial
Maturity and Risky Behavior
(Under the direction of Martha J. Cox)

This doctoral dissertation examines how pubertal onset and maternal sensitivity and

responsiveness (MSR) affect psychosocial maturity (PSM) and risky behavior in late

adolescence for male and female youth. Analyses were conducted on a subsample (N = 730) of

Black, Hispanic, and White youth from the National Institute of Child Health and Human

Development Study of Early Child Care and Youth Development (NICHD SECCYD), an 18-

year study of the implications of early child care experiences and youth development. Using

structural equation modeling (SEM), this dissertation addresses several research questions: 1.

Does MSR predict adolescent PSM and risk-taking?; 2. Does pubertal onset predict PSM and

risk-taking?; 3. Does pubertal timing moderate the effects of MSR on PSM and risky behavior?;

4. Are the pathways linking MSR, puberty, PSM and risk-taking moderated by adolescent sex?

For all youth, results are consistent with the notion that higher early adolescent MSR and

increases across adolescence predicts higher PSM and lower sexual risk-taking, but not non-

sexual risk-taking. Consistent with past literature, early pubertal onset was associated with higher

non-sexual and sexual risk-taking, but not PSM. However, the present data show PSM is

associated with lower sexual and non-sexual risk-taking. Results from a two-group SEM provide

evidence in support of sex moderation. Specifically, higher grade 5 MSR predicted lower non-

sexual risk-taking among girls, but not boys. Additionally, higher grade 5 MSR predicted lower

non-sexual risk-taking among female, but not male youth. Pubertal onset was not predictive of

PSM, but was predictive of non-sexual risk-taking in boys and sexual risk-taking in girls. Male youth but not female youth were differentially susceptible to MSR across pubertal onset. Specifically, males with later pubertal onset had the lowest PSM with low MSR and the highest PSM with high MSR. However, males with earlier pubertal onset were less sensitive to the effects of MSR. Taken together, these data suggest that the nuanced pathways linking pubertal onset and maternal sensitivity and responsiveness to adolescent psychosocial maturity and risky behavior are moderated by adolescent sex. Nevertheless, psychosocial maturity remains important in protecting against risky behavior across male and female youth.

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INTRODUCTION

Adolescence is characterized by extensive change across numerous domains of functioning and gives rise to heightened vulnerability to developmental contexts. A majority of research on adolescent development focuses on maladaptive outcomes like risky behavior and underemphasizes sources of adolescent resilience and protection. Psychosocial maturity (PSM) is one important source of resilience that is positively associated with adolescent and young adult adjustment including positive peer relationships, academic achievement, and emotional well-being. It is important to examine how psychosocial maturity develops and whether it protects against increased adolescent risk-taking. Theory highlighting the importance of individual-context fit during adolescence points to pubertal timing and parenting as two sources of individual variability in adolescent psychosocial maturity development and risk-taking. The literature has consistently linked early pubertal timing, especially among female youth, to increased negative outcomes and risk-taking, whereas parent-child relationship quality has consistently been positively associated with adaptive outcomes including PSM. Understanding how puberty and parenting affect PSM is of great importance for the design and delivery of interventions, especially for youth at risk for engaging in risky behavior, academic underachievement, and delinquency. However, the specific pathways through which parenting and puberty jointly affect PSM and risk-taking remain unclear. It may be that children who show early pubertal development have the potential for the best and worst outcomes from a Differential Susceptibility Theory (DST) perspective. However empirical tests of this hypothesis are absent from the literature. Early pubertal timing in the context of a supportive environment

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may be protective whereas in the least supportive environments early pubertal timing may lead to low psychosocial maturity and high risk-taking. Furthermore, this may differ across adolescent sex. Therefore, this dissertation will address this gap in the literature by testing a model examining whether pubertal timing confers susceptibility to parenting during adolescence.

Adolescent Psychosocial Maturity

Psychosocial maturity is a multidimensional construct generally encapsulating broad domains of functioning universally required for successful adaptation in society. These domains include self-sufficiency, interpersonal skills, and social engagement (E. Greenberger & Sørensen, 1974). Given these domains, psychosocial maturity necessarily encompasses psychological, sociological, and to some extent biological aspects of development. The self-sufficiency domain includes achieving autonomy, the establishment of a mature work orientation, and a clear sense of identity (Greenberger, 1984). Autonomy includes the ability to make decisions independently, having a sense of control or agency, and taking personal initiative to take action when necessary (Greenberger, 1984). Work orientation refers to skills necessary to perform tasks, task persistence, and enjoying work. Identity clarity refers to having an understanding of one's goals and values as well as positive sense of self. The interpersonal domain includes communication skills and awareness of and adherence to social norms and goals, expectations for behavior, and social roles. The social engagement domain includes a sense of community, tolerance of cultural and individual differences, and openness to social change. A more recent conceptualization of psychosocial maturity, provided by Inkeles and Leiderman (1998), offers a slightly different set of capacities that in some ways overlap with previous conceptions. In their conceptualization, Inkeles and Leiderman advanced six characteristics as being central to psychosocial maturity: responsibility, cooperation, planfulness, individualism, efficacy, and perseverance.

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Individualism, efficacy, and responsibility in this framework, can be likened to a clear sense of identity, autonomy, and initiative as described by Greenberger (1984). Cooperation is consistent with aspects of interpersonal adequacy (e.g., adherence to social norms) in Greenberger's model (1984; 1975). Taken together, maturity in these domains supports the individual's ability to function independently as an adult, adaptively engage in and contribute to social interactions and maintain social relationships, and contribute to society in meaningful ways that are supportive of maintaining and improving existing social systems. These conceptualizations of psychosocial maturity are presented as universal and applicable across diverse societies. In other words, the requirements of becoming a mature, active participant in adult society are consistent across cultures and societies.

Psychosocial maturity may be indicative of the repertoire of responses individuals bring to the table in the face of novel experiences during these transitions. Psychosocial maturity can be viewed as a toolbox which adolescents can draw from in the face of novelty. The construct of psychosocial maturity represents those nonacademic capacities required for success as an individual member of society. These capacities have been organized under the construct of psychosocial maturity guided by theory and have been conceptualized as developmental in nature. This construct adds to our understanding of adolescent development by contributing above and beyond constructs like well-being in that it encompasses the universal set of characteristics and capabilities that are important for functioning as an individual, in a social context, and in support of society. Given these conceptualizations, psychosocial maturity has implications for understanding the transition into and through adolescence but also beyond adolescence into adulthood. For the purpose of this study, the latent construct of PSM will

comprise personal responsibility, self-reliance, work orientation, identity, impulse control, future outlook orientation, and resistance to peer influence.

Adolescent Risk Behaviors

In adolescence prevalence rates for numerous poor adjustment outcomes exceed that of any prior developmental stage, including aggressive behavior, increased internalizing symptoms, psychopathology, and especially risky behavior (Dahl, 2004). Risk behaviors have been articulated from numerous perspectives, including epidemiological and psychosocial frameworks, with the differences lying in the outcomes of interest. Epidemiological risk behavior research tends to focus on health and survival, whereas psychosocial research focuses on general well-being and social interaction. Therefore, adolescent risk behavior refers broadly to the behaviors youth engage in that are associated with increased morbidity and mortality and psychosocial risk that may undermine successful adolescent development and social adjustment (Jessor, 1991). These include both behaviors that are associated with thrill-seeking, where the risks are known (e.g., doing something dangerous on a dare), as well as those behaviors where risk is less known to youth (e.g., early coitus). Among the most common adolescent risk behavior research there is a focus on alcohol and drug use, violence, non-violent delinquency, property damage, and sexual contact (e.g., Kotchick, Shaffer, Miller, & Forehand, 2001; Lynne-Landsman, Graber, & Andrews, 2010; Repetti, Taylor, & Seeman, 2002). Other literature has also highlighted the importance of risk-taking from a cognitive perspective (Steinberg, 2007). This research tends to focus on the importance of the neural mechanisms underlying risk versus reward processing among youth. Though important for understanding cognitive processes underlying risk tendency, the nature of this work provides little information about the actual risk

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behaviors in which youth engage. Thus, the present study will operationalize risk behavior as adolescent experiences with alcohol, drugs, violence, delinquency, and sex.

The Importance of Psychosocial Maturity and Risk-Taking

Setting youth on a positive path as early as possible provides the most benefit across the lifespan, given the cascading effects of early positive development (Lewin-Bizan, Bowers, & Lerner, 2010). However, in instances in which intervention must be provided, it is important to understand specifically where intervention efforts must be focused. Having a clear understanding of an adolescent's psychosocial maturity level can provide information about what sorts of support might be needed in the face of developmental transitions. For example, with the understanding that an adolescent is less mature with regard to decision-making during the period in which peers become more salient, parents and other adults can provide additional support, both cognitive (e.g., joint decision making) and structural (e.g., increased supervision), to help minimize negative consequences of poor decision-making while engaging in behaviors that facilitate the development of independent decision-making. Therefore the usefulness of the construct lies in its ability to inform areas of immaturity going into a developmental transition. In the context of understanding adolescent risk-taking from a social neuroscience perspective, Steinberg (2007) has conceptualized psychosocial maturity as comprising impulse control, future orientation, and resistance to peer influence. This is one example of how the concept of psychosocial maturity can be helpful in thinking about development, especially during adolescence. Specifically, Steinberg (2007) suggested that the development of psychosocial maturity may be linked to decreased risky behavior seen during adolescence. These along with the other implications of psychosocial maturity suggest that it may be particularly relevant in understanding, predicting, and facilitating positive adjustment among youth.

However, the field has historically focused on pathology and poor outcomes at the expense of studying positive youth development. Consequently, there is still little longitudinal work examining the typical developmental patterns of PSM in adolescence. The few longitudinal studies published focus primarily on college students and juvenile offenders, include PSM as a predictor of longitudinal outcomes rather than examining it as a developmental process, or focus on one aspect of psychosocial functioning (e.g., Colwell et al., 2005; Steinberg, Blatt-Eisengart, & Cauffman, 2006). For example, findings from an accelerated cohort study among male juvenile offenders indicate increases in temperance (i.e., impulse control), but not other dimensions of PSM, were characteristic of youth with decreasing antisocial behavior from 14 to 22 years (Monahan, Steinberg, Cauffman, & Mulvey, 2009). Given the importance of PSM for positive adjustment, several researchers have attempted to identify factors that facilitate PSM development in adolescence. Indeed, there are several theories that inform our understanding of adolescent psychosocial maturity and risky behavior.

Theoretical Framework

Across the transition to adolescence individuals experience normative developmental changes in a number of domains including the parent-child relationship, peer relationships, school, and for some youth, work (Eccles, 1999; Zarrett & Eccles, 2006). Developmental systems theories are particularly informative about the transition to adolescence given their emphasis on multiple domains of functioning and levels in ecological systems and how they are related to each other (Sameroff, 2010). Ecological systems theory stresses the importance of varying levels of contextual spheres of influence on human development (Bronfenbrenner, 1977). According to ecological systems theory, individuals are influenced not only by the contexts in which development occurs but also by the interactions among various contexts

(Bronfenbrenner, 1977). In extending the ecological systems theory the bioecological model posits that in addition to context, development can be understood also as a function of ongoing interactions among the environment and biopsychological processes, including pubertal development (Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Evans, 2000).

Dynamic systems approaches not only allow investigation of the interrelations between systems across various levels, but necessitate that interactions among levels are as important for development as is the unique influence of each level. Additionally, dynamic systems approach acknowledges the importance of the interconnectedness between organism and environment and how this relation changes over time. Accordingly, the stage-environment fit theory suggests that optimal development occurs when the demands of a developmental context are consistent with the competencies and capacities possessed by the individual given their developmental stage. Whenever there is a mismatch between the individual's environment and their developmental stage, outcomes are less than optimal. More recently, the stage environment fit model has been expanded to encompass the family as an important developmental domain. For example, Gutman and Eccles (2007) found support for the stage-environment fit theory indicating that parental practices (specifically autonomy granting) that fit with adolescent developmental maturity yields better adolescent mental health among American youth. However, some youth may be more or less sensitive to context fit or misfit.

Differential susceptibility theory (DST) addresses this potential variability in sensitivity to context. DST stipulates children vary in their susceptibility to deleterious and advantageous effects of the environment (Belsky, Bakermans-Kranenburg, & van Ijzendoorn, 2007). Differential susceptibility suggests that adolescents prone to the negative effects of pubertal timing are more negatively affected by risks and more positively affected by supports. Both

theory and research point to ways that individual child characteristics contribute to whether pubertal timing gives rise to supportive or unsupportive social environments (e.g., relationships with parents) for particular adolescents. DST argues that the effects of context, such as parenting, on development may moderate the effects of individual traits, including pubertal timing such that some youth respond more negatively to early puberty, whereas others may be largely unaffected or do better (Blakemore, Burnett, & Dahl, 2010). For example, in another study conducted with data drawn from the NICHD SECCYD, trajectories of one aspect of PSM, social competence, early or late maturation had an accentuation effect such that more socially competent youth became more competent and less socially competent youth showed declining competence across the transition to middle school and through puberty (Monahan & Steinberg, 2011). Thus, some youth may be more sensitive to some influences than others and at different periods in development (Obradović, Bush, & Boyce, 2011). This notion of differential susceptibility has yet to be demonstrated with regard to longitudinal influences of pubertal timing on PSM. Further, these patterns of effects may differ across age such that pubertal timing and parenting may not be consistently correlated with PSM within individuals (Obradović, Bush, Stamperdahl, Adler, & Boyce, 2010). Differential susceptibility to the putative effects of early or late pubertal timing has yet to be assessed with regard to the predictors of PSM across adolescence. This study will address this gap in the literature by examining the interactions between pubertal development and parenting across adolescence to determine whether asynchronous puberty confers additional sensitivity to the parenting context during adolescence.

Adolescence as a critical period. A critical period can be defined as a time span characterized by heightened sensitivity to the interactions between the individual and external influences that are necessary for the accomplishment of particular developmental capacities, therefore

adolescence can accurately be described as a critical period in development, especially with regard to heightened sensitivity to correlates of psychosocial maturity and risk-taking. The literature is rife with examples of how events occurring during adolescence may lay the ground work for the emergence of developmental capacities responsible for subsequent lasting outcomes, especially those with a life course (e.g., Johnson, Crosnoe, & Elder, 2011) or developmental cascades perspective (e.g., Cox, Mills-Koonce, Propper, & Gariepy, 2010). The concept of a critical period does help us in framing questions regarding the transition to adolescence especially in considering the fit or misfit between the demands facing youth and their developmental readiness to handle them. Several scholars have used this concept to make sense of adolescent development and resilience in the face of heightened risk-taking.

Steinberg (2008) presents a neuroscience perspective to adolescent risk-taking that explains the discrepancy between the maturation of the socioemotional network (limbic and paralimbic brain areas) and the cognitive control network (lateral prefrontal lobe), as underlying the rise in risk-taking during adolescence. In particular, he suggests that the rapid maturation of the socioemotional network gives rise to an increased sensitivity to social interactions, especially peer influence and immediate rewards, while the cognitive control network develops more slowly leaving youth with less ability to counter the socioemotional temptations with logic and sound decision making. Further, the evidence on extensive adolescent synaptic pruning and connectivity in regions of the brain responsible for decision making supports this explanation for adolescent sensitivity. Similarly, Spear (2000b; 2000a) provides ample evidence of the neurological changes in the brain, including changes to the dopaminergic system, which occur during adolescence and are associated with particular risk behaviors including alcohol and drug use.

Additionally, literature on activational and organizational effects of hormones on the adolescent brain suggests their effects on moods and behavior are unlike their effects during other periods of development and further create vulnerabilities to particularly salient stimuli (e.g., social interactions, drug-use) and are implicated in several experience-expectant developmental processes including peer interactions (Buchanan, Eccles, & Becker, 1992). Exposure to drugs and alcohol may be particularly problematic because the organization of serotonergic and dopaminergic systems at adolescence may both increase the risk of alcohol and drug dependence and influence the maturation of neurotransmitter systems in ways that affect attitudes, social rewards, and stress responses (Spear, 2000a). Consistent with a "for better and for worse" characterization of differential susceptibility, the same cognitive mechanisms underlying the increased risk for affective disorders, risk-taking, and injury that accompany adolescence may also confer benefits and create opportunities for experiences to support the emergence of adaptive functionality including psychosocial maturity.

Despite increased change associated with the transitions into adolescence and into early adulthood, most individuals seem to navigate these transitions quite well. Certainly there are many factors that contribute to successful adjustment during these transitions, psychosocial maturity may be particularly critical in providing important individual resources for youth during these transitions. Adolescence is marked by changes in relationships with parents, peers, as well as broader social contexts. Indeed, adolescence may be defined as the period in which one transitions from having child-like dependencies to having adult responsibilities and capacities. This is the case across multiple domains including peer relationships, a sense of self and agency, reproductive maturity, civic duty, and economic responsibility. Changes in these domains occur simultaneously or at least in close temporal proximity, causing these transitions to be filled with

an unprecedented amount of novelty with regard to expectations required for positive adjustment.

Pubertal Development and Adolescent Adjustment

Pubertal development is the maturational process leading up to sexual maturity. It is at the end of this process that individuals achieve the ability to sexually reproduce. Pubertal development occurs in two overlapping stages: adrenarche and gonadarche. The onset and progression of pubertal development varies across sex and race/ethnicity, however, among typically developing youth (i.e., youth free from adrenal, hypothalamic, gonadal, or other hormonal disorders) the underlying biological process is consistent.

Andrenarche is the first stage of puberty that occurs between six and nine years of age in girls and between seven and ten years in boys, with some differences across race and ethnicity. Andrenarche involves the increase of relatively weak (in comparison to testosterone) adrenal androgens including dehydroepiandrosterone (DHEA); while testosterone and estradiol may be present, during this phase of puberty changes in secondary sexual characteristics are not evident (Dorn, Dahl, Woodward, & Biro, 2006). The second and most commonly researched and referenced phase of puberty, gonadarche, involves the development of primary and secondary sexual characteristics. Primary sexual characteristics are those directly related to sexual reproduction (e.g., ovaries, testes). Secondary sexual characteristics include breast development, pubic hair, and genital development. The initiation of gonadarche begins with the pulsatile release of gonadotropin releasing hormone (GnRH) from the hypothalamus and subsequently pulsatile release of gonadotropins luteinizing hormone (LH) and follicle stimulating hormone (FSH) from the pituitary, which gives rise to the release of gonadal hormones (testosterone, estradiol, and progesterone). It is these gonadal hormones that initiate the development of

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primary and secondary sexual characteristics. Androgens (i.e., testosterone) are implicated in the development of testes, the deepening of the male voice, facial hair in males, as well as pubic hair in both males and females (however, the source of androgens is largely adrenal for females and gonadal for males). Testosterone is primarily implicated in male pubertal maturation, whereas estradiol is implicated in female pubertal maturation. These hormones are responsible for initiating pubertal maturation, signaling to the body that it will soon be time for reproductive functionality. At this point, the subsequent processes diverge substantially for males and females. Nevertheless, the general progression for both include several changes: a) increased gonadal sexual hormone production; b) the development of secondary sexual characteristics (e.g., pubarche or pubic hair growth); c) endomorphic changes (e.g., growth spurt); d) skin changes; e) change in functionality of sexual organs (e.g., production and release of spermatozoa among males, and ovulation and menstruation among females). The process for males and females are discussed separately below.

Among female youth, gonadarche begins between nine and ten years of age and begins with pubarche, the growth of pubic hair, followed by or concurrent with thelarche, breast budding (Herman-Giddens, 2006). Among girls in the US, there are race differences in the timing of pubarche, thelarche, and menarche. Specifically, African American girls, on average begin each stage of pubertal development earliest among American youth, and European American girls are last, and their Mexican American counterparts between them (Herman-Giddens & Slora, 1997; Rosenfield, Lipton, & Drum, 2009).

Among male youth, the earliest sign of pubertal development based on secondary sexual characteristics is genital growth, followed by pubic hair development (Herman-Giddens, 2006). Like female youth, African American males develop earlier than their European American

counterparts, with Mexican American youth in between (Herman-Giddens, 2006; Rosenfield et al., 2009). In comparison to girls, boys experience pubarche more than a year later (Rosenfield et al., 2009) and achieve the final stage of pubertal development behind their female counterparts, with European American boys reaching the final stage just before 16 and African American boys about 5 months earlier (Herman-Giddens, 2006).

Beyond physical change, puberty has been characterized as a period of reorganization for many domains of development including cognitive and neural mechanisms underlying social behavior (Blakemore et al., 2010; Steinberg, 2005). With the onset of puberty, youth face both biophysiological changes and their social and behavioral ramifications, including the development of psychosocial maturity (Cota-Robles, Neiss, & Rowe, 2002). However, research has primarily focused on uncovering the many negative implications of pubertal timing, including risky sexual behavior, drug use, and antisocial behavior. For example, studies among adolescent girls have demonstrated associations between early pubertal timing and earlier sexual debut, lower self-esteem, and poorer body image (e.g., Halpern, Kaestle, & Hallfors, 2007; Haynie, 2003). Among male adolescents, the pattern of findings is less consistent, indicating both risks (e.g., aggressive behavior) and benefits (e.g., social status) of early puberty [e.g., popularity (Graber, 2013)]. Furthermore, the direction and strength of effects of pubertal timing may not be consistent across age. For example, Obradović and Hipwell found that early pubertal development among female adolescents at age 10 predicted increased concurrent as well as increasing trajectories of internalizing behavior from 12 years to 13 years, whereas at age 13 later pubertal development predicted increased concurrent internalizing behavior (2010). However, this study only focused on female adolescents. Few longitudinal studies examine the differential effects of pubertal timing at different ages in male and female adolescents.

Furthermore, research has only more recently begun to examine the relation between pubertal

development and positive aspects of youth development such as psychosocial maturity. For

example, in a longitudinal investigation of social competence, one aspect of psychosocial

maturity, Monahan and Steinberg (2011) found that early pubertal maturation was associated

with positive outcomes among male youth. However, among female youth with lower initial

levels of social competence, early puberty was associated with negative mental health outcomes

(Monahan & Steinberg, 2011). Yet, no research has examined this relation broadly in PSM or

investigated differential susceptibility to pubertal timing. More work is needed to understand

mediating proximal processes operating to yield differing outcomes. Several mechanisms have

been suggested as pathways through which puberty is thought to influence adolescent

psychosocial adjustment. For example, a large body of research supports the notion that parent-

child relationships constitute an important developmental context for exploration (Barber, Stolz,

Olsen, Collins, & Burchinal, 2005).

Effects of puberty on parenting. Parent-child relationship quality is not unaffected by

normative developmental changes characteristic of adolescence; indeed, the literature is rife with

evidence of normative changes in parent-child relationship quality throughout adolescence

(Laursen & Collins, 1994; Laursen, DeLay, & Adams, 2010). Marked changes in critical aspects

of parent-child relationships occurring during adolescence include increases in conflict, distance,

and negativity, particularly across the pubertal transition (Granic, Hollenstein, Dishion, &

Patterson, 2003). Findings suggest declining positive characteristics of the parent-child

relationship, such as a decrease in closeness, warmth, and positive identification, beginning in

early adolescence followed by stabilization and slight increases in late adolescence (Gutman &

Eccles, 2007; Steinberg & Morris, 2001). Thus, longitudinal characterization of the bi-directional

relation between adolescent pubertal maturation and parenting may be of particular importance in predicting PSM development and risk-taking. Thus, the present study will investigate how pubertal maturation influences parenting during adolescence.

Effects of parenting on puberty. Individual differences in pubertal maturation are not only influenced by genetic factors, but also aspects of developmental contexts, particularly the early family environment and parenting (Manuck, Craig, Flory, Halder, & Ferrell, 2011). Previous research has shown that multiple aspects of the parent-child relationship, including parental control and parent-child conflict predict earlier pubertal timing (Moffitt & Belsky, 1992). However, the magnitude of the effects may be moderated by sex; Steinberg (1988) found that advanced pubertal maturation predicted poorer parent-child relationships among male and female, youth, the reverse finding that parenting influenced pubertal timing was only supported among female adolescents. More recent studies support the sex-differentiated effects of parenting on adolescent pubertal development and highlight that girls may be particularly sensitive to parental influences (N. B. Ellis, 1991). In addition to parenting influencing pubertal timing, parenting may also shape the implications of pubertal timing. More specifically, parenting may moderate the effects of asynchronous pubertal timing such that some early maturing youth may be protected from increases in risky behavior associated with early maturation (Boyce & Ellis, 2005). Therefore the present study seeks to examine how early parenting may influence the onset of pubertal maturation and how pubertal maturation may shape later parenting during adolescence.

Parenting to Promote Psychosocial Maturity and Positive Outcomes

Parenting is one of the most investigated predictors of PSM. Indeed, a large body of research supports the notion that parenting constitutes an important developmental context for

exploration (for a review see Barber et al., 2005). In general, parenting can be thought of as the nexus of several concepts: parents' aims for socializing their child, specific parenting practices, and the attitudes parents express toward their children (Darling & Steinberg, 1993). That is, parenting includes both the quality of the parent-child relationship (e.g., responsiveness, affect, and attachment) and specific parenting behaviors (e.g., monitoring, autonomy granting, and control). Three common components are represented in various models of parenting. These components are affect, control, and autonomy support (Skinner, Johnson, & Snyder, 2005). Affect includes warmth, acceptance, nurturance, involvement, and how parents deal with their child's emotional states. Traditionally, these parenting components have been conceptualized using bipolar scales. The polar opposite (as indicated on bipolar scales of affect) of warmth includes rejection and hostility. Control can be thought of as limit setting and rule enforcement, as opposed to chaos, lax control, and inconsistency. Autonomy support includes facilitation of adolescent development of appropriate self-reliance and independent functioning through exchanges in which the adolescent's views are solicited and considered, whereas the opposite, coercion, is characterized by parental intrusion, overcontrol, and the demand for total obedience. These same three core components are seen in other relevant models of relationship quality including parent-child attachment. For example, Cox and Harter have argued that the quality of the parent-child relationship (e.g., closeness, warmth, conflict, and hostility) may be of critical importance for adjustment outcomes (2003). Their assertion is consistent with the research discussed by Rohner and colleagues regarding the cross-cultural importance of parental acceptance, warmth, and sensitivity in predicting positive development (2005). Indeed, a recent cross-cultural meta-analysis further substantiates assertions that parental warmth and affection

are positively related to child psychosocial adjustment including independence, self-adequacy, and emotional stability (Khaleque, 2013).

The most popular conceptualization of the parent-child relationship focuses on the outcome of the relationship, attachment. Attachment styles, which characterize the attachment relationship as a function of the quality of parent's affect, consistency (i.e., control), and intrusiveness. According to biological conceptualizations of attachment, the need for attachment and behaviors used to accomplish it are innate and present due to their survival value (Bowlby, 1958). The nature of parent-child relationship hinges on the behaviors and interactions occurring within that relationship across many interactions (Bretherton & Munholland, 2008). The parental behaviors associated with the most adaptive attachment outcomes (i.e., secure attachment) include sensitivity and responsiveness (Ainsworth, 1979) and are of particular interest among parenting style researchers.

Several models of parenting style have been articulated with sensitivity and responsiveness at their core. Baumrind's model (1971) is most widely accepted and arguably serves as a foundation for the majority of modern studies of parenting style. Nevertheless, Baumrind's as well as more recent articulations converge on the importance of parental warmth and responsiveness (Arim, Shapka, Dahinten, & Olson, 2011; Darling & Steinberg, 1993). Studies generally indicate authoritative parenting is associated with positive adolescent outcomes including PSM and social competence (Diana Baumrind, 1991; Lamborn, Mounts, Steinberg, & Dornbusch, 1991; McKinney & Renk, 2011; Steinberg et al., 2006; Steinberg, Lamborn, Darling, Mounts, & Dornbusch, 1994). Authoritative parenting is thought to facilitate psychosocial maturation by increasing adolescent receptivity to parental socialization via involvement; supporting developing social skills through parent-child conversations; and supporting the

development of self-regulatory skills through appropriate levels of parental control and support for autonomy (Steinberg, 2001).

Premature adolescent behavioral autonomy has been associated with risky behaviors, poorer academic performance, and increased susceptibility to peer pressure (Steinberg & Silverberg, 1986). However, adolescents who perceive their parents are overly controlling report poorer parent-adolescent relationship quality (Reindl, Reinders, & Gniewosz, 2013). Therefore ideal parenting with a high goodness-of-fit involves diminishing control and increasing autonomy granting as the child matures and develops increasing cognitive and self-regulatory capacities. Finding the appropriate balance may be challenging because it requires parents to attend to a number of their child's characteristics and behaviors, some of which may be poor indicators of adolescent psychosocial maturity. One highly salient marker of maturity is physical development; however, pubertal development may be a particularly poor marker of adolescent psychosocial maturity, especially among early or late maturing youth. These processes may be bidirectional as parents may modify their parenting practices in accordance to their child's behaviors, competencies, and physical maturation. Such a scenario could include a parent relinquishing control and granting more autonomy to their adolescent with regards to making decisions about how to spend time with friends when that adolescent has demonstrated the ability to behave responsibly when unsupervised or under minimal supervision. Because, not all parents are equally equipped to engage with their adolescent in the most adaptive ways, it is important to understand the characteristics of parents and features of parent-child relationships that are most beneficial.

Just as researchers interested in temperament have argued for a goodness of fit (e.g., Thomas & Chess) between the child's temperament and environment, goodness of fit is also

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important when matching adolescent characteristics to parenting, which is viewed as a specific developmental context (Darling & Steinberg, 1993). Therefore, it is also important to understand how parenting may change as a function of the developing child's pubertal status. Further, not all parents are equally equipped to make appropriate parenting adjustments in response to the developmental changes in adolescence (Kerr, Stattin, & Özdemir, 2012). Baumrind and Ainsworth highlighted responsiveness as an important component of parenting to consider (e.g., 1979; 1966). Indeed, responsiveness is important when observing specific interactions between parent and child at any given moment, but also longitudinally. That is, parents must be responsive to the developing competencies of their child and adjust their parenting accordingly. It is this interactive relationship between parent and child that has increasingly become the interest of parenting researchers (Kerr & Stattin, 2003). For example, Kochanska and Kim (2012) found evidence that individual child characteristics (temperament/negative emotionality) predict subsequent parenting behaviors, but differentially across parent-child relationship quality. They also found relationship quality to moderate the association between parenting behaviors and later child behavioral outcomes, reflecting the additional importance of sensitivity and warmth. Findings suggest declining positive characteristics of the parent-child relationship, including closeness, warmth, and positive identification, beginning in early adolescence followed by stabilization and slight increases in late adolescence (Gutman & Eccles, 2007; Steinberg & Morris, 2001). Therefore, there is evidence that parenting does change over adolescence and given the moderating role of parenting, it is important to investigate the fit or misfit of parenting at different points in adolescence and whether some youth are more or less sensitive to parenting with regard to predicting psychosocial maturity and risky behavior.

Previous research points to authoritative parenting as predictive of adaptive parental flexibility, particularly due to sensitive responsiveness. Parents with higher responsiveness and sensitivity are expected to better adapt their parenting behaviors across development and appropriately modulate control of and autonomy granted to their adolescent child. For example, among parent-child dyads with more flexibility with regard to communication and conflict resolution, parent reported support for autonomy increased across adolescence, which is consistent with the notion that flexible parents are better suited to engage in parenting practices facilitative of adolescent adjustment (Van der Giessen, Branje, Frijns, & Meeus, 2013). Additionally, Kerr and colleagues found that neglectful or authoritative parenting styles were more likely to change as a function of adolescent adjustment than adolescent adjustment was to change as a function of authoritative or neglectful parenting style (Kerr et al., 2012). In other words, adolescent adjustment seems to guide subsequent parenting styles more so than parenting style guides subsequent adolescent adjustment. This finding is consistent with the high level of responsiveness among authoritative parents and the moderate to high level of responsiveness typical of neglectful parents. Thus, authoritative parents are better equipped to make changes in response the developmental changes in adolescence because they are particularly responsive and adaptable to their child's needs. However, the field has yet to explore how parents' reactions to their adolescent's pubertal maturation shape subsequent psychosocial maturity and risk-taking.

Change in parenting in response to a child's pubertal timing has yet to be assessed with regard to the predictors of PSM and risky behavior across adolescence. The specific pathways through which parenting and puberty affect PSM also remain unclear. Pubertal timing and parenting may interact to affect PSM. Therefore, this dissertation addresses this gap in the

literature by testing a moderation model where pubertal timing is expected to interact with parenting during adolescence to predict PSM and risky behavior.

Summary

As discussed above, adolescence is marked by change across numerous developmental domains, which can place some youth at risk during transitions. Specifically, puberty is a critical transition, the timing of which may be associated with maladaptive outcomes. However, interventions can be designed for and target youth and parents with the greatest need. The present research is critical for identifying at-risk youth for the purpose of intervention. However, interventions designed to facilitate positive youth development can be particularly costly. Thus, identifying the adolescents who stand to benefit the most from interventions as well as the specific ages at which program types are most effective may be useful for creating and administering interventions to adolescents and their families more efficiently. This study addresses the limited knowledge of the effects of differential susceptibility to pubertal timing on the development of psychosocial maturity in adolescence. Psychosocial maturity, although inversely related to many negative outcomes, is not conceptually or operationally equivalent to the absence of a negative outcome (e.g., low aggressive behavior does not equate to PSM). Yet, most research on pubertal timing has assessed implications for negative outcomes at the expense of understanding the consequences for the development of positive attributes including psychosocial maturity. This research will help address this gap and provide more insight into the positive correlates of pubertal timing. Such research may have implications for programs designed to dampen the negative outcomes associated with pubertal precocity or late-blooming through positive parenting and the promotion of psychosocial maturity development.

Because the effects of pubertal development are rarely assessed with repeated measures of pubertal stage, this information would be valuable in determining when pubertal timing is a risk factor. Understanding when puberty and parenting interact to influence PSM will help uncover the window of time in adolescence that certain youth may be particularly vulnerable to the effects of pubertal timing with regard to PSM and risk-taking. If the main and interactive effects differ across age of onset, then there may be evidence for age-of-set-specificity of differential susceptibility. Such findings might uncover time points in which youth are particularly vulnerable and most receptive to intervention. For example, it may be that among early maturing youth, high levels of positive parenting at fifth grade positively predicts later PSM and less positive parenting does not. Further, it is possible that later developing youth may show less sensitivity to similar parenting at those time points. If that is the case, interventions should specifically target parents of early maturing youth before youth reach fifth grade and highlight the importance of parenting during early adolescence.

Finally, understanding the mechanisms leading to PSM will help explain the proximal processes that should be targeted by interventions. Given the wide array of negative outcomes inversely related to PSM, understanding how youth achieve PSM may provide information that can adjunct the traditional intervention approach, which tends to be primarily focused on reducing negative behaviors by suggesting mechanisms for developing positive attributes and subsequently reducing risk across future transitions. If parenting mediated the relation between pubertal timing and PSM, then interventions can be further tailored accordingly. Additionally, if parenting during adolescence moderates this mediated link between puberty and PSM, there would be support for interventions focusing on enhancing maternal responsiveness and

sensitivity. This dissertation will address these issues by assessing the mediating and moderating effects of parenting on the relation between pubertal timing and PSM.

Research Questions and Hypotheses

Broadly, this study addresses the following question: How do early parenting, puberty, and parenting during adolescence affect psychosocial maturity and risky behavior in late adolescence? The study will address several questions in route to the primary research question regarding differential susceptibility as outlined below.

1. Does parenting predict adolescent psychosocial maturity and risk-taking?

   Higher levels of positive parenting during adolescence are expected to positively predict psychosocial maturity and negatively predict risky behavior.

2. How is pubertal timing associated with psychosocial maturity and risk-taking?

   A main effect of pubertal timing will demonstrate that early maturing youth will, on average, experience lower psychosocial maturity and higher risky behavior.

3. Are early developing youth more susceptible to the effects of parenting on subsequent psychosocial maturity and risky behavior? That is, does pubertal timing moderate the effects of parenting on psychosocial maturity and risky behavior?

   Pubertal timing will confer susceptibility such that early maturing youth will be at the greatest risk of lower levels of psychosocial maturity and higher risky behaviors in the face of less than optimal parenting during adolescence. Additionally, early maturing youth will benefit most from optimal parenting during adolescence such that

they will demonstrate the highest levels of psychosocial maturity and lowest risky behaviors.

4.   Are the pathways linking parenting, puberty, psychosocial maturity and risk-taking moderated by adolescent sex?

Testing moderation of these pathways is largely exploratory, therefore there are no further specific hypotheses regarding differences in magnitude or directionality of effects for the remaining pathways.

METHOD

Participants

The analyses for this study will utilize data from the NICHD SECCYD, an 18-year study of the longitudinal implications of early child care experiences and youth development. The original sample of 1,364 families was selected in 1991 from 31 hospitals in or near Charlottesville, VA; Irvine, CA; Lawrence, KS; Little Rock, AR; Madison, WI; Morganton NC; Philadelphia, PA; Pittsburgh, PA; Seattle, WA; and Boston, MA. Conditional random sampling was used to achieve adequate representation of families of color, low-educated mothers, and single mothers, but was not intended to be nationally representative. Recruitment and selection procedures have been previously described in several publications (NICHD Early Child Care N. E. C. C. Network, 2001).

The present sample is a subsample for which data collected through Phase IV, when study children were approximately 15 years old, are available. Phase IV data collection occurred between 2005 and 2008 and included 1,056 children and families from the original sample. The present analyses included a sub-sample consisting of 730 adolescents (370 female) with observations during adolescence on key study variables (589 European American, 96 African American, and 45 Hispanic). On average maternal education at the first wave of data collection was 14.4 years, or two years of college education. The sample was mostly middle class; early income-to-needs ratio ranged from 0.11 to 28.65 (M = 3.73).

Procedure

Several data collection methods (e.g., structured observation, telephone interview, nurse examination) were used in this study. Data for were collected via direct observation, self-administered questionnaire, telephone interview, and nurse examination. Telephone interviews were conducted with mothers to gather demographic information on the family. Parenting sensitivity and responsivity data were collected using structured interaction observations and standardized observation coding. Pubertal development data were collected by a nurse practitioner or doctor during either a medical office visit or a nurse home visit. All other data were collected via parent and/or child self-report.

Outcome Measures

Psychosocial maturity. At age 15, study children completed the 30-item Psychosocial Maturity Inventory (E. Greenberger & Bond, 1976) via audio assisted self-interview (ACASI) questionnaire designed to assess psychosocial maturity. The Personal Responsibility questionnaire consists of three subscales (self-reliance, identity, and work orientation) derived from 30 items, which are responded to on a 4-point scale (1 = s*trongly disagree* and 4 = s*trongly agree*). Each subscale is computed by taking the averages of the 10 respective reverse scored items (e.g., "I can't really say what my interests are."), such that higher scores are consistent with greater psychosocial maturity. Self-reliance scores indicate feelings of internal control and ability to make decisions autonomously. Identity scale scores reflect adolescent self-esteem, clarity of self, and consideration of life goals. Work Orientation scores reflect adolescent pride in successful completion of tasks. The sets of raw items used to create the Self-reliance score, Identity score , and Work Orientation score all have moderate internal reliability (10 items each; Cronbach's alpha = .71, Cronbach's alpha = .77, and Cronbach's alpha = .78, respectively). The overall Psychosocial Maturity score is computed as the mean of items 1 to 30, with higher scores

indicating more psychosocial maturity. The raw items used to create the Psychosocial Maturity Inventory score have high internal reliability (30 items, Cronbach's alpha = .87).

Impulse control. Eight items from the Weinberger Adjustment Inventory were used to assess a second aspect of psychosocial development and maturity, the ability to have impulse control versus being impulsive (Weinberger & Schwartz, 1990). Adolescents responded using a 5-point scale (1 = *false* and 5 = *true*) to indicate the extent of agreement between their behavior and each statement (e.g., "I'm the kind of person who will try anything once, even if it's not that safe"). Impulse Control is computed as the mean of 7 items. Higher values indicate more mature behavior (i.e., more impulse control). The seven items used to create this score had moderate internal reliability (Cronbach's alpha = .82)

Future outlook inventory. The 8-item Future Outlook Inventory (Cauffman & Woolard, 1999) assesses adolescents' ability to anticipate short and long term consequences. For example, "I think about how things might be in the future". Participants are asked to respond according to what is most true for them using a 4-point response scale (1 = *never* to 4 = a*lways*). Responses are summed to form the global measure of future orientation, with higher scores indicating a greater degree of future consideration and planning. This measure assesses the adolescent's ability to consider his or her decisions and their long-term consequences and implications for others. Items for this instrument were drawn from various measures of similar constructs (e.g., Scheier & Carver, 1985; Strathman, Gleicher, Boninger, & Edwards, 1994; Zimbardo, 1980).

Resistance to peer influence. The 9-item resistance to peer influence questionnaire designed to tap an adolescent's capacity to stand up to peer influence and behave as he or she wishes was modified from a pre-existing measure (Steinberg, & Monahan, 2007). Items on the

measure were selected to assess a range of behaviors including, but not limited to, antisocial behavior. Adolescents responded using a 4-point scale (1 = *not at all true* and 4 = *very true*). Sample items include "I go along with my friends just to keep them happy" and "It's pretty hard for my friends to get me to change my mind." Resistance to peer influence score is the sum of the 9 items, with higher scores indicating a greater resistance to peer influence. The items used to create this score in the present study have modest internal reliability (Cronbach's alpha = .69). Confirmatory factor analysis (CFA) was conducted as a first step to establish the measurement models for psychosocial maturity. CFA supports the use of work orientation, identity, self-reliance, impulse control, future outlook orientation, and resistance to peer influence scale scores as indicators of the latent construct PSM.

Risky behavior. At age 15, study children were administered the 61-item Things I Do questionnaire designed to assess adolescent risky behaviors. This questionnaire was developed for use in the NICHD SECCYD, and draws from the work of Elder and colleagues (1994), the Fast Track project, and the New Hope project. The first part of the questionnaire asks adolescents to report how many times in the past year they have engaged in 55 different risky behaviors using a 3-point response scale (0 = *not at all* and 2 = *more than twice*). However, for the computation of scale scores, variables were dichotomized (0 = *never* and 1 = *once or twice and more than twice*). Included items ask about vaginal and oral sexual behavior, tobacco use, adolescents' safety, and violence related behaviors. The any risk-taking scale is computed as the sum of response values to the first 53 items, with higher values indicating more risk-taking. The 53 items used to create the any risk-taking score have high internal reliability (Cronbach's alpha = .89). Sexual risk is computed for cases with complete data as the sum of the 4 items related to sexual activity, with higher values indicating more sexual risk-taking. The items used to create

the sexual risk score have moderate internal reliability (Cronbach's alpha = .73). Confirmatory factor analysis (CFA) was conducted as a first step to establish the measurement model for risky behavior. Results confirmed a two factor model (i.e., any risk-taking and sexual risk-taking). Therefore, in subsequent models risk-taking is indicated by two factors indicated by the items from the two sub-scales, any risk-taking and sexual risk-taking.

Predictor Variables

Measures Administered in Adolescence

Pubertal development. Starting at age 9 1/2, annual HPDA exams were conducted until the study child reached full maturity, Tanner stage 5. The focus of the HPDA is the evaluation of the child's Tanner stage with some additional information about the child's physical status. Tanner staging for girls was based on instructions from the American Academy of Pediatrics manual, Assessment of sexual maturity stages in girls (Herman-Giddens & Bourdony, 1995). Tanner staging for boys was based on Tanner's original criteria (adapted from Tanner, 1962). If a child was between stages on any Tanner stage measure, he or she was scored at the lower stage. Most of the exams were conducted by nurse practitioners with experience in Tanner Staging but a few of the exams were conducted by pediatric endocrinologists. Age of pubertal onset was derived using age in which nurse examinations first indicated pubertal status of Tanner stage 2 for pubic hair. Given the timing of the initial assessment, some of the first assessments were conducted after an adolescent had already reached stage 2, for these youth, age at the initial assessment was used as their entry point into puberty. Prior to analyses, age of pubertal onset was normed within each sex and racial/ethnic group, such that values reflect deviation from the mean for one's race and sex group as prescribed by Sun, et al., 2002. For example, an African American female achieving Tanner stage 2 development at age 9.5 would receive a score of -

0.75, representing onset 9 months earlier than the national average age at pubic hair Tanner stage 2 for African American female youth (10.25 years).

Maternal responsiveness and sensitivity. A composite of maternal responsiveness and maternal sensitivity were used as indicators of maternal parenting during adolescence. The adolescent version of the H.O.M.E. Inventory administered at grade 5 and age 15 was used to assess maternal responsiveness. Although the inventory includes items covering several composite measures (i.e., responsiveness, learning materials, stimulation, and harsh parenting) the present research uses only the responsiveness scale which reflects acceptance and responsivity from mother to child. Items are scored using a binary (1 = *yes*, 0 = *no*) scoring system, the sum of which is taken to obtain the responsiveness scale score. Inter-observer agreement was higher than 90%.

Maternal sensitivity was assessed using videotaped structured mother-child interactions were used to assess maternal sensitivity during adolescence when youth were in grade 5 and at age 15. At grade 5 mother-child dyads were asked to discuss their top three areas of disagreement from 22 pre-selected topics and then work through an "Egg Bungee Jump" problem-solving task (Egeland & Heister, 1993; Pianta, 1994). At age 15 dyads were asked talk through one or more topics they disagree upon (e.g., chores, homework, and use of free time) for 8 minutes. Videotapes of the structured interactions of study adolescents and their mothers were coded centrally by trained observers on the basis of several qualities of the mother-child relationship related to promotions of dyadic closeness and relatedness and respect for child autonomy. These qualities varied slightly over the course of the study to account for emerging capacities and child maturation. While the coding varied across years to ensure developmentally appropriate measurement, the scoring range remained the same across waves such that a 7-point

scale (1 = *very low* to 7 = *very high*) was used to rate maternal responsiveness. Maternal Sensitivity represents a composite of maternal validation/agreement, engagement, the inverse of inhibiting relatedness, the inverse of hostility/devaluing, respect for autonomy, and valuing/warmth. Higher scores indicate more positive reaction, support for autonomy, and less hostility and inhibiting relatedness by the mother toward the adolescent. Items used to create this score have moderate internal reliability (6 items, Cronbach's alpha = .81).

Parenting during adolescence (Grade 5 and age 15) was represented by a mean of the standardized and mean-centered maternal sensitivity and HOME total scores. Change in parenting during adolescence was calculated as the simple slope of Grade 5 and age 15 parenting.

Control Variables

Demographics. The study uses demographic data collected when the study child was in their 4th year of school (for most youth, third grade) as control variables in analyses, with the exception of maternal education and race/ethnicity which were assessed when the target child was 1 month old. Parents responded to a 14-item self-administered questionnaire regarding family pre-tax income, parental education status, and other employment and income questions. Mothers reported their annual income and their partner/spouse's annual income before taxes by circling one of 27 income ranges that included their family's income. The midpoint of the range was used for analyses. Income-to-needs ratio is computed by dividing the total family pre-tax income by the poverty threshold for a household. The poverty threshold, obtained from the US Census Bureau, for a household is determined by the year the income is earned, the total number of members in the household, and the number of full-time children living in the home. Maternal education was assessed via self-report when the study child was one month old (1 = *less than 12*

years, 2 = *high school /GED*, 3 = *some college*, 4 = *bachelor's*, 5 = *post-graduate*). Race and ethnicity was coded on the basis of interviewer observation rather than self-report (1 = *White*, 2 = *Black*, 3 = *Native American*, 4 = *Asian*, 5 = *Hispanic*, 6 = *Mixed*).

Social skills. When the child was in third grade, mother-reported social skills were assessed using the Social Skills Rating System (SSRS; Gresham & Elliot, 1990) items for the total social skills score. Total social skills reflect a child's frequency of cooperation, assertion, and self-control based on parent-report on a Likert scale (1 = *Never*, 2 = *Sometimes*, 3 = *Very Often*). Sample items include the frequency with which the target child, "Controls temper when arguing with other children."; "Cooperates with family members without being asked." The 38 items are summed to create a scale score with higher scores indicating the parent perceives their child increasingly engages in socially acceptable behavior. The raw items used to create this score have high internal reliability (Cronbach's alpha = 0.90).

Early positive parenting. A composite of two measures completed at 36-, and 54-months, and grade 3 will be used to characterize the early parenting context. The first measure used to assess the early childhood parenting context, particularly responsiveness, was the H.O.M.E. Inventory, an interviewer-completed measure of the stimulation and support available to a child in the home environment (Caldwell & Bradley, 1984). The instrument assesses several components of the child's home environment including stimulus from objects, events, and family interactions. The measure is administered over the course of about an hour and involves direct observation and semi-structured interview. Data for the present study were collected using age appropriate (i.e., infant-toddler, early child, adolescent) versions of the measure (Bradley et al., 2000; Caldwell & Bradley, 2004). Items are scored using a binary (1 = *yes*, 0 = *no*) scoring system and sets of items are summed to calculate scale scores for responsiveness, learning

materials, stimulation, and harsh parenting. All items may be summed to create an overall score; however, this study will use the responsiveness subscale only. Inter-rater reliability was greater than 90% at each assessment and total H.O.M.E. scale reliability as assessed by Cronbach's alpha ranged from 0.82 to 0.93.

The second means of assessing the early parenting context used videotaped structured mother-child interactions to quantify qualities of the parent-child relationship that address supportive presence, respect for and promotion of the child's autonomy, and hostility (N. E. C. C. R. Network, 1999). Developmentally appropriate tasks were administered as the child aged, such that in early interactions (e.g., 36-months) mothers were given a set of boxes containing separate sets of toys including a set of blocks, markers with paper and stencils, and dress-up shoes and clothes; whereas the interaction at grade 3 was structured around mother and child views of a set of randomly selected rules that families might have followed by a joint problem-solving activity requiring dyads to plan a series of errands. Interactions were scored using a standard scoring procedure whereby coders scored mothers on supportive presence, respect for child autonomy, stimulation of cognitive development, and hostility using a 7-point scale (1 = *very low* to 7 = *very high*) adapted from Egeland and Heister (1993). Analyses will use the maternal sensitivity scale, which includes maternal supportive presence, respect for autonomy, and the inverse of hostility. The raw items used to create this score have moderate internal reliability (Cronbach's alpha = 0.80). Following the same method used for parenting during adolescence, the early parenting composite was constructed using 36 month, 54 month, and grade 3 standardized maternal sensitivity and HOME scores. That is, early parenting was represented by a mean of the standardized and mean-centered maternal sensitivity and HOME total scores.

Analysis Plan

Descriptive and correlational statistics (e.g., means, standard deviations, and univariate normality) were run for each variable of interest. Structural equation modeling (SEM) was used to test the study hypotheses. SEM was chosen to address several of the limitations of traditional regression models that would have implications for the present study. Specifically, an SEM approach facilitates testing potential mediating pathways that may exist between concurrent and subsequent constructs. As such, this study tested whether some of the early predictor variables (e.g., early parenting) are mediated by variables appearing later in the model (e.g., parenting during adolescence). Furthermore, this approach provides a framework in which both direct and indirect pathways can be modeled simultaneously. Models were parameterized using the Mplus 7 software package (Muthén & Muthén, 1998-2015) using the robust maximum likelihood estimator. This estimator accommodates non-normal data by adjusting standard errors using the Huber-White sandwich estimator.

Measurement invariance across sex was assessed to determine the stability of the measurement model across sex. Full measurement invariance was confirmed across sex for both sexual risk-taking and any risk-taking. However, only partial measurement invariance was confirmed for PSM such that all item loadings were freely estimated across sex, with the exception of Future Orientation and Self Reliance which were constrained to equivalence (see *Table 3*).

Given the complexity of subsequent models, following the confirmation of the measurement models, parenting and risky behavior subscale scores were included in the remaining models as manifest variables. This reduced the computational demands of model

estimation by removing the need to perform the extensive calculations underlying the measurement components of the hypothesized structural models.

After the measurement components were established, all main effects, indirect effects and interactions among constructs were estimated in an unconditional model with Grade 3 control variables included as time-invariant covariates clustered on site. The first component of the model assessed the effects of early parenting and puberty on parenting during adolescence, psychosocial maturity, and risky behavior. This step addressed the research questions: 1) How does early parenting influence pubertal maturation and later parenting? 2) Do pubertal onset and parenting during adolescence predict adolescent psychosocial maturity and risk-taking? 3) Does pubertal timing indirectly affect risk-taking and psychosocial maturity through parenting during adolescence? 4) Are early developing youth more susceptible to the effects of parenting on subsequent psychosocial maturity and risky behavior? The final analytical step involved testing all main, indirect, and interactive effects among constructs using a series of multiple group analyses to address the question of whether sex moderates specific pathways linking parenting, puberty, psychosocial maturity and risk-taking.

Analyses were evaluated on the basis of the following fit indices: Chi-square (χ^2), Chi-square/ degrees of freedom ratio (χ^2/df), comparative fit index (CFI), Tucker-Lewis index (TLI), root-mean-square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Chi-square measures the probability of rejecting a false null hypothesis (Type I error), therefore this test statistic should be relatively small and non-significant (e.g., $p > .05$; Kenneth A Bollen & Curran, 2006, chapter 2). However with large samples, such as the one in the present study, chi-square is positively distorted (Bollen, & Curran, 2006, chapter 2) and large statistically significant chi-square values may still be acceptable (Jöreskog, 1969, 1971). When

sample size is large, a comparison of the chi-square to the degrees of freedom (χ^2/df) provides a better description of model fit (Jöreskog, 1969). The χ^2/df ratio should be larger than one and less than 3(Jöreskog, 1969). The literature suggests that a CFI equal to 1 indicates an ideal fit, and values less than 0.9 are unacceptable (Bollen, 1990). TLI values should be very close to 1, with values less than 0.9 indicating poor fit and those greater than 1.2 indicating the possibility of over-fitting the data or too many parameters (Tucker & Lewis, 1973). Conventions in the literature suggest RMSEA values below 0.05 indicate a very good fit, values greater than 0.1 signify a poor fit, those in between 0.05 and 0.1 a moderate fit (Browne, Cudeck, Bollen, & Long, 1993; Steiger, 1990). Additionally, confidence intervals for the RMSEA are presented based on suggestions in the literature (MacCallum & Austin, 2000). SRMR values less than .08 are deemed acceptable (Hu & Bentler, 1999). Bayesian information criteria are presented as a means to compare nonnested models, with smaller values indicating better fit (BIC; Raftery, 1995).

RESULTS

Descriptive Statistics. Table 1 shows means and standard deviations for the complete

sample and by sex. Bivariate correlations for key study variables are presented in

(N =730)

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	14.4	2.3	-													
2.	3.74	2.7	.55**	-												
3. Early	0	.75	.58**	.48**	-											
4. Social	57.3	9.6	.25**	.20**	.42**	-										
5. Age of	11.4	1.3	0	.04	.07^	.04	-									
6.	0	.82	.49**	.42**	.74**	.41**	.02	-								
7.	6.88	4.8	-.03	-.03	-	-	0	.44**	-							
8. Sexual	.109	.23	-	-	.11* -	.09* -	-	* -	-	-						
9. Any	.384	.20	.16* -	.13* -	.10* -	.10* -	.10 -	.16* -	.09 -	.49	-					
10.	28.7	3.6	.18* -.04	.21* 0	.28* .01	.22* .09*	.07 -	.21* .03	.05 .04	-	-	-				
11.	3.52	.89	.12*	.14*	.18*	.16*	.02 -	.18*	.06	.08* -	.29* -	.42*	-			
12.	2.62	.49	.06	.02	.09*	.15*	.01 -	.09*	.05	.24* - .09*	.47* .35*	.32* *	.38* *	-		
13.Self-	3.44	.39	.14*	.07	.18*	.18*	.09 -	.15*	.04	-.04 .15*	- *	.48* *	.33* *	.22* *	-	
14.	3.54	.42	.10*	.15*	.17*	.17*	.05 .03	.17*	.07	- .13*	.13* *	.33* *	.41* *	.19* *	.59* *	-
15. Work	3.01	.50	.17*	.15*	.14*	.18*	.01	.16*	.04	- .16*	- .31*	.35* *	.48* *	.44* *	.49* *	.48* *

Table 1 and   *Table 2* for the full sample and by sex, respectively. Correlations are

discussed for the full sample and then for males and females in turn. Correlations among study

variables were largely as expected. With one exception, maternal sensitivity and responsiveness at grade 5 was positively associated with higher levels of all indicators of psychosocial maturity, including impulse control, future orientation, self-reliance, identity, and work orientation ($r = .17$, $p < .001$; $r = .09$, $p < .05$; $r = .16$, $p < .001$; $r = .17$, $p < .001$; $r = .15$, $p < .001$, respectively). The exception was resistance to peer influence, which was not significantly associated with parenting at grade 5 ($r = .03$, $p = .42$). Improvement in maternal sensitivity and responsiveness from grade 5 to age 15 was positively associated with identity ($r = .08$, $p < .05$), but not resistance to peer influence, impulse control, future orientation, self-reliance, or work orientation ($r = .04$, $p = .30$; $r = .06$, $p = .10$; $r = .06$, $p = .11$; $r = .04$, $p = .34$; $r = .04$, $p = .23$, respectively). Non-sexual risk-taking and sexual risk-taking were negatively associated with maternal sensitivity and responsiveness at grade 5 ($r = -.19$, $p < .001$; $r = -.15$, $p < .001$, respectively). Increasing maternal sensitivity and responsiveness from grade 5 to age 15 was negatively associated with sexual risk-taking ($r = -.08$, $p < .05$), but not non-sexual risk-taking ($r = -.05$, $p = .18$). Pubertal onset was significantly associated with one indicator of psychosocial maturity, future orientation ($r = -.09$, $p < .05$), such that early puberty was associated with lower future orientation. Bivariate correlations between pubertal onset and resistance to peer influence, impulse control, self-reliance, identity, and work orientation were all non-significant ($r = -.03$, $p = .47$; $r = -.02$, $p = .68$; $r = -.05$, $p = .16$; $r = -.03$, $p = .39$; $r = -.003$, $p = .93$, respectively). Pubertal onset was negatively associated with sexual risk-taking ($r = -.11$, $p < .01$), such that early onset was associated with increased sexual risk; however the correlation between pubertal onset and non-sexual risk-taking did not reach statistical significance ($r = -.06$, $p = .12$).

Among male youth, maternal sensitivity and responsiveness at grade 5 was positively associated with all but two indicators of psychosocial maturity, including impulse control, self-

reliance, identity, and work orientation (r = .19, p < .001; r = .22, p < .001; r = .22, p < .001; r = .14, p < .01, respectively). The exceptions were resistance to peer influence and future orientation, which were not significantly associated with parenting at grade 5 (r = .06, p = .23; r = .04, p = .40, respectively). Change in maternal sensitivity and responsiveness from grade 5 to age 15 was not associated with resistance to peer influence (r = -.02, p = .77), impulse control (r = .02, p = .77), future orientation (r = .07, p = .17), self-reliance (r = .01, p = .91), identity (r = .02, p = .69), or work orientation (r = .03, p = .63) for male youth. Non-sexual risk-taking and sexual risk-taking were negatively associated with maternal sensitivity and responsiveness at grade 5 (r = -.19, p < .001; r = -.15, p < .001, respectively). Change in maternal sensitivity and responsiveness from grade 5 to age 15 was neither associated with sexual risk-taking (r = -.01, p = .83) nor non-sexual risk-taking (r = -.01, p = .81). Earlier male pubertal onset was significantly associated with one indicator of psychosocial maturity, future orientation (r = -.11, p < .05), such that earlier male pubertal onset was associated with lower future orientation. Bivariate correlations between male pubertal onset and resistance to peer influence, impulse control, self-reliance, identity, and work orientation were all non-significant (r = -.05, p = .34; r = -.09, p = .09; r = -.07, p = .19; r = -.06, p = .29; r = -.06, p = .29, respectively). Pubertal onset was not significantly associated with sexual risk-taking (r = -.07, p = .17) or non-sexual risk-taking (r = -.07, p = .18) for male youth.

Among female youth, maternal sensitivity and responsiveness at grade 5 was positively associated with 4 out of 6 indicators of psychosocial maturity, including impulse control, future orientation, identity, and work orientation (r = .15, p < .01; r = .12, p < .05; r = .13, p < .05; r = .16, p < .01, respectively). The exceptions were resistance to peer influence and self-reliance, which were not significantly associated with parenting at grade 5 (r = -.03, p = .53; r = .09, p =

.09, respectively). Increasing maternal sensitivity and responsiveness from grade 5 to age 15 was positively associated with resistance to peer influence, impulse control, and identity ($r = .10$, $p < .05$; $r = .10$, $p < .05$; $r = .12$, $p < .05$, respectively), but not future orientation, self-reliance, or work orientation ($r = .05$, $p = .32$; $r = .07$, $p = .18$; $r = .06$, $p = .24$, respectively). Non-sexual risk-taking and sexual risk-taking were negatively associated with maternal sensitivity and responsiveness at grade 5 ($r = -.24$, $p < .001$; $r = -.12$, $p < .001$, respectively). Increasing maternal sensitivity and responsiveness from grade 5 to age 15 was associated with lower sexual risk-taking ($r = -.15$, $p < .01$), and marginally associated with lower non-sexual risk-taking ($r = -.10$, $p = .056$). Earlier pubertal onset was significantly associated with increasing levels of identity ($r = -.11$, $p < .05$). Bivariate correlations between pubertal onset and resistance to peer influence, impulse control, future orientation, self-reliance, and work orientation were all non-significant ($r = -.001$, $p = .98$; $r = .05$, $p = .30$; $r = -.08$, $p = .15$; $r = -.04$, $p = .49$; $r = .04$, $p = .42$, respectively). Pubertal onset was negatively associated with sexual risk-taking ($r = -.15$, $p < .01$), such that early onset was associated with increased risk; however the correlation between pubertal onset and non-sexual risk-taking did not reach statistical significance ($r = -.05$, $p = .38$).

Research Questions 1-3: Effects of Pubertal Onset and Parenting on PSM and Risky Behavior. The first model (*Figure 1*) assessed the main and interactive effects of parenting and pubertal timing on psychosocial maturity and risky behavior controlling for site (treated as a cluster variable) early income, maternal education, race, early parenting, and grade 3 social skills in the entire sample. This model provided adequate model fit, $\chi^2(74) = 285.118$, $p < .001$, CFI = .917, TLI = .864, RMSEA = .063, 95% CI [.055, .07], $\chi^2/df = 3.85$, SRMR = .038, BIC = 12632.903. The total amount of variance explained in each outcome was as follows: .10 in psychosocial maturity, .11 in sexual risk-taking, .34 in non-sexual risk-taking, .56 in maternal sensitivity and

responsiveness at grade 5, and .33 in change in maternal sensitivity and responsiveness.

Standardized path coefficients are shown in Figure 1. Maternal sensitivity and responsiveness at grade 5 and positive change from grade 5 to age 15 were independently related to higher psychosocial maturity (βs = .23, and .19, p < .001, respectively), negatively related to sexual risk-taking (β = -.16, p < .01, and β = -.13, p <.001), but not non-sexual risk-taking (β = -.08, p = .11, and β = -.05, p = .13, respectively). Pubertal onset did not predict psychosocial maturity (β = -.03, p = .50), maternal sensitivity and responsiveness at grade 5 (β = -.03, p = .32), or the change in maternal sensitivity and responsiveness (β = -.01, p = .75). However, earlier pubertal onset did significantly predict higher non-sexual risk-taking (β = -.07, p < .05) and sexual risk-taking (β = -.10, p < .001), such that earlier pubertal onset was associated with greater risk-taking behaviors. Psychosocial maturity negatively predicted concurrent non-sexual risk-taking (β = -.52, p < .001) and sexual risk-taking (β = -.21, p < .001). The interaction term for maternal sensitivity and responsiveness and puberty did not significantly predict psychosocial maturity (β = .004, p = .92), non-sexual risk-taking (β = -.02, p = .38) or sexual risk-taking (β = .02, p = .65) after accounting for the other variables in the model. The indirect paths linking pubertal onset with psychosocial maturity, non-sexual risk-taking, and sexual risk-taking were not statistically different from zero (β = -.004, p = .53; β = .02, p = .36; β = .01, p = .24, respectively). Similarly, none of the indirect effects of the interaction between pubertal onset and maternal sensitivity and responsiveness on non-sexual risk-taking and sexual risk-taking via psychosocial maturity were statistically significant (β = -.001, p = .92, β = -.002, p = .92, respectively).

Research Question 4: Sex Moderation. A two-group (male, female) unconstrained model was assessed to address the remaining research question regarding sex moderation of the pathways linking maternal sensitivity and responsiveness, puberty, psychosocial maturity and risk-taking

during adolescence. To this end, the same structural paths included in the previous model were freely estimated across child sex. The unconstrained two-group model marginally fit the data, $\chi^2(148) = 432.507$, $p < .001$, CFI = .899, TLI = .835, RMSEA = .073, 95% CI [.065, .081], $\chi^2/df = 2.922$, SRMR = .049, BIC = 12954.458. To determine which parameters in the structural model differed across males and females, the final model tested introduced several parameter constrains (see *Table 4* for incremental model indices for constrained parameters). This partially constrained model provided marginally acceptable fit to the data, $\chi^2(186) = 476.552$, $p < .001$, CFI = .897, TLI = .866, RMSEA = .065, 95% CI [.058, .073], $\chi^2/df = 2.56$, SRMR = .066, BIC = 12743.983. Compared to the unconstrained two-group model, the change in model fit was not statistically significantly different $\chi_\Delta^2(38) = 44.045$, $p = .231$, thus the more parsimonious partially restricted model is retained. Figure 2 shows standardized parameter estimates from this model (females in parentheses). Chi-square difference testing ($\chi_\Delta^2(6) = 16.224$, $p < .05$) indicates this model fit the data better compared to a model with all structural parameters constrained to equivalence across sex, $\chi^2(192) = 492.776$, $p < .001$, CFI = .893, TLI = .866, RMSEA = .066, 95% CI [.058, .073], $\chi^2/df = 2.57$, SRMR = .066, BIC = 12719.434. Parameter estimates for male and female youth are presented in turn.

Among males, psychosocial maturity was significantly predicted by higher maternal sensitivity and responsiveness at grade 5 ($\beta = .23$, p < .001), increasing maternal sensitivity and responsiveness from grade 5 to age 15 ($\beta = .19$, p < .001), and the interaction between grade 5 maternal sensitivity and responsiveness and pubertal onset ($\beta = .12$, p < .01). However, the main effect of pubertal onset did not significantly predict psychosocial maturity ($\beta = -.02$, p = .65). Sexual risk-taking among male youth was negatively predicted by psychosocial maturity ($\beta = -.20$, p < .01), maternal sensitivity and responsiveness at grade 5 ($\beta = -.18$, p < .001), change in

maternal sensitivity and responsiveness (β = -.08, p < .05), but not pubertal onset (β = -.08, p = .15) or the interaction between grade 5 maternal sensitivity and responsiveness and pubertal onset (β = .02, p = .65). Despite the lack of a significant direct effect of the interaction between pubertal onset and maternal sensitivity and responsiveness on sexual risk-taking the indirect effect via psychosocial maturity did reach statistical significance (β = -.02, p < .05). Non-sexual risk-taking among male youth was negatively predicted by psychosocial maturity (β = -.47, p < .001), pubertal onset (β = -.13, p < .05), and marginally by maternal sensitivity and responsiveness at grade 5 (β = -.12, p = .06), and increasing maternal sensitivity and responsiveness from grade 5 to age 15 (β = -.07, p = .051). Non-sexual risk-taking among male youth was not significantly directly predicted by the interaction between grade 5 maternal sensitivity and responsiveness and pubertal onset (β = -.02, p = .34). However, the total effect and indirect effect of the interaction term on non-sexual risk-taking are statistically significant (β = -.08, p < .05; β = -.05, p < .01, respectively). Pubertal onset did not significantly predict maternal sensitivity and responsiveness at grade 5 (β = -.03, p = .22) or change in maternal sensitivity and responsiveness (β = -.03, p = .65). None of the indirect paths linking pubertal onset with psychosocial maturity, non-sexual risk-taking, and sexual risk-taking were statistically different from zero. Among males, the total amount of variance this model explained in each outcome was as follows: .12 in psychosocial maturity, .10 in sexual risk-taking, .30 in non-sexual risk-taking, .60 in maternal sensitivity and responsiveness at grade 5, and .32 in change in maternal sensitivity and responsiveness.

Among females, psychosocial maturity was significantly predicted by maternal sensitivity and responsiveness at grade 5 (β = .23, p < .001) and increasing maternal sensitivity and responsiveness from grade 5 to age 15 (β = .20, p < .01), whereas the interaction between

grade 5 maternal sensitivity and responsiveness and pubertal onset (β = -.09, p = .07) was marginally significant. However, the main effect of pubertal onset was not a statistically significant predictor of psychosocial maturity (β = -.02, p = .65). Sexual risk-taking among female youth was negatively predicted by psychosocial maturity (β = -.20, p < .001), maternal sensitivity and responsiveness at grade 5 (β = -.18, p < .001), increasing maternal sensitivity and responsiveness from grade 5 to age 15 (β = -.19, p < .01), and pubertal onset (β = -.13, p < .001), but not the interaction between grade 5 maternal sensitivity and responsiveness and pubertal onset (β = .02, p = .64). Total and specific indirect effects of the interaction term on sexual risk-taking via psychosocial maturity did not reach statistical significance (β = .04, p = .41; β = .19, p = .15, respectively). Non-sexual risk-taking among female youth was negatively predicted by psychosocial maturity (β = -.53, p < .001), maternal sensitivity and responsiveness at grade 5 (β = -.12, p < .05), and marginally by growth in maternal sensitivity and responsiveness (β = -.08, p = .058) such that higher levels of psychosocial maturity and maternal sensitivity and responsiveness were protective. Non-sexual risk-taking among female youth was not significantly predicted by pubertal onset (β = -.03, p = .33) or the interaction between grade 5 maternal sensitivity and responsiveness and pubertal onset (β = -.03, p = .34). While the total effect of the interaction term on non-sexual risk-taking was not significant (β = .25, p = .42), the indirect effect via psychosocial maturity approached significance (β = .05, p = .07). Pubertal onset did not significantly predict maternal sensitivity and responsiveness at grade 5 (β = -.03, p = .24) or change in maternal sensitivity and responsiveness (β = 0, p = .97). None of the indirect paths linking pubertal onset with psychosocial maturity, non-sexual risk-taking, and sexual risk-taking were statistically different from zero. Among females, the total amount of variance this model explained in each outcome was as follows: .11 in psychosocial maturity, .12 in sexual

risk-taking, .37 in non-sexual risk-taking, .53 in maternal sensitivity and responsiveness at grade

5, and .36 in change in maternal sensitivity and responsiveness.

DISCUSSION

Understanding how puberty and parenting affect PSM is of great importance for the design and delivery of interventions, especially for youth at risk for engaging in risky behavior, academic underachievement, and delinquency. However, the specific pathways through which parenting and puberty jointly affect PSM and risk-taking remain unclear. Further, the developmental research has largely neglected the effect of differential susceptibility to pubertal timing on the development of psychosocial maturity in adolescence. This study sought to address these gaps and provide more insight into the positive correlates of pubertal timing and the interactive effects of parenting and puberty. The purpose of this study was to examine the main and interactive effects of pubertal onset and maternal sensitivity and responsiveness on psychosocial maturity and risky behavior among a sample of adolescents. An additional aim of this study was to determine whether these pathways are moderated by adolescent sex. The results of this study offer insight into how puberty and parenting operate independently and interactively to influence psychosocial maturity and risky behaviors during adolescence.

Parenting as a predictor of psychosocial maturity and risk-taking

As hypothesized, the present data show that maternal sensitivity and responsiveness consistently predicted adaptive adolescent outcomes; that is, higher levels of psychosocial maturity and lower rates of sexual and nonsexual risk-taking behaviors. The protective role of maternal responsiveness and sensitivity is largely consistent across male and female youth. These findings are in line with the literature highlighting the benefits of authoritative parenting.

While the present study did not empirically examine specific parenting behaviors mediating this association between sensitive and responsive parenting and psychosocial maturity, the principles underlying a goodness-of-fit model, suggest it is explained by supporting adolescents' freedom to tinker with and explore adult-like experiences with age-appropriate parental support and guidance in the face of novel challenges. For example, a responsive and sensitive mother could be expected to support an adolescent's identity development by gradually freeing them to make decisions regarding how they spend their time and the peers with which they affiliate. Subsequent perceived success in making these choices may further lead an adolescent to an increased sense of self-reliance consistent with the notion that flexible parents engage in practices that better facilitate adolescent adjustment (Van der Giessen et al., 2013).

Also consistent with a goodness-of-fit model of the parenting context, parenting should change as a function of the needs and competencies of each individual adolescent as well as the challenges/demands placed on them in other environments (e.g., school, peers). As such, the present finding showing a positive trend in maternal responsiveness and sensitivity from grade 5 to age 15 is consistent with the literature indicating change in parent-child relationship quality during adolescence is normative and typically increases towards late adolescence (Gutman & Eccles, 2007; Steinberg & Morris, 2001; Van der Giessen et al., 2013). This positive trend was associated with increased psychosocial maturity and decreased sexual risk-taking, but not non-sexual risk-taking. One potential reason for this difference in effects may be related to the relatively early establishment of same-sex peer groups in comparison to the establishment of opposite-sex attraction and romantic relationships. In other words, adolescent non-sexual risk-taking may be less influenced by change in maternal sensitivity and responsiveness because youth have already established connections to peer networks most related to non-sexual risk-

taking (i.e., same-sex peers), whereas romantic relationships are still emerging during this period. This notion is consistent with empirical findings highlighting the relative stability of non-sexual maladaptive behaviors (e.g., aggression, delinquency) over adolescence (e.g., Benson & Beuhler, 2012; Ellis & Zarbatany, 2007). Additional research is required to determine whether changes in maternal sensitivity and responsiveness at periods prior to the establishment of same-sex peer networks can buffer youth from non-sexual risk-taking. Another area for exploration is whether the level of sexual risk-taking observed is meaningful given the low incidence of risk-taking in the present sample, especially in light of emerging research exploring normative trajectories of premarital sexual experience not indicative of maladjustment (e.g., Meier, 2007; Reese, 2014; Tolman, 2011). So, it is possible that the level of sexual behavior reported in the present sample is not above the threshold for normative sexual initiation at or before age 15.

Nevertheless, this pattern of findings can be taken to mean changes in parenting and the parent-child relationship during adolescence can have implications for both broad domains of functioning (i.e., psychosocial maturity) and specific domains of functioning (i.e., sexual risk-taking) for male and female youth alike. Sex differences in the magnitude of the effect in change in maternal responsiveness and sensitivity on adolescent sexual risk-taking suggests that female youth may be more sensitive to the effects of changes in maternal sensitivity and responsiveness during adolescence, a finding consistent with previous literature (Reese, 2014). Future research should seek to uncover the particular mechanisms through which parenting influences adolescent adjustment, sexual risk-taking in particular. For example, it may be that maternal responsiveness and sensitivity during adolescence underlie particular parenting behaviors such as monitoring, supervision, or discussing sex and sexuality (Morrison-Beedy et al., 2013; Tilton-Weaver, Burk, Kerr, & Stattin, 2013). Still, present findings highlight the importance of understanding how

maternal sensitivity and responsiveness change during adolescence and the implications for sexual risk-taking. Additionally, these findings support the potential value of parenting interventions occurring between grades 5 and age 15.

Despite what we do know, there are still gaps in the literature on parenting across the adolescent period. For one, a major limitation in the parenting literature in general is the limited research involving the influence of fathers. There is evidence suggesting differences in parenting practices and relationship quality across mothers and fathers (e.g., Shanahan, McHale, Crouter, & Osgood, 2007). Given the conceptualization of families as systems (Cox & Paley, 2003), it is important to also understand other ecological components that shape the family. Therefore, future research should examine the transactional effects of mothers' and fathers' parenting.

Pubertal timing as a predictor of psychosocial maturity and risky behavior

This study only provides partial for the hypothesis that pubertal onset would predict less adaptive levels of psychosocial maturity, non-sexual risk-taking, and sexual risk-taking. Specifically, present findings do not support a direct link between pubertal onset and psychosocial maturity. Conceptually, this null finding makes sense given early puberty is shown to be related to adolescent outcomes via other pathways including affiliation with deviant peers, negative body image, quality of peer relationships (e.g., Mendle, Harden, Brooks-Gunn, & Graber, 2012). In fact, Mendle and colleagues (2012) noted that once the quality of peer relationships was accounted for, the main effects of pubertal timing on depressive symptomatology were no longer significant. Yet, it is important that addition research identify additional mechanisms that may be important. One mediating mechanism that may be ruled out by the present study is the path linking puberty and psychosocial maturity via changes in the quality of the mother-child relationship (i.e., maternal responsiveness and sensitivity) given

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present null findings. It is possible that rather than directly affecting psychosocial maturity, puberty has evocative effects that modify the quality of social experiences adolescents have that subsequently influence psychosocial maturity. Another potential reason for null findings in this regard may be related to the time between average age of onset and when psychosocial maturity was assessed. On average female youth began puberty at 10.93 years, nearly 4 years prior to the assessment of psychosocial maturity; for males the temporal distance between pubertal onset and psychosocial maturity assessment was about 3 years. More proximal influences of psychosocial maturity might have explained a statistically significant proportion of the variance. For example, pubertal stage at age 15 might have served as a better predictor of psychosocial maturity given its temporal proximity.

In contrast to the findings for psychosocial maturity, results from the one-group model support a connection between earlier pubertal onset and risk-taking behavior, both sexual and non-sexual. These results are consistent with other empirical literature linking early pubertal onset with increased risk-taking including illicit drug use and delinquent behaviors (Carter, Silverman, & Jaccard, 2012). Interestingly and despite literature suggesting earlier puberty is a risk factor for female youth and not male youth; the present findings are consistent with a smaller body of literature showing similarities across sex (Natsuaki, et al., 2009) and the complexities of pubertal timing effects (Mendle & Ferrero, 2012). So the present findings are at least somewhat consistent with the literature and reflect that with regard to risky behaviors at age 15, both male and female youth are negatively affected by earlier puberty. It is still important to investigate the explanatory pathways that account for these effects. It is probable that peers also serve as a mediating mechanism shaping the relationship between pubertal onset and risk-taking behavior, as youth typically do not engage in risky behaviors alone. Indeed, associations between peer

influence and engagement in risky behaviors is well established. For example, Steinberg (2008) asserts that adolescents' are increasingly sensitive to social interactions and peer influence renders them less able to counter the socioemotional temptations, like risky behavior, with logic and sound decision making.

Differential susceptibility to parenting

Differential Susceptibility Theory (DST) argues those who respond least favorably to poor conditions will respond most favorably in optimal conditions because the same characteristic underlies sensitivity to context, whether the context is good or bad. The Differential Susceptibility model is particularly helpful in understanding how individuals at the greatest risk of succumbing to adversity thrive when substantial support is provided. As necessitated by the idea of individual variance in susceptibility, some individuals will be less likely to demonstrate variability in functioning across different contexts, which is protective in that a negative environment will be ineffective in evoking worse fitness. Just as some contexts are not equally promotive of positive adolescent development, conceptualizing parenting style as a context can enhance our understanding of how features of parenting may contribute to the net vulnerability one faces across the adolescent transition. This is consistent with the present findings; in the face of lower maternal responsiveness and sensitivity, later maturing male youth demonstrate the lowest levels of psychosocial maturity. Whereas in environments characterized by high maternal responsiveness and sensitivity, later maturing male youth show the highest levels of psychosocial maturity. Earlier maturing male youth are largely unaffected by differences in maternal sensitivity and responsiveness, a finding partly consistent with previous literature linking early puberty among males to positive outcomes (Graber, 2013).

Furthermore, these analyses are consistent with the five guidelines for detecting differential susceptibility as presented by Belsky and colleagues (2007): 1) test for true interaction is statistically significant, which when plotted shows intersecting lines; 2) independence of pubertal onset and maternal sensitivity and responsiveness was confirmed; 3) tests of independence indicated no association between pubertal onset and psychosocial maturity; 4) the graphical representation of the present data is consistent with exemplars (Belsky et al., 2007, p. 303 see Panel A); 5) replication with different outcomes (i.e., risky behaviors) to determine model specificity. Each of these empirical requirements is demonstrated in the present investigation of the interaction between pubertal onset and maternal sensitivity and responsiveness. Therefore, theoretical and empirical stipulations for establishing differential susceptibility are achieved. Specifically, when predicting psychosocial maturity among male youth, the interaction between pubertal onset and maternal sensitivity and responsiveness is consistent with pubertal timing as a susceptibility factor. This finding is inconsistent with previous research among the same sample; past research showed that among male youth, earlier puberty, rather than later, conferred differential susceptibility to early adolescent social competence (Monahan & Steinberg, 2011). These varied findings highlight the importance of examining the developmental timing of differential susceptibility across various predictors and outcomes. It is also important to explicate the mechanisms accounting for differences.

For example, male late bloomers may have lower psychosocial maturity in the face of low maternal sensitivity and responsiveness given their decreased likelihood to associate with older peers. These older peers could potentially influence early maturing youth in a positive way and promote psychosocial maturity. Similarly consistent with an evocative gene-environment interaction perspective, early maturation may signal to others that one should be treated more

maturely, which may facilitate the emergence of psychosocial maturity (Brendgen, 2012; Burt, 2008). So, absent these positive peer effects and maternal sensitivity and responsiveness supportive of psychosocial maturity, later maturing male youth may be particularly disadvantaged. Given the statistical independence of pubertal onset and maternal sensitivity and responsiveness, it is unlikely that mothers are demonstrating less responsiveness and sensitivity to later maturing male youth in ways that stymie psychosocial maturity. Consistent with stage-environment fit approaches, later maturing males are in need of greater maternal responsiveness and sensitivity to reach adaptive levels of psychosocial maturity, and absent moderate to high maternal responsiveness and sensitivity the context and resources available to them are not well suited for their developmental needs.

Sex moderation

The present findings demonstrate age of pubertal onset is differentially associated with risk-taking behaviors for male and female youth. Earlier pubertal onset directly predicted increased sexual risk-taking in females, but not males, a result that is not explained by differences in mean levels of sexual risk-taking or sex differences in pubertal timing. Similarly, earlier pubertal onset predicted increased non-sexual risk-taking in males, but not directly for females. This result is not easily explained by sex differences in pubertal timing, given the present study included sex-specific norms of pubertal timing. Therefore, future research is needed to examine the mechanisms causing these differences. One such mechanism may be related to how adolescents are perceived by others. For example, earlier maturing adolescent females may appear older than their agemates and attract additional attention and sexual advances from older males thereby contributing to sexual risk-taking through engagement with older males. For male youth, engaging with older males may be more closely associated with

non-sexual risk-taking given their increased likelihood to interact with an older same-sex peer group during a time when they are particularly vulnerable to social influences.

Another sex difference emerged when examining the paths linking maternal sensitivity and responsiveness and adolescent outcomes. Specifically, higher maternal sensitivity and responsiveness at Grade 5 was associated with lower non-sexual risk-taking among female youth, but not male youth. This finding may be related to gender stereotypes and the nature of the non-sexual risk behaviors selected for study. Given the relatively higher incidence of these behaviors among males than females, it may take something other than maternal sensitivity and responsiveness to buffer male youth from increased non-sexual risk-taking. For example, in comparison to mothers, fathers may provide better sex-typical models to support male youth's successful navigation of situations in which opportunities to engage in non-sexual risk are present given their likelihood of involving same-sex peers.

Despite findings supporting differential susceptibility among male youth, the present data do not provide support for similar findings among female youth. However, the interaction between pubertal onset and maternal sensitivity and responsiveness did approach, but not achieve, statistical significance when predicting psychosocial maturity. It is possible, that given the limitations associated with the timing of the first pubertal assessment, which are discussed later, statistical tests involving pubertal onset among girls may not be adequately powered in the current data. An examination of indirect effects suggests that the mediational processes accounting for the effects of the interaction between pubertal onset and maternal sensitivity and responsiveness are also moderated by adolescent sex. Specifically, results indicate that the effect of the interaction on sexual risk-taking in males and on non-sexual risk-taking in females may be suppressed by psychosocial maturity. In other words, any influence the interaction between

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pubertal onset and maternal sensitivity and responsiveness has on risk taking is overpowered by the influence psychosocial maturity has on risk behaviors. Among male youth, the interaction between pubertal onset and maternal responsiveness and sensitivity indirectly predicted sexual risk-taking via psychosocial maturity. Among female youth, the interaction between pubertal onset and maternal responsiveness and sensitivity marginally indirectly affected non-sexual risk-taking via psychosocial maturity. These results further support the notion that psychosocial maturity serves as a repertoire of responses individuals bring to the table in the face of myriad experiences and can be viewed as a toolbox from which adolescents can draw.

General Conclusions

Despite previous literature suggesting adolescent characteristics predict subsequent parenting; present results indicate that pubertal onset does not influence subsequent maternal sensitivity and responsiveness. These inconsistent findings may in part be explained by the indicators of pubertal onset selected for analysis. Specifically, Tanner stage 2 pubic hair was used to indicate pubertal onset. It may be that adolescent characteristics that are less visible to parents, such as pubic hair, are the least likely to influence parenting. Turning to one of the control variables in the present study, social skills, supports the plausibility of this explanation. Undoubtedly, social skills represent an adolescent characteristic that would be more noticeable to the parent. In the structural equation model with grade 3 controls, social skills at grade 3 predicted higher maternal sensitivity and responsiveness at grade 5. While this finding is not central to the present study, it is consistent with previous literature (Hofer et al., 2013).

Findings from the present study highlight the importance of psychosocial maturity in protecting youth against increased risk-taking behavior (Steinberg, 2007). In addition to being important early on in adolescence, psychosocial maturity is important for later periods of

development including adulthood. One of the reasons early psychosocial maturity is important is in its protective role in the face of other risks across development. For example, among a sample of American adolescents, Lewin-Bizan and colleagues (2010) found that psychosocial maturity (termed positive youth development or PYD) positively predicted subsequent social engagement attitudes. In an investigation of the relation between psychosocial maturity and adolescent alcohol use, higher psychosocial maturity was associated with less alcohol use both concurrently at age 15 and at a two-year follow-up (Adalbjarnardottir, 2002). Therefore, the ways in which youth navigate the adolescent transition have implications throughout the remainder of the life course; as such, understanding psychosocial maturity during adolescence in particular is critically important. However, in addition to adolescence, psychosocial maturity could be informative with regard to studying adult samples as well. This may be particularly true given the widening gap between adolescence and adulthood commonly termed emerging adulthood. During this developmental period individuals may be particularly well-positioned to close the gap in between any competencies possessed by the end of adolescence and those consistent with adulthood via their continued development of psychosocial maturity.

Overall, results from the present study support the use of a dynamic systems approach to adolescent development (Bronfenbrenner & Evans, 2000). Particularly, the findings noting differential susceptibility highlight the importance of fit and misfit of maternal sensitivity and responsiveness, consistent with the stage-environment fit theory (Gutman & Eccles, 2007). Furthermore, the distal prediction of age 15 psychosocial maturity by maternal sensitivity and responsiveness in grade 5, which was highly correlated with earlier maternal sensitivity and responsiveness, supports the notion of developmental cascades (Cox et al., 2010). That is, earlier maternal sensitivity and responsiveness may lay the groundwork for the subsequent

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establishment of adaptive psychosocial maturity. Additionally, the present data are consistent with the notion that adolescence in general and puberty in particular are sensitive periods of development (Romeo, 2005). Consistent with the literature on male puberty, the present results support sex differences in the implications of pubertal timing. Specifically with regard to non-sexual risk, male youth may be placed at risk given later puberty, rather than earlier puberty like their female counterparts (Gaysina, Richards, Kuh, & Hardy, 2015; Monahan & Steinberg, 2011). The finding that female youth were more sensitive to grade 5 maternal sensitivity and responsiveness with regard to non-sexual risky behavior (but not other outcomes), partially supports evidence previously presented by Ellis (1991) that girls may be particularly sensitive to parenting influences.

The present study explained only a small proportion of variance in psychosocial maturity, sexual risk-taking, and nonsexual risk-taking suggesting that there may be other key predictors excluded from these analyses. It is critical that future research address this limitation and uncover additional factors that contribute to these important adolescent outcomes. For example, future research can examine the additional influence that fathers have on psychosocial maturity and risky behavior. Another avenue for exploration includes other influential adults such as teachers, coaches, and mentors. Given the increasing influence peers have during adolescence, it could prove fruitful to investigate peer influences as well. For example, several studies by Dijkstra and colleagues indicate that over time adolescents become more and more like their friends, in both positive and negative ways (e.g., Dijkstra, Cillessen, & Borch, 2013; Dijkstra, Gest, Lindenberg, Veenstra, & Cillessen, 2012).

Among the study strengths are the large longitudinal sample followed from birth through 15 years, the rigorous nurse assessment of adolescent physical development, and the use of

structured parent-child dyadic interactions. However, there are also several limitations to the present study, which relied heavily on a mostly European American, middle class sample. The demographics of the present sample limit generalizing results for several reasons. The sample is largely a middle-class sample, which limits the variability in many of the key variables of interest. Previous literature has shown that the variability in parenting and family functioning (McLoyd, 1990; Newland, Crnic, Cox, & Mills-Koonce, 2013) and child socioemotional well-being (McLoyd, 1997) is predicted by socioeconomic status and race. Furthermore, the literature points to the particular vulnerability of children facing family economic changes during transitions including the transition to early adolescence (e.g., Morris, Duncan, & Clark-Kauffman, 2005). Thus the results are not generalizable beyond the present sample.

Another limitation of the present study is that pubertal development was assessed beginning when youth were approximately 9.5 years old. For the earliest maturing youth, the first pubertal assessment was after puberty was already underway. In the present sample roughly 30% of females and 10% of males were already in Tanner Stage 2 or higher at the first assessment. Further, the pattern of pubertal timing in this sample reflects previously cited racial differences (e.g., Herman-Giddens, 2006; Rosenfield et al., 2009; Sun et al., 2002). African American female youth were more likely to have exceeded Tanner stage 1 by the initial pubertal assessment compared to their European American counterparts, 60% and 27%, respectively. This difference held among African American and European males as well (35% and 6.5%, respectively). Given sex and race differences in the timing of puberty, this affected the accuracy of age of pubertal onset among female youth more than male youth and African American youth more so than European American youth. It may be that some of the null results, particularly regarding the direct, indirect, and interactive effects of pubertal onset among female youth

resulted from artificially low variability resulting in inadequate statistical power. Thus, the present findings regarding the implications of age of pubertal onset must be interpreted with caution, especially with regard to African American female youth.

Despite the limitations, this study adds to our understanding of adolescence as a sensitive developmental period. This work builds our understanding of the development of positive adolescent attributes, specifically psychosocial maturity. This study implicates parenting as a particularly important and dynamic context of development in this regard. Findings relating increasing maternal sensitivity and responsiveness during adolescence to less sexual risk-taking provide support for the effectiveness of parenting interventions targeting parents of adolescents. However, it is important to temper these findings given the relatively low incidence of risky behavior in this sample. Furthermore, this study adds to the differential susceptibility literature by demonstrating that later maturing male youth may be particularly susceptible to negative outcomes associated with less than optimal maternal sensitivity and responsiveness. Taken together, these data suggest that there are distinct pathways linking pubertal onset and maternal sensitivity and responsiveness to adolescent psychosocial maturity and risky behavior that are moderated by adolescent sex. Beyond the nuanced pathways through which youth arrive at psychosocial maturity, its importance in protecting against risky behavior remains consistent across male and female youth.

Table 1 Correlations and Descriptive Statistics Observed Variables: Entire Sample

(N =730)

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Maternal Education	14.40	2.39	-													
2. Income-to-Needs Ratio	3.74	2.78	.55**	-												
3. Early Parenting	0	.75	.58**	.48**	-											
4. Social Skills Grade 3	57.37	9.61	.25**	.20**	.42**	-										
5. Age of Pubertal Onset	11.45	1.36	0	.04	.07^	.04	-									
6. Parenting Grade 5	0	.82	.49**	.42**	.74**	.41**	.02	-								
7. Change in Parenting	6.88	4.82	-.03	-.03	-.11*	-.09*	0	.44**	-							
8. Sexual Risk-Taking	.109	.23	-.16**	-.13**	-.10**	-.10*	-.10*	-.16**	-.09*	-						
9. Any Risk-Taking	.384	.20	-.18**	-.21**	-.28**	-.22**	-.07	-.21**	-.05	.49	-					
10. Resistance to Peer Influence	28.75	3.67	-.04	0	.01	.09*	-.02	.03	.04	-.08*	-.29**	-				
11. Impulse Control	3.52	.89	.12**	.14**	.18**	.16**	-.01	.18**	.06	-.24**	-.47**	.42**	-			
12. Future Orientation	2.62	.49	.06	.02	.09*	.15**	-.09*	.09*	.05	-.09**	-.35**	.32**	.38**	-		
13.Self-Reliance	3.44	.39	.14**	.07	.18**	.18**	-.05	.15**	.04	-.04	-.15**	.48**	.33**	.22**	-	
14. Identity	3.54	.42	.10*	.15**	.17**	.17**	.03	.17**	.07	-.13**	.13**	.33**	.41**	.19**	.59**	-
15. Work Orientation	3.01	.50	.17**	.15**	.14**	.18**	.01	.16**	.04	-.16**	-.31**	.35**	.48**	.44**	.49**	.48**

Note. * p < .05, ** p < .01

Table 2 Correlations and Descriptive Statistics Observed Variables by Sex

Males (N =360; below the diagonal) Females (N = 370; above the diagonal)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Maternal Education	-	.52**	.54**	.21**	.02	.45**	.01	-.18**	-.23**	-.06	.09	.04	.09	.09	.20**
2. Income-to-Needs Ratio	.58**	-	.47**	.18**	.03	.42**	-.01	-.15**	-.23**	0	.17**	.02	.07	.17**	.19**
3. Early Parenting	.61**	.48**	-	.37**	.06	.73**	-.08	-.17**	-.31**	-.01	.14**	.14**	.11*	.13*	.14**
4. Social Skills Grade 3	.27**	.22**	.45**	-	.06	.38**	-.05	-.09^	-.14*	-.02	.08	.13*	.07	.12*	.14**
5. Age of Pubertal Onset	-.02	.05	.08	.03	-	.04	-.01	-.14**	-.07	0	.06	-.07	-.03	.12*	.05
6. Parenting Grade 5	.53**	.42**	.75**	.44**	-.01	-	-.46**	-.13*	-.27**	-.01	.16**	.14**	.09	.14**	.19**
7. Change in Parenting	-.07	-.06	-.13*	-.12*	.01	.42**	-	-.14**	-.08	.08	.10	.04	.06	.11*	.04
8. Sexual Risk-Taking	-.14*	-.12*	-.24**	-.11*	-.10*	-.18**	-.03	-	.48**	-.05	-.31**	-.05	-.05	-.21**	-.15**
9. Any Risk-Taking	-.13*	-.19**	-.24**	-.25**	-.08	-.15**	-.04	.51**	-	-.28**	-.50**	-.29**	-.13*	-.17**	-.37**
10. Resistance to Peer Influence	-.05	.01	0	.15**	-.04	.04	0	-.10	-.24**	-	.37**	.22**	.48**	.36**	.35**
11. Impulse Control	.14*	.10*	.22**	.24**	-.09	.20**	.03	-.17**	-.45**	.47**	-	.32**	.23*	.42**	.55**
12. Future Orientation	.07	.01	.03	.15**	-.09	.04	.07	-.14**	-.39**	.39**	.45**	-	.16**	.12*	.43**
13. Self-Reliance	.17**	.06	.22**	.25**	-.08	.19**	.03	-.03	-.13*	.45**	.38**	.25**	-	.56**	.46**
14. Identity	.13*	.11*	.22**	.24**	-.07	.21**	.02	-.03	-.10	.34**	.39**	.28**	.66**	-	.47**
15.Work Orientation	.13*	.08	.14*	.22**	-.04	.13*	.05	-.17**	-.26**	.37**	.39**	.46**	.54**	.49**	-
Mean (females)	14.59	3.86	.07	58.78	10.93	.05	-.02	.10	.35	29.47	3.57	2.67	3.49	3.53	3.03
SD (females)	2.37	2.96	.72	9.29	1.15	.76	.76	.27	.18	3.48	.90	.49	.38	.44	.53
Mean (males)	14.27	3.63	-.07	55..93	12.03	-.06	.02	.11	.42	27.9	3.48	2.58	3.38	3.56	3.00
SD (males)	2.45	2.56	.78	9.74	1.35	.84	.72	.27	.21	3.71	.88	.49	.40	.39	.47

Note. * p < .05, ** p < .01

Table 3 Psychosocial Maturity Factor Loadings by Sex

Indicator	Psychosocial Maturity Standardized Factor Loading	
	Males	Females
Resistance to Peer Influence	.596	.507
Impulse Control	.713	.781
Future Orientation	.575	.537
Self-Reliance	.479	.466
Identity	.439	.539
Work Orientation	.623	.711

Table 4 Model Indices for Constrained Parameters

Fit Index	Fully Constrained Baseline Model	Freed Parameter					
		Regression of Sexual Risk-Taking on Parenting Change	Regression of Pubertal Onset on Sexual Risk-Taking	Regression of Pubertal Onset on Non-Sexual Risk-Taking	Regression of Psychosocial Maturity on MSR Change	Regression of Psychosocial Maturity on Pubertal Onset X Grade 5 MSR*	Regression of Parenting Change on Pubertal Onset
χ^2	492.776	489.058	490.796	489.574	491.421	484.257	495.827
χ^2 df	192	191	191	191	191	191	191
CFI	.893	.894	.894	.895	.894	.896	.892
TLI	.866	.866	.865	.867	.865	.868	.863
RMSEA	.066	.065	.066	.065	.066	.065	.066
χ^2/df	2.57	2.56	2.57	2.56	2.57	2.54	2.59
SRMR	.066	.066	.066	0.066	.066	.066	.066
BIC	12719.434	12723.048	12723.516	12721.460	12725.965	12719.468	12725.821

Note. *MRS = Maternal Sensitivity and Responsiveness.

Figure 1 Initial structural equation model relating parenting and pubertal onset to psychosocial maturity, sexual risk-taking and non-sexual risk-taking
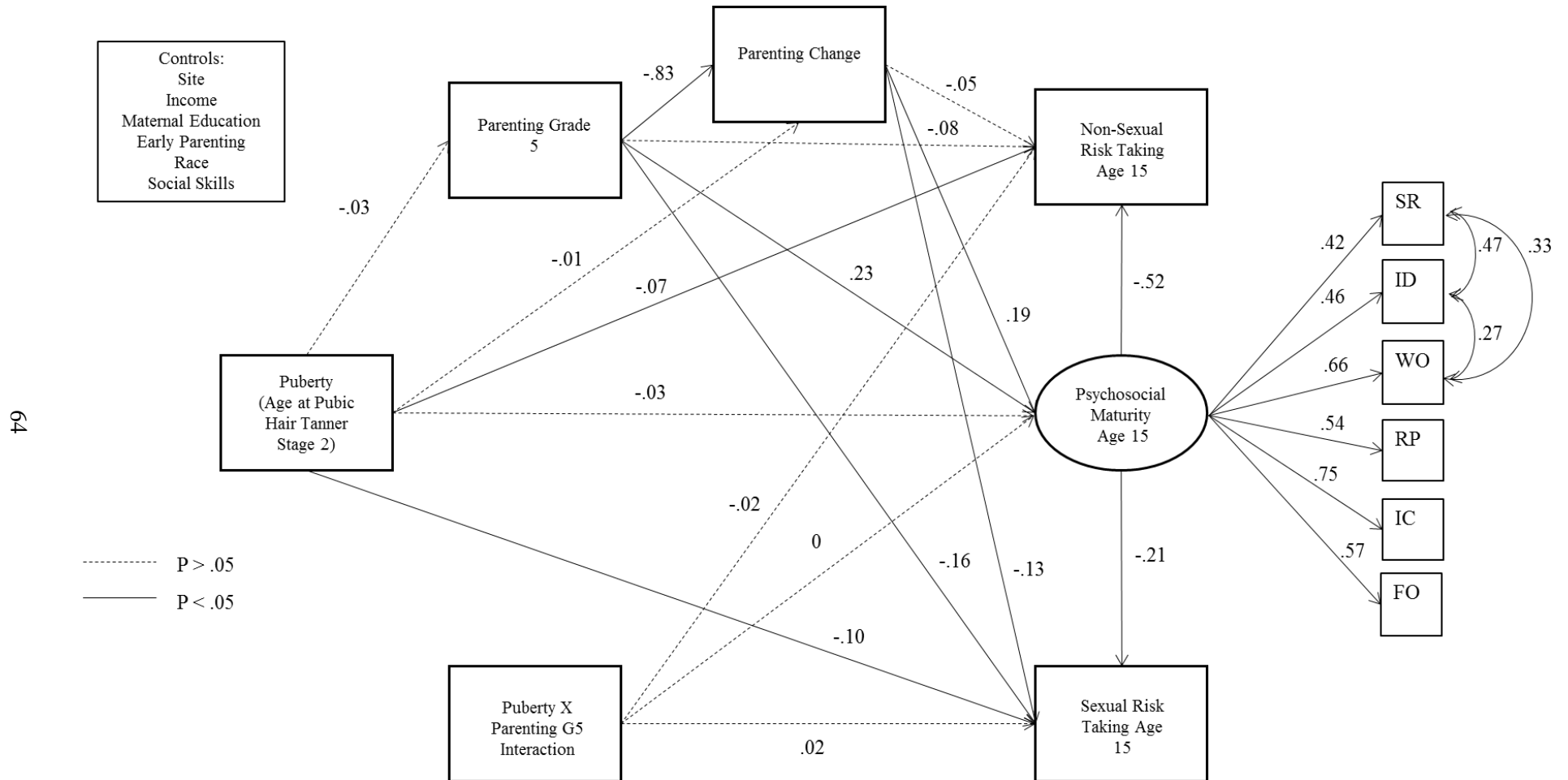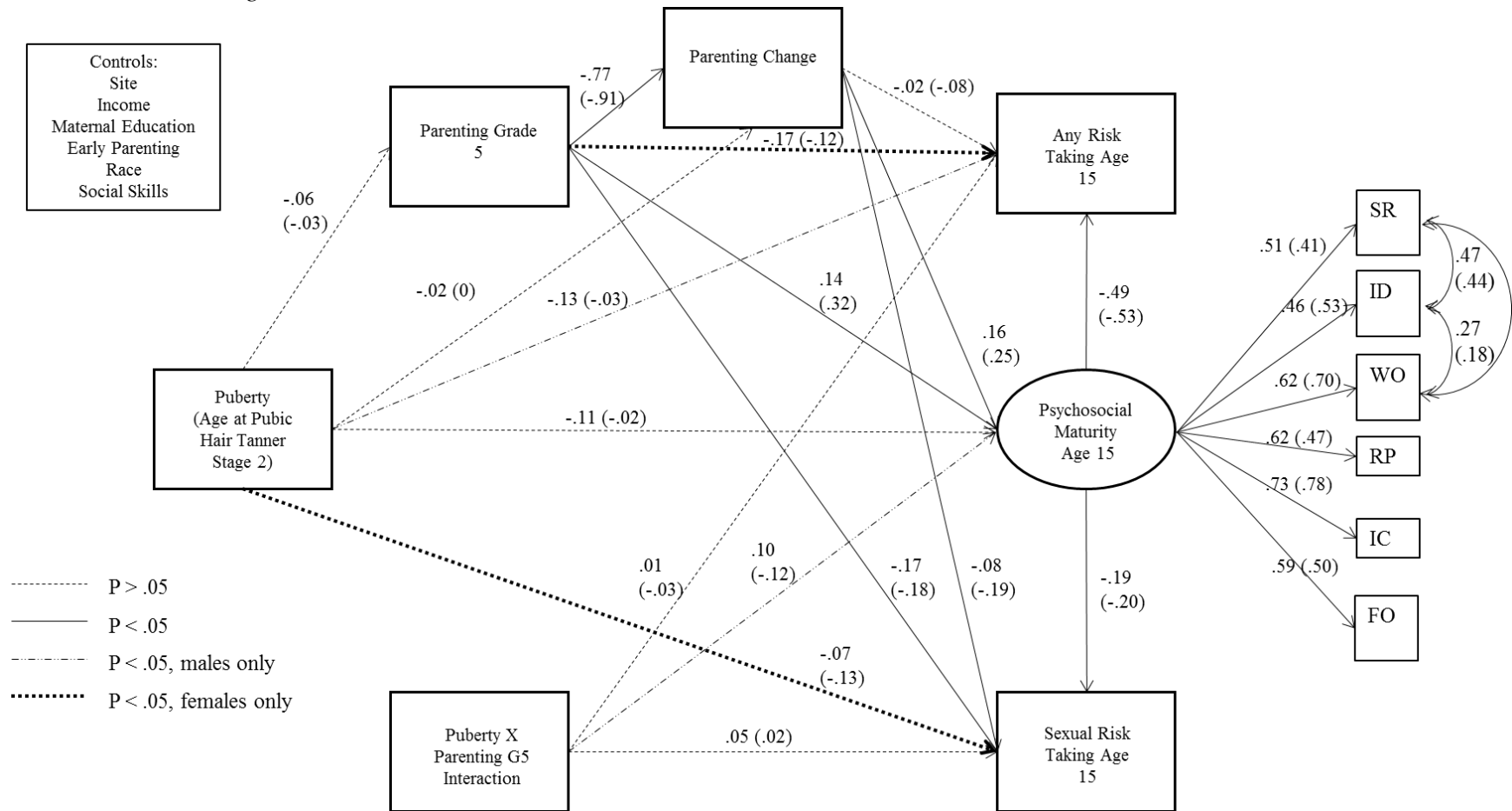
Figure 2 Two-group structural equation model relating parenting and pubertal onset to psychosocial maturity, sexual risk-taking and non-sexual risk-taking

Controls:
Site
Income
Maternal Education
Early Parenting
Race
Social Skills

Parenting Change

Parenting Grade 5

Any Risk Taking Age 15

Puberty (Age at Pubic Hair Tanner Stage 2)

Psychosocial Maturity Age 15

Puberty X Parenting G5 Interaction

Sexual Risk Taking Age 15

SR
ID
WO
RP
IC
FO

-.77 (-.91)
-.02 (-.08)
-.17 (-.12)
-.06 (-.03)
-.02 (0)
-.13 (-.03)
.14 (.32)
.16 (.25)
-.49 (-.53)
-.11 (-.02)
.01 (-.03)
.10 (-.12)
-.17 (-.18)
-.08 (-.19)
-.19 (-.20)
-.07 (-.13)
.05 (.02)
.51 (.41)
.46 (.53)
.62 (.70)
.62 (.47)
.73 (.78)
.59 (.50)
.47 (.44)
.27 (.18)

- - - - - P > .05
———— P < .05
—·—·— P < .05, males only
·········· P < .05, females only

Note. Parameter estimates for females are in parentheses.

Figure 3 Pubertal onset as a moderator of the associations between maternal sensitivity and responsiveness and psychosocial maturity among male youth
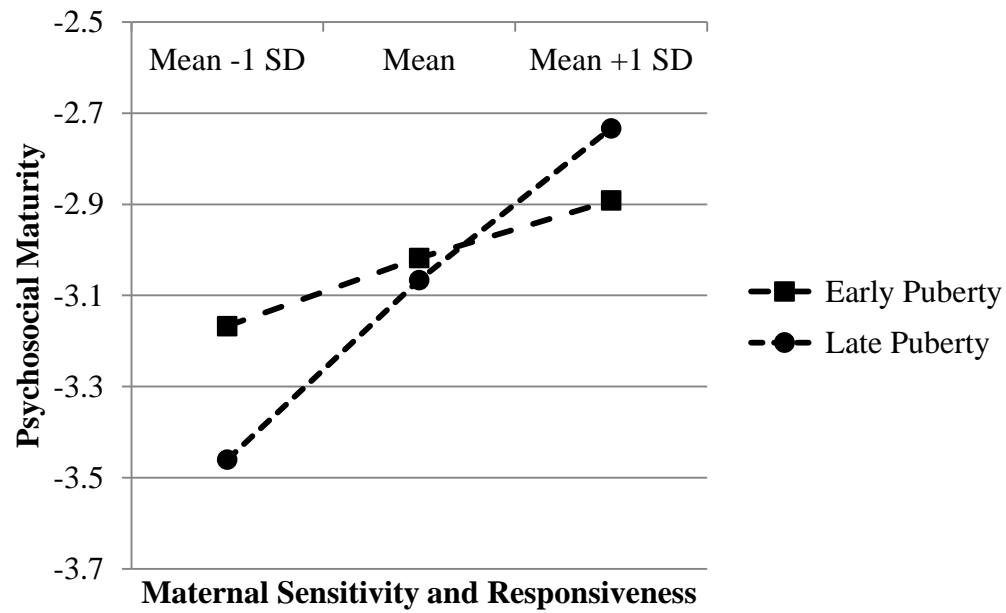
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