

This week, you will research and create an annotated bibliography of five peer-reviewed articles that were published within the last 10 years and relate to the article you selected in Week Two for your Article Review. The peer-reviewed articles you select should be researched in the Ashford University Library and represent a variety of viewpoints on the subject matter. They may support or refute the information presented in your chosen article for review. Each of the peer-reviewed articles must include a complete reference that is correctly formatted in APA style as outlined by the Ashford Writing Center and an annotation of five to six well-developed sentences in your own words that summarize the source and describe its applicability to your selected topic. Please note that no sections from the abstracts of the articles should be included in your annotation.

In your annotation for each peer-reviewed article, analyze psychology as a science as it is presented in the article and explain how it relates to this particular topic. Assess the professional roles presented in the article and describe how they relate to the roles as presented in the article you have chosen for review. Explain any psychological theoretical perspectives presented in the article and how they either support or refute the information provided in the review article. Evaluate contemporary applications of psychology as they are described in the article and compare these to the descriptions within the article for review.

Adolescent and Parental Contributions to Parent–Adolescent Hostility Across Early Adolescence

Bridget B. Weymouth¹ · Cheryl Buehler¹

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Abstract Early adolescence is characterized by increases in parent–adolescent hostility, yet little is known about what predicts these changes. Utilizing a fairly large sample ($N = 416$, 51 % girls, 91 % European American), this study examined the conjoint and unique influences of adolescent social anxiety symptoms and parental intrusiveness on changes in parent–adolescent hostility across early adolescence. Higher mother and father intrusiveness were associated with increased mother- and father–adolescent hostility. An examination of reciprocal effects revealed that mother- and father–adolescent hostility predicted increased mother and father intrusiveness. Significant associations were not substantiated for adolescent social anxiety symptoms. These findings suggest that intrusive parenting has important implications for subsequent parent–adolescent interactions and that similar patterns may characterize some aspects of mother- and father–adolescent relationships.

Keywords Adolescence · Hostility · Intrusiveness · Parent–adolescent relationship · Social anxiety

Introduction

Early adolescence is characterized by multiple life changes for adolescents, parents, and their relationships. For example, adolescents experience the transition into middle school, which is accompanied by new teachers, friends, and school structures (Holas and Huston 2012). This transition happens conjointly with adolescent pubertal maturation (Rudolph 2014) and increases in peer influence (Steinberg and Monahan 2007). Concurrently, parents begin to experience physical and cognitive effects of aging (Lachman 2004). These individual changes and transitions have the potential to create stress in parent–adolescent relationships (McCubbin and Patterson 1983), and studies suggest that parent–adolescent hostility increases during early adolescence (De Goede et al. 2009). Parent–adolescent hostility is defined as overt behavior and expression/communication between parents and adolescents that includes arguing, angry comments, contempt, yelling, swearing, name-calling, and/or physical aggression (Buehler 2006). Research suggests that greater parent–adolescent hostility is associated with a range of adolescent maladaptive emotional and behavioral outcomes, including higher depressive symptoms (El-Sheikh and Elmore-Staton 2004), anxiety (Pasch et al. 2006), and aggression (Steeger and Gondoli 2013). Thus, it is imperative to prevention efforts that research produces valuable information regarding what predicts parent–adolescent hostility.

Guided by Bowen's family systems theory (Kerr and Bowen 1988) and empirics, we utilized a fairly large sample of two-parent families to examine the influence of adolescent social anxiety symptoms and intrusive parenting on parent–adolescent hostility across early adolescence (sixth, seventh, and eighth grades; for conceptual model, see Fig. 1). Prior research has identified several parent and

✉ Bridget B. Weymouth
bbweymou@uncg.edu

Cheryl Buehler
cabuehle@uncg.edu

¹ Department of Human Development and Family Studies, The University of North Carolina at Greensboro, P.O. Box 26170, Greensboro, NC 27402-6170, USA

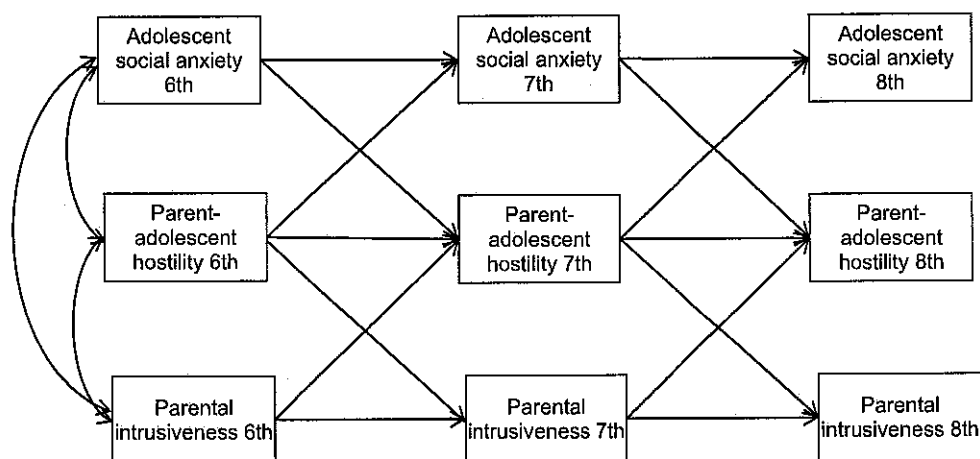


Fig. 1 Conceptual model

adolescent correlates of parent–adolescent hostility, including adolescent temperament (Trentacosta et al., 2011) and specific aspects of ineffective parenting (Sorokhabi and Middaugh 2014). A major limitation of this research, however, is that many studies have not reflected the interconnected nature of individuals and relationships within families (Cox et al. 2001). Specifically, the established adolescent and parental correlates and predictors of parent–adolescent hostility have largely been examined in isolation of one another. As such, prior research has not reflected the dyadic nature of parent–adolescent hostility, such that it is a construct that may be influenced uniquely and conjointly by the behaviors and experiences of the parent *and* the adolescent. In contrast to previous research, this study makes a substantive contribution to the literature on parent–adolescent hostility by discerning the amount of variance in parent–adolescent hostility that is accounted for uniquely by adolescent social anxiety symptoms and parental intrusiveness, while also taking into account their conjoint influence.

Adolescent Social Anxiety Symptoms and Parent–Adolescent Hostility

Developmentally, early adolescence also is an important time to examine social anxiety symptoms. Social anxiety symptoms are defined as feelings of nervousness, insecurity, and avoidance with regard to peers and nonfamilial adults in social interactions and settings (Mallott et al. 2009). One of the hallmarks of early adolescence is changes in adolescent cognitive functioning and capabilities (Steinberg and Silk 2002), which have important implications for adolescents' perceptions and reasoning regarding their relationships with peers and parents. Adolescents develop increasingly advanced social cognitive skills that promote heightened involvement with peers and

the importance that adolescents place on these relationships (Blakemore and Choudhury 2006). Likewise, research suggests that beginning in early adolescence, peers become increasingly important influences on adolescent behavior and well-being (Lam et al. 2014). For example, adolescents become more concerned with how they are perceived by peers and nonfamilial adults during social interactions (Ollendick and Hirshfeld-Becker 2002), fears of negative evaluation increase (Westenberg et al. 2007), and social anxiety symptoms and disorders become more prominent (Kessler et al. 2005).

This study focused specifically on adolescent social anxiety symptoms rather than other indicators of maladjustment for two reasons. First, social anxiety is prominent during early adolescence. Social anxiety ranks third among all mental health disorders and is the most prevalent anxiety disorder. Moreover, the average age of onset for clinical level symptoms of social anxiety is during adolescence (Kessler et al. 2005). Thus, symptoms of social anxiety increase across early adolescence. This trajectory is in contrast to adolescent externalizing symptoms and antisocial behaviors that are more commonly examined in relation to parent–adolescent relationships. Specifically, studies have found that externalizing problems (Castelao and Kröner-Herwig 2014) and antisocial behaviors (Light et al. 2014) decrease, on average, during early adolescence.

Second, a focus on social anxiety symptoms is important, because it acknowledges that adolescents' developmentally salient experiences and interactions with peers and adults that exist *on the periphery* of family systems may have important implications for parent–adolescent interactions *within families*. Although some studies have examined the impact that adolescents have on parent–adolescent hostility (e.g., Trentacosta et al. 2011), research on parent–adolescent interactions is still largely parent-driven. There is less focus on the effects that children and

their experiences have on parent–adolescent relationships. This study makes an important and novel contribution by not only examining the effects of adolescents on parent–adolescent hostility, but by connecting the developmental salience of peer relationships during early adolescence to familial relationships.

In this study, we took a developmental approach to social anxiety and examined social anxiety symptoms, characterized by fears of negative evaluation and social withdrawal, rather than clinical diagnoses. Research on psychopathology indicates that, when assessed over time, patients often do not consistently meet diagnostic cutoffs for diagnoses. Moreover, there can be great fluctuation and variability in social anxiety symptoms over time (Cumings et al. 2000). Thus, a focus on symptoms captures this variability over time.

Bowen's family systems theory suggests that anxiety symptoms reverberate throughout family subsystems (Kerr and Bowen 1988). Additionally, Kerr and Bowen (1988) suggested that anxiety symptoms, such as fears of rejection and feelings of inadequacy, can manifest in anger and hostility that affects family functioning. Theoretically, heightened adolescent social anxiety may increase parents' general anxiety (Schrock and Woodruff-Borden 2010) such that parents may experience worry and concern regarding adolescents' well-being. Heightened anxiety among both adolescents and parents, moreover, may increase the likelihood that adolescents and parents will engage in anxiety-related, hostile behaviors. As such, we hypothesized that adolescent social anxiety is associated positively with increases in parent–adolescent hostility across early adolescence.

Previous cross-sectional studies have reported significant associations between social anxiety and expressed hostility (Hawkins and Cogle 2011), and suggest that socially anxious individuals express hostility and anger significantly more often than do nonanxious controls (Erwin et al. 2003). Other studies have found that higher levels of fear of negative evaluation, an important component of social anxiety, is associated with greater hostility (Erwin et al. 2003), higher perceptions of hostility during social interactions (DeWall et al. 2010), and less prosocial behavior (Maner et al. 2007). Among adolescents, specifically, higher levels of fear of negative evaluation has been associated with more social and overt aggression (Loukas et al. 2005) as well as physical and psychological dating aggression among males (Hanby et al. 2012).

The findings summarized above, however, are limited to associations between social anxiety and *individual* hostile thoughts and behavior. Prior research on parent–child interactions has suggested similar associations. Findings suggest that parents of children with anxiety diagnoses express more negative tone (Suveg et al. 2008) and are less

positive and encouraging (Hudson and Rapee 2000) during observed parent–child interactions than are parents of children without anxiety diagnoses. Other research has found that anxious adolescents express less positive affect during discussions with mothers and fathers than adolescents without anxiety disorders (Suveg et al. 2008). Existing research, however, has been limited to examinations of adolescents with generalized anxiety. Moreover, the comparative and clinical natures of these studies do not discern if there is an association between social anxiety symptoms and parent–adolescent hostility or the directional nature of this association. Overall, to our knowledge, research to date has not provided evidence regarding whether hostility, as predicted by social anxiety symptoms, also manifests in dyadic interchanges between relationship partners. This study extends the literature by examining adolescent social anxiety symptoms within a community-based sample of families as a predictor of dyadic mother- and father–adolescent hostility across early adolescence.

Intrusive Parenting and Parent–Adolescent Hostility

Another important characteristic of adolescence is developmentally normative increases in adolescent differentiation from parents (Laursen and Collins 2009) in which adolescents strive to develop an individual sense of self while maintaining connection and closeness with their parents (Kerr and Bowen 1988). This idea is mirrored by attachment theory (Bowlby 1973), which emphasizes that the balance of autonomy and relatedness is important for close relationships. Specifically, scholars suggest that adolescents who fail to strike a balance between autonomy and relatedness are more likely to utilize hostile tactics in relationship interactions as a way to maintain control (Oudekerk et al. 2015). From an attachment perspective, parental intrusiveness damages adolescents working models of themselves and relationships, because it inhibits adolescents' confidence in navigating social interactions (Bowlby 1973).

During adolescence, growing cognitive abilities also facilitate adolescent reflection about parents' social rules and expectations. Adolescents reconsider the boundaries that divide which issues are subject to parents' authority versus adolescents' personal jurisdictions (Laursen and Collins 2009). This occurs at a time when parents are experiencing increases in parenting stress (Putnick et al. 2010) and must adjust their parenting in order to balance individuality and togetherness in the parent–adolescent relationship to accommodate adolescents' increasing needs for autonomy (Oudekerk et al. 2015). For example, adolescents and parents tend to agree that parents should set limits for adolescent safety, social conduct, and morality issues. In contrast, adolescents believe that parents should

have less authority regarding issues located in their personal domain, such as their emotional and physical expression (Darling et al. 2008). We examined intrusive parenting, which is defined as parental control and inhibition of adolescents' thoughts, feelings, and emotional expression through the use of love withdrawal, guilt induction, and manipulative tactics (Barber et al. 2012), as a parenting behavior that might disturb this balance during a developmentally sensitive period.

Theoretically, higher parental engagement in control over adolescents' personal domain may upset the dynamic equilibrium between individuality and togetherness in parent–adolescent relationships (Kerr and Bowen 1988). Parental control also may undermine developmentally normative increases in adolescent differentiation from parents (Soenens and Vansteenkiste 2010). Higher parental intrusion may constitute boundary violations in the parent–adolescent relationship for adolescents (Barber et al. 2012), and adolescents will likely attempt to restore balance by establishing less permeable emotional boundaries between themselves and their parents. At the same time, parents may struggle to maintain control. Poorly differentiated families, moreover, tend to be more emotionally reactive to one another (Skowron et al. 2009). Thus, parents and adolescents who disagree about emotional boundaries will likely engage in more hostile interactions. As such, we hypothesized that parental intrusiveness is associated with increases in parent–adolescent hostility across early adolescence.

Prior studies have reported that higher intrusive parenting is significantly associated with higher parent–adolescent anger during disagreements (Smetana and Gaines 1999). Other studies have substantiated associations when specifically examining expressed parent–adolescent hostility (Steeger and Gondoli 2013). Few studies, however, have examined the connection between intrusive parenting and parent–adolescent hostility, and most of these studies have been cross-sectional (for an exception, see Steeger and Gondoli 2013). Thus, research has not adequately demonstrated how some of these patterns unfold across early adolescence. Furthermore, although prior research has studied mothers' intrusive parenting, none of these studies examined fathers' intrusiveness as a predictor of father–adolescent hostility. As such, this study extends the literature by elucidating how the associations between mother and father intrusiveness and parent–adolescent hostility unfold across early adolescence.

Co-occurrence of Adolescent Social Anxiety Symptoms and Intrusive Parenting

In addition to the unique effects of adolescent social anxiety symptoms and parental intrusiveness on changes in

parent–adolescent hostility, it also is important to note their possible conjoint relationship and influence. Cross-sectional studies have found positive associations among mother intrusiveness, adolescent social anxiety symptoms (Loukas et al. 2005), and social phobia diagnoses (Knappe et al. 2012). Only two studies have examined associations over time. One prospective study found a positive association between parental intrusiveness and later social anxiety symptoms (Lewis-Morrarty et al. 2012). Loukas (2009) found that adolescent social anxiety symptoms were associated with increased maternal intrusiveness 1 year later. Likewise, only one study has examined specially father intrusions and found that paternal intrusiveness was not associated with adolescent social phobia diagnoses (Knappe et al. 2012). Overall, a review of the research indicates that the strength of the association between parental intrusiveness and adolescent social anxiety symptoms or diagnoses is between .10 and .32. This study makes an important contribution to existing research by examining the conjoint influence of adolescent social anxiety symptoms and parental intrusiveness over time among both mothers and fathers.

The Importance of Parent and Adolescent Gender

This study utilized a sample of two-parent families because it allowed us to examine the associations with father–adolescent hostility, which rarely has been examined in previous research. This study makes an important contribution to existing research on parent–adolescent hostility by examining both mother- and father–adolescent relationships. Studies suggest that mothers spend more time with their children than do fathers (Craig 2006). Moreover, mother–adolescent relationships are more intimate than are father–adolescent relationships (Steinberg and Silk 2002). As such, in the context of greater time and higher intimacy in mother–adolescent relationships, it is possible that mother–adolescent dyads might simply have more time to discuss issues and engage in parent–adolescent hostility than do father–adolescent dyads. Likewise, greater intimacy might heighten the transfer of anxiety within mother–adolescent dyads leading to greater mother–adolescent hostility. Mothers also might experience more difficulty adjusting their parenting to fit adolescents' needs for greater autonomy.

Among the few studies that have examined father–adolescent hostility and conflict, some studies have shown that father–adolescent hostility is uniquely associated with indicators of adolescent maladjustment, including internalizing and externalizing problems (El-Sheikh and Elmore-Staton 2004), problem behaviors (Hakvoort et al. 2010), and depressive symptoms (Pasch et al. 2006). Thus, these results suggest that father–adolescent hostility is

important for adolescent well-being. Research that also elucidates whether the *predictors* of father- and mother-adolescent hostility are shared or are unique will be crucial to prevention efforts. Thus, this study makes an important contribution by examining adolescent social anxiety symptoms and parental intrusiveness as predictors of mother- and father-adolescent hostility. Given that no studies to our knowledge have done this, we did not formulate specific hypotheses about differences in associations between mother- and father-adolescent dyads.

It also is important to note that this study examines mother- and father-adolescent hostility in separate models rather than the alternatives of: (a) examining an aggregate of mother- and father-adolescent hostility, or (b) examining mother- and father-adolescent hostility in the same model, but as separate constructs. Studies have shown that the correlation between mother- and father adolescent hostility is high (i.e., $r > .50$) (e.g., Hakvoort et al. 2010). However, research also has shown that mother- and father-adolescent hostility are uniquely associated with some indicators of adolescent well-being (Adams and Laursen 2007). As such, the aggregation of mother- and father-adolescent hostility into one construct might obscure the unique effects related to these relationships. Likewise, due to the high correlation between mother- and father-adolescent hostility, examining mother- and father-adolescent hostility separately but in the same model might obscure associations which, if examined in separate models, would be significant and shared by mother- and father-adolescent dyads.

This study also examined adolescent gender as a potential moderator. Research has found that girls tend to engage in more harmony-maintenance in relationships than boys (Davies and Lindsay 2004), such that girls try to appease others through repression of their own thoughts and feelings (Rosenfield et al. 2000). In contrast, boys may be more assertive than girls in relationships (Rosenfield et al. 2000). Thus, conceptually, the associations among adolescent social-anxiety symptoms, intrusive parenting, and parent-adolescent hostility might be stronger for boys than girls, because boys might be more willing to engage in parent-adolescent hostility. However, research that has examined whether adolescent gender moderates associations among adolescent social anxiety, intrusive parenting, and parent-adolescent hostility is very limited, and has produced inconsistent findings. Loukas et al. (2005) found that fear of negative evaluation (a component of social anxiety) was associated with overt aggression (a component of parent-adolescent hostility) among boys but not girls. With regards to parental intrusiveness, Steeger and Gondoli (2013) found that adolescent gender did not moderate the association between mother intrusiveness and mother-adolescent hostility. Prior studies typically have

controlled for adolescent gender or have utilized small sample sizes that did not allow for moderation analyses. Given that evidence of adolescent gender moderation is scant, our examination of adolescent gender was exploratory and we did not make any specific hypotheses regarding adolescent gender moderating effects.

It also is possible adolescent social anxiety symptoms and intrusive parenting might be differentially associated with parent-adolescent hostility depending on the gender of the parent and the adolescent. Research suggests that same-sex parent-child dyads are typically more engaged with one another than are opposite-sex parent-child dyads (Raley and Bianchi 2006). Moreover, the salience of this engagement seems to be stronger for fathers than mothers. Based on an investment hypothesis, scholars have suggested that fathers might be more invested in and involved with their sons than daughters (Pleck and Masciadrelli 2004). In terms of parenting influences on adolescent well-being, however, some studies have found stronger associations for opposite-sex dyads than same-sex dyads (Gaylord-Harden et al. 2010). In contrast, other studies have not substantiated gender differences (Fosco et al. 2012). Given these inconsistent findings and the lack of research that has examined the role that the intersection between parent and adolescent gender might play in associations among adolescent social anxiety, parental intrusiveness, and parent-adolescent hostility, specific hypotheses were not formulated in this study.

Covariates

Studies have demonstrated that several adolescent-, parent-, and family-level characteristics are important to consider when examining parent-adolescent hostility. As such, this study includes several covariates. First, we controlled for adolescent pubertal maturation during sixth grade. A developmental readiness hypothesis suggests that adolescents might not be cognitively or emotionally equipped to deal with the experience of earlier pubertal maturation (Ge and Natsuaki 2009). Thus, early maturation might foster adolescent maladjustment and problems in parent-adolescent relationships. Likewise, studies have found that earlier pubertal maturation is associated with greater parent-adolescent conflict (Collins and Laursen 2004).

Second, we controlled for the number of children in the family, birth order, and the age of the eldest child in the family. Studies have found that more children in families increases the odds that parents will engage in abusive and neglectful behaviors (Kim, 2009). Numerous children in families might deplete parents' resources to effectively engage with adolescents (McCubbin and Patterson 1983), leading to the use of more coercive, hostile tactics. Alternatively, scholars have suggested that parents with multiple

children might learn from their experiences with older children, and parent–adolescent hostility might be lower among subsequent parent–child dyads (Shanahan et al. 2007). Whiteman et al. (2011) found that birth order, as well as the first child leaving home, were significantly associated with mother- and father–child conflict frequency. Specifically, first-born adolescents experienced greater conflict with parents than second-born adolescents. Moreover, when the first-adolescent left home, there was an increase in second-born conflict. Thus, although Whiteman et al. (2011) focused on conflict frequency instead of hostility, these results suggest that the birth order, as well as age of the eldest child in the family, might have important implications for parent–adolescent hostility.

Third, we controlled for marital satisfaction. A negative spillover hypothesis suggests that negative moods, feelings, and/or behaviors in the marital subsystem may transfer into parents' interactions with children (Cox et al. 2001). Additionally, studies have found that marital conflict is associated with both concurrent (Low and Stocker 2005) and later (Gerard et al. 2006) parent–adolescent conflict. Finally, we controlled for parental education and family income. It is possible that lower family income and lower parental education might deplete parental resources, and thus their ability to parent effectively. Thus, parents might resort to more hostile and coercive parenting strategies (McCubbin and Patterson 1983). Likewise, studies have found that parental education (Whiteman et al. 2011) and greater economic security (Delgado et al. 2013) are associated with greater parent–adolescent conflict.

Direction of Effects

The focus of this study was to examine how adolescent social anxiety symptoms and parental intrusiveness might conjointly and uniquely predict changes in parent–adolescent hostility across early adolescence. Good research designs, however, also consider alternative explanations. This study utilized a complete short-term longitudinal design that reduces endogeneity problems and helps identify temporal precedence. Additionally, the guiding family systems theoretical framework for this study suggests reciprocal influences among family subsystems may occur over time (Minuchin 1985). Thus, it is plausible that levels of and changes in parent–adolescent hostility also may influence changes in adolescent social anxiety symptoms and parental intrusiveness across early adolescence. Cross-sectional research has found that, controlling for adolescent depressive symptoms, father–daughter hostility is associated with daughters' social anxiety symptoms (Starr and Davila 2008). Other cross-sectional research also has found that, controlling for other indicators of maladjustment,

parent–adolescent hostility is associated positively with adolescent general anxiety symptoms (El-Sheikh and Elmore-Staton 2004). Regarding parental intrusiveness, studies have found that parent–adolescent hostility is associated positively with higher levels of (Buehler 2006) and changes in (Steege and Gondoli 2013) intrusive parenting. As such, the models tested in this study also estimated the influence of parent–adolescent hostility on adolescent social anxiety and intrusive parenting, although these paths were not the primary focus of this study and no hypotheses were made.

Present Study and Hypotheses

The goal of this study was to examine the influence of two developmentally and theoretically important constructs, adolescent social anxiety and intrusive parenting, on parent–adolescent hostility across early adolescence. Guided by family systems theory and empirics, we hypothesized that adolescent social anxiety symptoms and intrusive parenting are each uniquely associated with increases in parent–adolescent hostility across early adolescence (model depicted in Fig. 1). As such, this study makes an important contribution to the literature by examining the proposition that the dyadic parent–adolescent relationship responds to the influences of each individual in the parent–adolescent dyad. Additionally, this study makes an important contribution to the literature by situating parent–adolescent relationships within the context of the growing salience of peers for adolescents, as well as their increasing need for individuation. Furthermore, in addition to its longitudinal design, this study also adds to existing literature by examining father–adolescent functioning (in addition to the more commonly studied mother–adolescent functioning), as well as adolescent gender as a moderator.

Methods

Sampling Procedures and Characteristics

The sample utilized in this study was selected from a larger project that examined family life during youth's transition into adolescence (Buehler 2006). Adolescents from 13 middle schools in a southeastern United States county (and their families) were recruited through 6th grade homeroom classrooms. Of the 71 % of families that returned consent forms within three contacts, 80 % agreed to participate in the study. The resulting sample was reasonably representative of the county in terms of race, parents' marital status, and family poverty status (contact author for statistical details).

Families were eligible to participate in the longitudinal study if parents were married or long-term cohabitants and there were no step-children in the family. There were 1131 families that fulfilled the study requirements and were invited to participate. Of those eligible, 37 % (416 families) agreed to join the longitudinal study. Using survey data from the larger, cross-sectional part of the study, eligible participating families were similar to eligible nonparticipating families on all study variables. Specifically, eligible participating and nonparticipating were compared on over 100 variables that assessed a range of topics including aspects of adolescent, parent–child, marital, and family functioning. There were no differences on any of the multiple variables assessed using adolescent survey information. Results indicated that there were only two differences from the teacher-report data. Eligible, participating adolescents had better class adjustment ($M = 5.17$, $SD = 1.26$) than did eligible, nonparticipating adolescents ($M = 4.78$, $SD = 1.37$). Additionally, eligible, participating adolescents had higher grades ($M = 3.37$, $SD = .76$) than did eligible nonparticipating adolescents ($M = 3.15$, $SD = .92$) (Buehler 2006).

Participating adolescents were 11–14 years old and in 6th grade at Wave 1 (W1) ($M = 11.86$, $SD = 0.69$). Girls comprised 51 % of the youth ($n = 211$). Participating families were 91 % European American and 3 % African American. African American participation was somewhat different than the percentage of married African American couples with children younger than 18 years old in the county (5 %) and in the United States (7.8 %; U.S. Census Bureau 2000a, Table PCT27 of SF4). On average, parents had earned an associate's degree, which is similar to county education statistics of European American adults over 24 years of age (U.S. Census Bureau 2000b, Table P148A of SF4). The median household income for families in this study was about \$70,000, which was higher than the county-level median income (\$59,548) for European American families (U.S. Census Bureau 2000c, Table PCT40 of SF3; \$64,689 inflation-adjusted dollars through 2001).

Data Collection Procedures

Data were collected via questionnaires and observations. Participants were asked to complete questionnaires and participate in observations once a year for 3 years. The first data collection was when adolescents were in 6th grade (W1). Questionnaires and observational tasks were completed again 1 year later when adolescents were in 7th grade (W2) and again in 8th grade (W3). During W1 of data collection, adolescents completed questionnaires at school and were compensated with a pizza party. Additional questionnaires were mailed to parents and

adolescents to complete independently. During a yearly home visit, completed mailed questionnaires were collected, and parents and adolescents completed another set of questionnaires. During the home visit, families also participated in several observed interaction tasks.

This study utilized observational data from a 20-min problem-solving activity that included the mother, father, and adolescent. For the problem solving task mothers, fathers, and adolescents each independently completed the 28-item Issues Checklist (IC; Conger et al. 1992). Based on family member responses, home visitors selected eight issues for discussion. Participants were asked to elaborate on the issue, identify who was usually involved, and suggest possible solutions during their discussion. Families were instructed that they did not need to get through all of the discussion cards and to discuss issues at their own pace. The interaction from this task was videotaped and later coded by trained observers using the Iowa Family Interaction Rating Scales (IFIRS; Melby and Conger 2001). Each family member's behaviors were coded. Coders were trained in concordance the Iowa State Observational Laboratory procedures and criteria. Coders-in-training passed written exams (score of 90 % or higher) and a viewing exam (score of 80 % or higher within 1 rating point on a 9-point scale of the Iowa criterion scores). Monthly training checks also were conducted to minimize coder drift.

Families were compensated \$100 for their participation at W1, \$120 at W2, and \$135 at W3. There was some attrition: 416 families participated at W1, 366 families participated at W2, 340 families at W3 (82 % retention of W1 families). Analyses revealed, however, that there were no significant differences between retained families and families lost to attrition on any study variables (Buehler 2006).

Measures

Parent–Adolescent Hostility

Parent–adolescent hostility was a manifest variable. Mother–adolescent and father–adolescent hostility were examined in separate models and were each measured using adolescent, mother or father, and observer report.

Adolescent, mother, and father reports of parent–adolescent hostility were measured using the 7-item hostility subscale of the Iowa Youth and Families assessment protocol (Conger et al. 1994). Adolescents reported on their own and their mothers' and fathers' hostility. Mothers and fathers reported on their own and their adolescents' hostility. Hostile behaviors were rated on a 7-point response format (1 = *always* to 7 = *never*; reverse coded). Sample items were "Shout at him/her because you were upset with him/her" and "Call you bad names." Cronbach's alpha for

adolescent, mother, and father report of their own and each other's expressed hostility ranged from .80 to .90 for W1 to W3 measures.

Observer reports of mother- and father-adolescent expressed hostility were measured using 12 ratings of hostility, angry coercion, and antisocial behavior from the IFIRS (Melby and Conger 2001). Hostility was indicated by verbal instances of anger, contempt, and critical comments directed toward the other person. Angry coercion was indicated by participants' attempts to control the other person through hostile behavior. Antisocial behavior was indicated by egocentric behavior that demonstrated resistance and insensitive remarks and behaviors towards others. Trained coders rated mother-to-adolescent, adolescent-to-mother, father-to-adolescent, and adolescent-to-father behaviors on a 9-point scale (1 = *not characteristic* to 9 = *mainly characteristic*).

To assess interrater reliability, 20 % of the interaction tasks in this study were coded by two coders. The average level of agreement between the two coders (within one rating point) was 72 % for the mother-adolescent ratings and 73 % for the father-adolescent ratings. Intraclass correlations were .51 for the mother-adolescent ratings and .48 for the father-adolescent ratings. Inconsistencies in codes were resolved through discussion and consensus coding. Cronbach's alpha for observational composites ranged from .73 to .90 for W1 to W3 observations.

Adolescent and mother reports of their own and each other's hostility and the observational ratings of mother-to-adolescent and adolescent-to-mother hostility, angry coercion, and antisocial behavior were each standardized and averaged to create a composite of mother-adolescent hostility at each wave. This same method was used to create the summary score for father-adolescent hostility. Higher scores indicated more mother- or father-adolescent hostility.

Adolescent Social Anxiety Symptoms

Adolescent social anxiety symptoms was a manifest variable. Symptoms were measured at each of the three waves using adolescent reports on the Social Anxiety Scale for Children-Revised (SASC-R; La Greca and Stone 1993). This scale consists of fear of negative evaluation and social avoidance subscales. Adolescents indicated the frequency of social experiences using a 5-point response format (1 = *not at all* to 5 = *all the time*). Sample items included "I worry about what other kids think of me" and "I feel shy around kids I don't know." Adolescent reports on the fear of negative evaluation and social avoidance subscales were averaged to create a composite summary of adolescent social anxiety symptoms. Cronbach's alpha for W1 to

W3 ranged from .83 to .87. Higher scores indicated greater adolescent social anxiety symptoms.

Intrusive Parenting

Mother and father intrusive parenting were manifest variables examined in separate models. Intrusive parenting was measured at each of the three waves using adolescent report and mother or father self-report on an 11-item measure. This measure was created by combining two existing measures of parental psychological intrusion (Barber 1996; Bogenschneider et al. 1997). Adolescents, mothers, and fathers responded to items such as, "My mother/father is/I am the kind of person who is always trying to change how I/my child feel/s or think/s about things" on 3-point response format (1 = *not like her/him/me* to 3 = *a lot like her/him/me*). Cronbach's alpha for adolescent, mother, and father reports of intrusive parenting for W1 to W3 ranged from .64 to .88. Adolescent and mother reports of mothers' intrusive parenting were averaged across reporters to create a composite summary of mother intrusiveness. Adolescent and father reports of fathers' intrusive parenting were averaged to create a composite of father intrusiveness. Higher scores indicated greater intrusive parenting.

Covariates

This study controlled for several adolescent, parent, and family factors. Covariates were adolescent pubertal maturation, the number of children in the family, age of the eldest child in the family, the birth order of the target adolescent, parents' marital satisfaction, mother and father education, and family income. Each of these covariates was a manifest variable.

Adolescent Pubertal Maturation

Adolescent pubertal maturation was measured at W1 using adolescent report on the 5-item Pubertal Developmental Scale (Petersen et al. 1988). Male and females each completed three items assessing their growth in height, growth in body hair, and skins changes on a 4-point scale (1 = *has not started* to 4 = *seems completed*). Males also completed an additional two items about their voice deepening and facial hair which were assessed on the same 4-point scale. Females also completed two additional items. One item asked about breast development on the same 4-point scale. The other item asked if they had begun to menstruate (1 = *yes*, 2 = *no*). A total score on pubertal maturation was computed for males and females by averaging the scores across items. For females, because one item was dichotomous, items were standardized and then averaged to

create a score (Scheffelman-Offermans et al. 2011). Cronbach's alpha for males and females was .66 and .72, respectively.

Number of Children and the Age of the Eldest Child

The number of children and the age of the eldest child in the family were measured at W1 using mother report.

Birth Order

Birth order of the target adolescent was measured at W1 using mother report. Mothers indicated the ages of each child living in the family. The birth order variable was created by coding if the target adolescent was an only child, the youngest, the middle, or the oldest child in the family (0 = *only child* to 3 = *oldest*) (Pollet and Nettle 2009).

Marital Satisfaction

Parents' marital satisfaction was measured at each of the three waves using mother and father report on the 3-item Kansas Marital Satisfaction Scale (Schumm et al. 1986). Mothers and fathers responded to items such as, "How satisfied are you with your husband/wife as a spouse" on a 7-point response format (1 = *extremely dissatisfied* to 7 = *extremely satisfied*). Cronbach's alpha for mother and father reports of marital satisfaction from W1 to W3 ranged from .93 to .97. Mother and father reports were averaged to create a composite summary of marital satisfaction.

Educational Attainment

Mothers and fathers reported on their educational attainment at W1 on a 14-point scale (1 = *no schooling completed* to 14 = *professional degree/Ph.D.*).

Family Income

Mothers reported on family income at W1 (1 = "*under \$2500*" to 41 = *\$100,000 or more*).

Analytic Procedures

Descriptive statistics were calculated using SPSS (version 20). Hypotheses were tested using path analysis in AMOS, version 20. Separate mother-adolescent and father-adolescent models were estimated. Three fit indices were used to assess the acceptability of each analytic model: the Chi-square statistic, comparative fit index (CFI), and root-mean-square error of approximation (RMSEA). A non-significant Chi-square statistic indicated good model fit.

However, due to the large sample size, a significant Chi-square was expected for most models. Therefore, other fit indices also were examined (Byrne 2001). Adequate model fit was indicated by CFI values of .90 to .95 (Byrne 2001; Hu and Bentler 1999) and RMSEA values ranging from .06 to .08 (Browne and Cudeck 1993; Byrne 2001). Good model fit was indicated by CFI values greater than .95 and RMSEA values less than .05 (Browne and Cudeck 1993; Byrne 2001; Hu and Bentler 1999). The significance level for all estimates was set at $p < .05$. Missing values were addressed using full information maximum likelihood estimation methods, a preferred technique for producing estimates with minimal bias (Schlomer et al. 2010).

To test for adolescent gender moderation, mother- and father-adolescent models were examined across sons and daughters using multiple-group path analysis. Two models were estimated and compared. The first model constrained all parameters to be equal across groups. The second model allowed regression estimates to vary across sons and daughters. A significant change in Chi-square indicated that gender differences in the structural paths existed. In order to locate the source of differences, critical ratios were examined. Critical ratios greater than 1.96 ($p < .05$) indicated adolescent gender differences for a specific regression path.

Results

Preliminary Analyses

Descriptive statistics, including correlations, are shown in Table 1 for the mother- and father-adolescent models. Zero-order correlations were in the expected directions. Importantly, adolescent social anxiety symptoms and parental intrusiveness were each associated with parent-adolescent hostility within data collection waves. With regards to the problem-solving context of the observational component of the parent-adolescent hostility composite, the most frequent family issues discussed during 6th, 7th, and 8th grades included family disagreements about chores at home, kids fighting with each other, and attitudes and/or respect among family members.

Stability and Change from 6th to 8th Grade

Mother-adolescent and father-adolescent hostility demonstrated both stability and change from 6th to 8th grade. Standardized regression estimates across 6th to 8th grade were .62 and .49 ($ps < .001$) and .60 and .44 ($ps < .001$) for mother- and father-adolescent hostility, respectively. This suggests that parent-adolescent hostility scores from 6th to 8th grades share between 24 and 38 % of variance over time.

Table 1 Descriptive statistics and intercorrelations between variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. YR PA hos W1	.66 ^c	.36 ^c	.19 ^c	.33 ^c	.48 ^c	.23 ^c	.48 ^c	.38 ^c	.10	.13 ^b	.31 ^c	.24 ^c	.45 ^c	.41 ^c	.20 ^c	.13 ^a	.28 ^c	.22 ^c	.14 ^b
2. PR PA hos W1	.45 ^c	.42 ^c	.23 ^c	.10 ^a	.25 ^c	.43 ^c	.27 ^c	.72 ^c	.28 ^c	.05	.19 ^c	.41 ^c	.32 ^c	.66 ^c	.22 ^c	.10	.15 ^b	.34 ^c	.06
3. OB PA hos W1	.22 ^c	.28 ^c	.66 ^c	.07	.16 ^c	.14 ^b	.15 ^b	.25 ^c	.41 ^c	.01	.15 ^b	.15 ^b	.11 ^a	.21 ^c	.45 ^c	-.01	.09	.15 ^b	-.04
4. YR SA W1	.26 ^c	.13 ^b	.03	1	.29 ^c	.10 ^a	.27 ^c	.16 ^b	.03	.55 ^c	.11 ^a	.20 ^c	.17 ^b	.16 ^b	.08	.47 ^c	.16 ^b	.14 ^b	.01
5. YR intru W1	.45 ^c	.25 ^c	.14 ^b	.25 ^c	.46 ^c	.28 ^c	.27 ^c	.23 ^c	.07	.10 ^a	.47 ^c	.30 ^c	.31 ^c	.27 ^c	.15 ^b	.09	.45 ^c	.25 ^c	.13 ^b
6. PR intru W1	.27 ^c	.42 ^c	.07	.15 ^c	.20 ^c	.21 ^c	.16 ^b	.36 ^c	.18 ^c	.08	.17 ^c	.56 ^c	.27 ^c	.44 ^c	.25 ^c	.14 ^b	.26 ^c	.60 ^c	-.05
7. YR PA hos W2	.46 ^c	.41 ^c	.19 ^c	.25 ^c	.19 ^c	.29 ^c	.74 ^c	.29 ^c	.16 ^b	.18 ^c	.42 ^c	.16 ^b	.54 ^c	.28 ^c	.16 ^b	.19 ^c	.29 ^c	.21 ^c	.04
8. PR PA hos W2	.37 ^c	.71 ^c	.22 ^c	-.01	.20 ^c	.34 ^c	.45 ^c	.43 ^c	.33 ^c	.14 ^b	.25	.45	.31	.77	.19	.16	.20	.38	.09
9. OB PA hos W2	.20 ^c	.25 ^c	.46 ^c	.05	.14 ^a	.12 ^c	.36 ^c	.29 ^c	.60 ^c	-.01	.13 ^b	.17 ^c	.22 ^c	.30 ^c	.54 ^c	-.01	.13 ^a	.21 ^c	-.06
10. YR SA W2	.12 ^a	.10	.06 ^c	.55 ^c	.10 ^b	.16 ^c	.22 ^c	.09	.04	1	.13 ^b	.21 ^c	.05	.10	-.03	.59 ^c	.15 ^b	.11 ^a	-.04
11. YR intru W2	.31 ^c	.34 ^c	.13 ^b	.21 ^c	.45 ^c	.27 ^c	.42 ^c	.33 ^c	.28 ^c	.18 ^c	.62 ^c	.26 ^c	.34 ^c	.26 ^c	.19 ^c	.10	.51 ^c	.36 ^c	.09
12. PR intru W2	.26 ^c	.43 ^c	.13 ^c	.12 ^a	.16 ^c	.61 ^c	.25 ^c	.53 ^c	.16 ^b	.20 ^c	.30 ^c	.21 ^c	.24 ^c	.46 ^c	.16 ^b	.25 ^c	.25 ^c	.60 ^c	.03
13. YR PA hos W3	.40 ^c	.38 ^c	.19 ^c	.17 ^b	.19 ^c	.28 ^c	.52 ^c	.43 ^c	.24 ^c	.10	.39 ^c	.33 ^c	.73 ^c	.36 ^c	.28 ^c	.21 ^c	.43 ^c	.26 ^c	.01
14. PR PA hos W3	.41 ^c	.64 ^c	.28 ^c	.11 ^a	.16 ^c	.34 ^c	.44 ^c	.67 ^c	.33 ^c	.04	.25 ^c	.39 ^c	.48 ^c	.47 ^c	.24 ^c	.15 ^b	.26 ^c	.45 ^c	.12 ^a
15. OB PA hos W3	.23 ^c	.24 ^b	.42 ^c	.04	.18 ^c	.18 ^c	.27 ^c	.27 ^c	.52 ^c	.00	.25 ^c	.23 ^c	.31 ^c	.34 ^c	.57 ^c	-.03	.16 ^b	.14 ^b	-.08
16. YR SA W3	.15 ^b	.15 ^c	.09	.47 ^c	.12 ^c	.27 ^c	.22 ^c	.11 ^a	.03	.59 ^c	.21 ^c	.19 ^c	.24 ^c	.12 ^a	-.06	1	.16 ^b	.09	-.10
17. YR intru W3	.37 ^c	.33 ^c	.16 ^b	.14 ^b	.40 ^c	.28 ^c	.37 ^c	.30 ^c	.25 ^c	.13 ^a	.62 ^c	.28 ^c	.49 ^c	.33 ^c	.28 ^c	.13 ^a	.69 ^c	.33 ^c	.12
18. PR intru W3	.30 ^c	.39 ^c	.26 ^c	.17 ^b	.16 ^c	.55 ^c	.30 ^c	.40 ^c	.23 ^c	.16 ^b	.29 ^c	.66 ^c	.38 ^c	.49 ^c	.29 ^c	.21 ^c	.28 ^c	.21 ^c	.04
19. Adol gender	.03	-.06	-.06	.01	.06	-.03	-.05	-.05	-.05	-.04	.05	-.08	-.08	-.02	-.04	-.10	.10	-.12 ^a	1
<i>M</i>	1.65	1.89	3.00	2.14	1.36	1.30	1.66	1.80	3.25	2.32	1.32	1.28	1.64	1.87	3.23	2.30	1.35	1.28	0.49
	1.53	1.82	2.90	2.14	1.28	1.30	1.55	1.79	3.10	2.32	1.27	1.31	1.57	1.83	3.09	2.30	1.32	1.31	.49
<i>SD</i>	0.51	0.66	1.29	0.72	0.32	0.23	0.49	0.57	1.40	0.87	0.33	0.22	0.52	0.63	1.35	0.90	0.36	0.22	0.50
	.45	.58	1.30	.72	.27	.23	.41	.58	1.40	.87	.32	.24	.49	.64	1.28	.90	.37	.25	.50
<i>Min</i>	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
<i>Max</i>	4.29	5.36	9.00	4.61	3.00	2.27	3.63	4.44	7.17	5.00	2.73	2.09	4.19	4.00	8.33	5.00	3.00	2.09	1.00
	3.21	4.00	9.00	4.61	2.55	2.09	3.00	3.88	7.50	5.00	2.73	2.36	3.63	5.19	7.50	5.00	3.00	2.55	1.00

Correlations for mothers are depicted on the lower diagonal. Correlations for fathers are depicted on the upper diagonal. Correlations along the diagonal are correlations between mother and fathers. Descriptives for mothers are located in the first row. Descriptives for fathers are located in second row

W1 = 6th grade, W2 = 7th grade, W3 = 8th grade

YR youth report, PR parent report, OB observed, PA parent-adolescent, hos hostility, SA social anxiety, Intru intrusiveness, Adol adolescent

^a $p < .05$; ^b $p < .01$; ^c $p < .001$

Thus, there was adequate change in parent–adolescent hostility across early adolescence to examine predictors of this change. Stability and change also were demonstrated for adolescent social anxiety symptoms from 6th to 8th grades in the mother–adolescent ($\beta = .53$ and $.46$; $p < .001$) and father–adolescent ($\beta = .54$ and $.47$; $p < .001$) models. There also was stability and change in mother ($\beta = .47$ and $.51$; $ps < .001$) and father ($\beta = .52$ and $.45$; $ps < .001$) intrusiveness.

Mother–Adolescent Hostility

The mother–adolescent model fit the data well ($[\chi^2(67) = 89.55, p = .03, CFI = .99, RMSEA = .03]$; see Fig. 2). As hypothesized, higher 7th grade mother intrusiveness was associated with increased mother–adolescent hostility during 8th grade ($\beta = .14, p = .001$). Contrary to our hypothesis, significant unique associations were not found between adolescent social anxiety symptoms and mother–adolescent hostility across 6th to 8th grades.

There was some evidence of reciprocal effects. Higher 6th grade mother–adolescent hostility was associated with increased mother intrusiveness ($\beta = .22, p < .001$) during 7th grade. Additionally, higher 7th grade mother–adolescent hostility was associated with increased mother intrusiveness during 8th grade ($\beta = .16, p < .001$). Significant associations were not found between mother–adolescent hostility and later changes in adolescent social anxiety symptoms.

Multi-group analyses indicated that the mother–adolescent model differed for sons and daughters [$\Delta\chi^2(41) = 59.52, p = .03$]. Examination of critical ratios revealed that the association between 6th and 8th grade mother–adolescent hostility (i.e., the stability coefficient)

was significant for daughters ($\beta = .34, p < .001$) but not for sons ($\beta = .06, p = .43$). Thus, adolescent gender differences occurred in the stability of mother–adolescent hostility across 2 years, rather than in the prediction of mother–adolescent hostility.

Father–Adolescent Hostility

The father–adolescent model fit the data well ($[\chi^2(67) = 71.40, p = .33, CFI = .99, RMSEA = .01]$; see Fig. 3). As hypothesized, higher 7th grade father intrusiveness was associated with increased father–adolescent hostility during 8th grade ($\beta = .15, p = .001$). Contrary to our hypothesis, significant associations were not found between adolescent social anxiety symptoms and father–adolescent hostility across 6th to 8th grades.

There was some evidence of reciprocal effects. Higher 6th grade father–adolescent hostility was associated with increased father intrusiveness during 7th grade ($\beta = .13, p = .002$). Significant associations were not found between father–adolescent hostility and increases in adolescent social anxiety symptoms during early adolescence. Multi-group analyses indicated that adolescent gender did not moderate these associations [$\Delta\chi^2(41) = 48.15, p = .21$].

Discussion

Research has demonstrated that hostile parent–adolescent relationships are an important risk factor for adolescent well-being (Laursen and Collins 2009). Yet, little is known about how much of the variance in parent–adolescent hostility can be uniquely accounted for by relevant factors located in each member of the parent–adolescent dyad.

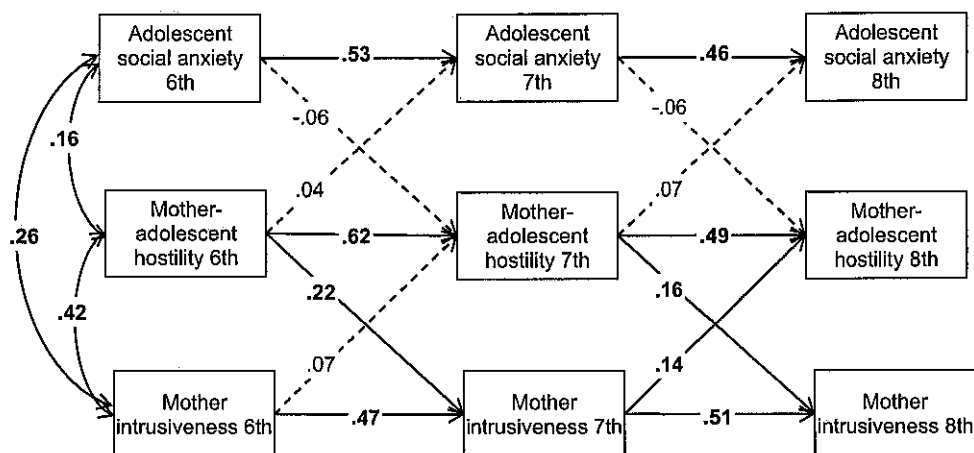


Fig. 2 Mother–adolescent path model 6th to 8th grade. Estimates are standardized coefficients. Bolded estimates are significant at $p < .05$. Associations were estimated between 6th and 8th grade adolescent social anxiety, mother–adolescent hostility, and mother intrusiveness,

but are not shown in the figure. Within each wave, disturbances between adolescent social anxiety, mother–adolescent hostility and mother intrusiveness were estimated but are not shown in the figure. Covariates are not depicted for simplicity

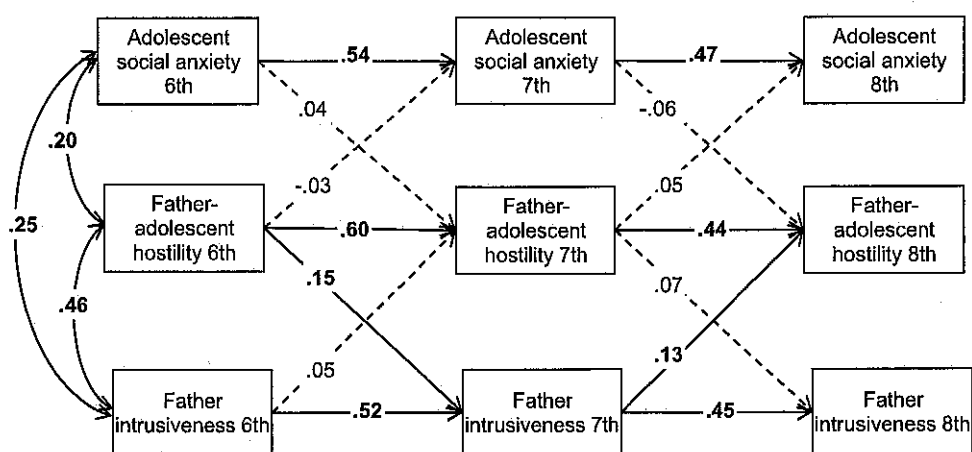


Fig. 3 Father-adolescent path model 6th to 8th grade. Estimates are standardized coefficients. **Bolded** estimates are significant at $p < .05$. Associations were estimated between 6th and 8th grade adolescent social anxiety, father-adolescent hostility, and father intrusiveness but

are not shown in the figure. Within each wave, disturbances among adolescent social anxiety, father-adolescent hostility, and father intrusiveness were estimated but are not shown in the figure. Covariates are not depicted for simplicity

Research also has been limited regarding how patterns unfold over time and whether associations are similar or different for mother- and father-adolescent dyads. This study contributes to research on parent-adolescent hostility by examining both adolescent and parental contributions to mother- and father-adolescent relationships. Although results indicated that the stability estimates of social anxiety and parental intrusiveness over time were comparable, significant findings were substantiated only for pathways between parental intrusiveness and parent-adolescent hostility.

As we hypothesized, mothers' and fathers' intrusive parenting were associated with increases in mother- and father-adolescent hostility, but only between 7th and 8th grades. Consistent with prior longitudinal research (Buehler 2006), we also found that the increases in 7th grade mother and father intrusiveness were predicted by higher mother- and father-adolescent hostility during 6th grade. Together, these findings suggest that 7th grade may represent an important developmental window for parental influences on subsequent parent-adolescent interactions. Higher parent-adolescent hostility during 6th grade may increase parenting distress and deplete mothers' and fathers' abilities to engage in positive parenting practices (Papp et al. 2005). Thus, mothers and fathers may attempt to manage higher 6th grade parent-adolescent hostility by engaging in increased control and manipulation of adolescents' thoughts and feelings during 7th grade.

This developmental and systemic pattern may be salient when adolescents are 12–13 years old (i.e., 7th grade), in part, because of transformational shifts in adolescents' desires for increased autonomy and for an increased need for adequate levels of family differentiation (Laursen and Collins 2009). For 7th grade adolescents, higher parental intrusiveness may constitute disrespect and violations of

adolescent boundaries regarding their emotional independence (Barber et al. 2012). Therefore, adolescents are likely to reject parents' intrusion which may manifest in increased hostility with parents during 8th grade (Smetana and Gaines 1999). This finding is consistent with prior cross-sectional research that found that higher parental intrusiveness was associated with higher parent-adolescent disagreement (Hawk et al. 2009) and expressed anger (Smetana and Gaines 1999). Contrary to the results of the current study, however, Steeger and Gondoli (2013) did not find a significant association between mothers' intrusive parenting during 7th grade and mother-adolescent conflict during 8th grade. These contrasting results might be due to differences in measurement methods and reporters. Steeger and Gondoli examined mother and adolescent reports of parenting and mother-adolescent conflict separately and solely utilized questionnaire data. The present study is an improvement over prior research because it enhanced construct validity by: (a) utilizing observational measurement of parent-adolescent hostility, and (b) utilizing composites of parent and adolescent reports on intrusive parenting and parent-adolescent hostility. Nonetheless, future research will need to clarify these inconsistencies and replicate the current findings.

Findings did not support the hypothesis that adolescent social anxiety is associated positively with increases in parent-adolescent hostility across early adolescence. There are a few possible explanations for these results. First, other mechanisms may be important to examine when considering the relationship between adolescent social anxiety and dyadic parent-adolescent hostility. For example, in addition to positing that anxiety may manifest in hostility, Kerr and Bowen (1988) suggested that individual anxiety may reverberate throughout family systems. More specifically, increases in adolescent social anxiety may

increase parents' worries and concerns regarding their adolescents' well-being (Schrock and Woodruff-Borden 2010). Future research should consider parental anxiety symptoms as mechanisms of influence in the association between adolescent social anxiety and parent–adolescent hostility. Additionally, the link between social anxiety and parent–adolescent hostility may characterize only a subgroup of individuals with social anxiety (Kashdan et al. 2009). Thus, the association between adolescent social anxiety and parent–adolescent hostility might depend on levels of adolescent or environmental characteristics such as emotional regulation or social support (Kashdan et al. 2009). To our knowledge, this is the first study to examine the association between adolescent social anxiety symptoms and dyadic parent–adolescent relationships (i.e., hostility). Given the theoretical and developmental saliency of adolescent social anxiety symptoms, future research should build on this study and continue to examine the ways in which adolescent social anxiety symptoms may influence dyadic, family relationships across adolescence. Important areas of consideration will include possible moderating effects that may suggest for whom or under which conditions these associations are significant.

An important contribution of this study to existing research was its examination of both mother- and father–adolescent relationships. As such, this study demonstrates both similarities and differences in the processes related to mother- and father–adolescent hostility across early adolescence. Consistent with findings of prior research on mother–adolescent hostility (Steeger and Gondoli 2013), results indicated that mothers continued to respond to higher mother–adolescent hostility during 7th grade with increased intrusive parenting during 8th grade. This study adds to existing research by finding that this path was not significant in the father–adolescent model. Possibly due to more closeness and intimacy in mother–adolescent relationships than father–adolescent relationships (Steinberg and Silk 2002), mothers might be more resistant than fathers to modifications in maternal–adolescent boundaries during 8th grade in response to higher 7th grade mother–adolescent hostility. Thus, some mothers may continue to manage or diffuse higher mother–adolescent hostility through increases in guilt induction and manipulative parenting tactics during 7th to 8th grades. In contrast to mothers, fathers may become more comfortable with less permeable boundaries or might increase their use of other conflict management tactics, such as withdrawal (Van Doorn et al. 2011), in response to higher father–adolescent hostility during 7th grade. Moreover, these findings might reflect differences in mothers and fathers parenting more generally. Scholars have suggested that, on average, fathers spend less time interacting with their children than mothers. With regards to more specific types of involvement,

mothers tend to engage in more daily caregiving and management of adolescents daily lives than fathers. In contrast, father involvement is typically characterized by engagement in weekend social activities and playful interactions with children and adolescents (for a review, see Parke 2013). As such, scholars suggest that fathers' interaction behaviors might reflect more flexible attitudes about parenting adolescents. Additionally, fathers' interaction behaviors might be perceived by adolescents as support for more egalitarian and peer-like parent–adolescent relationships (Parke 2013).

It is important to note, however, that the observational measure of parent–adolescent hostility used in this study was situated in the context of a triadic interaction. Although this study only used codes for dyadic interactions, it is important to consider the impact that each dyadic relationship within this triad might have for other dyadic relationships. This study controlled for marital satisfaction as a way to reduce the influence that the interparental relationship might have on dyadic, parent–adolescent hostility. Future research, however, should compare results when parent–adolescent hostility is observed in dyadic versus triadic contexts.

Although exploratory, this study also examined adolescent gender differences. Results indicated only one adolescent gender difference, which occurred in the stability coefficient for mother–adolescent hostility across 2 years. The pathway between 6th grade and 8th grade mother–adolescent hostility was significant for daughters but not sons. Prevention efforts should consider that mother–adolescent hostility during the transition into adolescence may have particularly important implications for the quality of mother–daughter relationships later during adolescence. Programs should target the communication techniques of both parents and adolescents, such as problem solving and responsiveness, but possibly in differential ways. Studies have found that more positive interactions between mothers and children were predicted by greater child engagement in problem solving. However, child engagement in problem solving was promoted by greater emotional responsiveness and less oppositional communication among mothers (Nelson et al. 2014).

Beyond this finding, adolescent gender did not moderate the associations among adolescent social anxiety symptoms, intrusive parenting, and parent–adolescent hostility across early adolescence. Other research also has examined the association between intrusive parenting and mother–adolescent hostility across early adolescence and did not find gender differences (Steeger and Gondoli 2013). The results from this study contribute to existing research by also examining father–adolescent hostility, and suggest that the patterns of mother- and father–adolescent hostility examined in this study are, overall, very similar for male and female adolescents across early adolescence.

Although this study makes several important contributions to the existing literature, there are several limitations. First, the intraclass correlations for observed parent–adolescent hostility were relatively low. However, by compositing the observational ratings with additional measures of hostility, the reliability of the overall composited measure of parent–adolescent hostility was improved. Second, the examinations in this study were largely focused on direct effects between variables. Thus, the current study cannot elucidate more complex processes of influence that might occur within families across early adolescence. Future research would be improved by examining mediators of these associations as well as important contextual moderators. Third, the findings are limited to a sample of primarily European American families. As such, findings are not generalizable to families of other racial or ethnic groups and family structures. This is an important avenue for future research, as some scholars suggest that “the broader cultural context in which adolescent–parent relationships occur would be expected to determine the types of issues and specific ways in which conflicts are expressed” (Smetana and Gaines 1999, p. 1447). Studies have found that Mexican-American adolescents were less likely than the European-American adolescents to endorse open disagreement with their parents (Phinney et al. 2005). In terms of parenting behaviors, some scholars have concluded that Mexican-American adolescents might equate parental psychological control with parental care and involvement (Sher-Censor et al. 2011). In other cultural contexts, parent–adolescent-hostility and parental intrusiveness might be perceived differently than among European-American families, which might affect the pattern of associations demonstrated in this study. It is possible that across cultural, racial, and ethnic groups, the predictors and processes of parent–adolescent hostility may vary from the findings of this study.

Likewise, the sample solely consisted of two-parent families, and the results may vary by family structure. Divorce may bring multiple transitions and perturbations in the parent–adolescent relationship that may inherently change family systems; therefore, the predictors of parent–adolescent hostility and how processes unfold over time among single-parent and/or divorced families may be different than those of two-parent families (Demo and Fine 2010). Overall, there is a dearth of research in this area and future research should aim to fill this gap.

Conclusion

Guided by family systems theory (Kerr and Bowen 1988), this study examined adolescent and parent predictors of parent–adolescent hostility across early adolescence and

detailed some of the interconnected nature of individuals and parent–adolescent relationships within families. In addition to its longitudinal, multi-method research design, this study makes important contributions to existing research by suggesting that parent–adolescent hostility at the beginning of adolescence shapes subsequent interactions via parental intrusiveness for both mother- and father–adolescent dyads. Moreover, although significant findings were not substantiated between adolescent social anxiety and parent–adolescent hostility, this study makes an important, novel contribution to the literature by examining how parent–adolescent relationships might be influenced by adolescents’ experiences with peers and nonfamilial adults. Future research should focus on examining additional mechanisms of influence and extend its scope to families of other races, ethnicities, and family structures.

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Author contributions BW collaborated with the second author to design the study, performed the statistical analyses for the study, and drafted and revised the manuscript; CB collaborated with the first author to design the study, provided the data for this study, helped with statistical analyses, and assisted in the drafting and revisions of the manuscript. All authors read and approved the final manuscript.

Conflict of interest The authors declare that they have no conflict of interest.

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Bridget Weymouth is a doctoral student in the department of Human Development and Family Studies at the University of North Carolina at Greensboro. Her primary research interests focus on how family processes are associated with parent–adolescent relationships and adolescent well-being. Her more specific interests include parent–adolescent hostility and the development of adolescent social anxiety symptoms.

Cheryl Buehler is Professor in the Department of Human Development and Family Studies at the University of North Carolina at Greensboro. Her primary areas of interest include family processes, including various aspects of parenting; marital conflict and early adolescent well-being; the work–family interface; adolescent close relationships; the transition into middle school; and family influences on health practices. She also has particular interest in research design, methods, and statistics.

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Parent-child relationships of boys in different offending trajectories: a developmental perspective

Loes Keijsers,¹ Rolf Loeber,² Susan Branje,¹ and Wim Meeus¹

¹Faculty of Social Sciences, Research Centre for Adolescent Development, Utrecht University, Utrecht, The Netherlands; ²Department of Psychiatry, University of Pittsburgh, Pittsburgh, PA, USA

Background: This study tested the theoretical assumption that transformations of parent-child relationships in late childhood and adolescence would differ for boys following different offending trajectories. **Methods:** Using longitudinal multiinformant data of 503 boys (ages 7–19), we conducted Growth Mixture Modeling to extract offending trajectories. Developmental changes in child reports of parent-child joint activities and relationship quality were examined using Latent Growth Curves. **Results:** Five offending trajectories were found: non-offenders, moderate childhood offenders, adolescent-limited offenders, serious childhood offenders, and serious persistent offenders. Non-offenders reported high and stable levels of relationship quality between age 10 and 16. Adolescent-limited offenders reported a similarly high relationship quality as non-offenders at ages 7 and 10, but a lower and decreasing relationship quality in adolescence. Compared with non-offenders, serious persistent offenders reported poorer parent-child relationship quality at all ages, and a decreasing relationship quality in adolescence. Serious persistent offenders and adolescent-limited offenders reported similar levels and changes in parent-child relationship quality in adolescence. Although serious persistent offenders reported fewer joint activities at age 10 and 13 than non-offenders, a similar linear decrease in joint activities in early to middle adolescence was found for boys in each trajectory. **Conclusion:** Developmental changes in parent-child relationship quality differ for different types of offenders. This finding has scientific and practical implications. **Keywords:** Delinquency, offending trajectories, parent-child relationship, longitudinal, growth curve modeling.

Introduction

From diverse theoretical view points, problematic parent-child relationships have been linked to children's and adolescents' engagement in delinquency (Loeber & Dishion, 1983; Reid & Patterson, 1989; Stattin & Kerr, 2000). However, the changing nature and quality of these relationships from childhood into late adolescence, while well-documented in developmental research (Conger, Lorenz, & Wickrama, 2004), are yet to have been described for offenders. Consequently, suggestions by researchers (Moffitt, 1993; Patterson & Yoerger, 1997) that the nature and quality of parent-child relationships evolve differently for boys in different offending trajectories, and the potential implication that offenders could be differentiated on transformations in parent-child relationships, are yet to be empirically tested. The current study therefore aimed to unravel the unique developmental changes in parent-child relationships that boys in different offending trajectories experience.

Offending trajectories in boys

Moffitt (1993) emphasized that the average age-crime curve in boys' delinquency represents meaningful

individual differences in offending trajectories. She initially distinguished three trajectories between childhood and early adulthood. In addition to a group of children who do not engage in delinquency (i.e., non-offenders), an estimated one forth up to two thirds go through a smooth childhood, but temporarily engage in moderate levels of nonviolent delinquency during adolescence (i.e., adolescent-limited offenders), and about 5% engage in serious delinquency from childhood into early adulthood (i.e., serious persistent offenders; Moffitt, 1993; Moffitt & Caspi, 2001; Patterson & Yoerger, 1997). Several subsequent empirical studies have confirmed and extended upon this idea. For instance, a fourth trajectory can be found empirically, that is composed of children who engage in childhood conduct problems, but who recover in adolescent years (Lacourse, Nagin, Tremblay, Vitaro, & Claes, 2003; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996). A review of 80 longitudinal studies using group-based modeling (Piquero, 2007), moreover, revealed a picture of three to six offense trajectories from childhood to late adolescence. Besides the theoretically assumed trajectories of adolescent-limited and life-course persistent offending, other offending trajectories were repeatedly found, such as late-onset persistent delinquency and moderate, but declining delinquency. Hence, empirical studies underscore the

emphasize the fact that there is more variation in delinquency than is theoretically described to date.

Although adolescent-limited and serious persistent offenders are assumed to have their own etiologies, prognoses, and require tailored interventions (Moffitt, 1993; Moffitt et al., 1996), these offenders may be difficult to differentiate based on their levels of delinquency (Moffitt et al., 1996), which in turn presents a considerable challenge to scientists and to practitioners working with delinquent youths. One domain on base of which different types of delinquents can be possibly differentiated is the nature and quality of parent-child relationships. In particular, developmental changes in parent-child relationships from childhood to adolescence are assumed to vary for boys in different trajectories (e.g., Moffitt, 1993; Patterson & Yoerger, 1997), and studying transformations in parent-child relationships may thus offer unique and valuable insights into the differential etiology of different types of offenders.

Typically, however, scholars examining parent-child relationship transformations ignore the existence of offending trajectories and studies on delinquency development ignore transformations in parent-child relationships. Instead, a common approach is to examine parent-child relationship transformations among a general population, which ignores the fact that transformations may go differently depending on adolescent offending. Another common approach is to predict offending trajectory membership from childhood family variables, which provides little more than basic descriptive information on differences between offenders; however (Piquero, 2007), and ignores the potential differences in family processes of boys in different offending trajectories. Changes in the parent-child relationship from childhood into adolescence in children in different offending trajectories are, to the best of our knowledge, yet to be examined.

Parent-child relationship transformations

Relationship transformations in families of non-offenders are believed to be a relatively smooth process towards greater adolescent independence (Collins, 1990; Steinberg, 1990). As part of normal development among nonoffending children, hierarchical authoritarian parent-child relationships in childhood are gradually transformed into more egalitarian ones in late adolescence, to meet adolescents' increasing need for autonomy and independence. As children enter high school, the role and influence of the peer group increases, while the time children spend in joint activities, their parents' declines (Larson, Richards, Moneta, Holmbeck, & Duckett, 1996). Keeping track of adolescents' whereabouts and activities, thus, becomes a process in which parents have to rely on their adolescents' disclosures regarding their leisure time (Keijsers, Branje, Van

Kerr & Stattin, 2000; Laird, Marrero, & Sentse, 2010; Marshall, Tilton-Weaver, & Bosdet, 2005; Racz & McMahon, 2011; Smetana, Metzger, Gettman, & Campione-Barr, 2006; Stattin & Kerr, 2000). Adolescent disclosure, in turn, may be facilitated by joint activities (Keijsers, Branje, Van der Valk et al., 2010; Willoughby & Hamza, 2010) and a good affective quality of the parent-child relationship (Keijsers, Branje, Frijns, Finkenauer, & Meeus, 2010; Keijsers, Frijns, Branje, & Meeus, 2009; Kerr, Stattin, & Trost, 1999).

As part of normative developmental changes, these two general aspects of parent-child relationships, joint activities, and the affective quality, are realigned. A decrease in joint activities is assumed to take place (Larson et al., 1996) under more or less stable levels of affection. For example, empirical studies on general populations show that the affective quality of the parent-child relationship is stable during adolescence (Loeber et al., 2000) or shows a small decline from early to middle adolescence (De Goede, Branje, & Meeus, 2009; Keijsers, Loeber, Branje, & Meeus, 2011; Shanahan, McHale, Crouter, & Osgood, 2007). That is, whereas parental involvement, in terms of joint activities, may decrease significantly, the affective quality of the relationship may be rather stable. Whether these normative relationship transformations from childhood into adolescence take place for non-offenders only, or also in families of offending boys is an unanswered question.

Parent-child relationship transformation for different types of offenders

Moreover, relationship transformations may evolve differently for boys in different offending trajectories. Adolescent-limited offenders are believed to have a history of warm and close relationships with their parents in childhood, however, problematic relationships with their parents during adolescent years (Moffitt, 1993; Patterson & Stouthamer-Loeber, 1984; Patterson & Yoerger, 1997; Stattin & Kerr, 2000). Their delinquency, emerging in adolescence, has been argued to reflect their needs to cut off childhood bonds to parents (e.g., Moffitt, 1993) and apparently this strategy is successful: Adolescent exhibiting moderate levels of delinquency spend less time than nondelinquent adolescents in joint activities with their parents and report the relationship to be of poorer quality (e.g., Keijsers, Branje, Van der Valk et al., 2010; Laird, Pettit, Bates, & Dodge, 2003). In summary, theory and findings suggest that the initially high-quality parent-child relationship of adolescent-limited offenders deteriorates rapidly in adolescence. To the best of our knowledge, this study is the first to examine these changes unique to adolescent-limited offenders.

For children exhibiting persistent conduct problems with an early-onset, parent-child relationships

that the boys' previous behavioral problems, as well as earlier disrupted family processes, result in relatively problematic transformations in parent-child relationships during adolescence. Empirical studies show, for instance, that parental involvement decreases more rapidly for children with early deviant behavior than is normative (e.g., Patterson, Bank, & Stoolmiller, 1990; Pettit, Keiley, Laird, Bates, & Dodge, 2007). How serious persistent offenders and their parents realign the parent-child relationship from childhood into late adolescence has never been described however. Knowledge is even more sparse with regard to offender trajectories that have only recently been described in the literature, such as boys with high levels of childhood deviance that desists after the childhood years (Moffitt et al., 1996; Piquero, 2007). This study aimed to answer this question.

The present study

In summary, the theoretically anticipated differential development of parent-child relationships in families of children who follow different trajectories in delinquency is a neglected field of study. It remains therefore unknown how normative transformational processes in parent-child relationships of non-offenders compare to processes in families of different offender subtypes, and to what extent adolescent-limited offenders differ from serious persistent offenders. This study addressed two research questions and related hypotheses to examine this issue.

First, we examined how many developmental offending trajectories can be distinguished from age 7 to 19. We hypothesized that we would find non-delinquents, children with temporarily moderate delinquency in adolescence (i.e., adolescent-limited offenders), and children with an early onset of serious and persistent delinquency. In addition, we expected one or more empirically based trajectories, such as children with heightened levels of delinquency in childhood only.

Second, this study examined how the nature and quality of parent-child relationships develop between ages 7 and 16 for boys in different offending trajectories. Therefore, we compared offending groups on mean levels (at age 7, age 10, age 13, and age 16) and developmental changes (from age 7 to 10, from 10 to 13, and from 13 to 16) of these relationship aspects. For *non-delinquents*, we expected a consistently high-quality parent-child relationship and high, but slightly decreasing joint activities during early adolescence. *Adolescent-limited delinquents* were hypothesized to have equivalent parent-child interactions as non-delinquents in childhood; however, a stronger decline in joint activities and relationship quality in early adolescence. For *serious persistent offenders*, we expected to find an increasingly poor quality of parent-child relationship and low levels of and strongly decreasing joint activities during early adolescence. We did not construct *a priori*

Methods

Sample and procedure

This study used data from the Pittsburgh Youth Study, a large longitudinal study on inner-city boys, in which three cohorts of boys in grade 1, 4, and 7 were screened on antisocial behavior. Based on a composite score of parental, teacher, and participant information, the 30% most antisocial boys were identified as high-risk and the remainder as lower risk. Per cohort, about 250 high-risk boys and 250 lower risk boys were randomly selected for participation (for a detailed description of this procedure: Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998).

After written informed consent was obtained from the participants and their legal guardians, data collection took place by interviewing primary caretakers, boys, and teachers. The first eight follow-ups were conducted half-yearly, and the subsequent nine assessments were conducted with an annual time interval. For the purpose of consistency, half-yearly waves were merged into yearly scores in this study, leading to thirteen annual waves of delinquency (age 7-19) and 10 annual waves of child-reported parent-child relationship measures (age 7-16). The cooperation rate throughout the study was high (average 82.3%; and 83.2% on the final assessment; Loeber et al., 2002).

The current study is based on data of the youngest cohort ($n = 503$; 256 high-risk and 247 lower risk). At the first follow-up, 4 months after the screening, the average age of participants was 6.9 years. Just over half of this sample was African-American (57.8%), and the remainder was Caucasian. The primary caretaker, the persons who claimed to have main responsibility for the boy, was almost exclusively female (96.8%; of which 92.2% was the biological mother). Demographics of this sample were representative for the school sample from which it was drawn (Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998).

Measures

The *General Delinquency Seriousness Classification* (Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998), based on combined reports of the parents (Child Behavior Check List, CBCL, Lifetime scale), the teacher (Teacher Rating Form; TRF), and the child (Self-Reported Antisocial behavior scale, SRA, or Self-Reported Delinquency scale, SRD), was used to classify delinquent behaviors: Level 0 represented absence of delinquency; level 1 consisted of minor delinquency at home or outside home, such as minor vandalism, fire-setting with insignificant damage or shoplifting; level 2 was comprised of moderately serious delinquent acts, including pick pocketing and carrying weapons; level 3 represented serious delinquency, including murder, rape, and robbery; and two or more serious level 3 offenses were assessed as level 4. Boys were classified in the category matching the most serious delinquent act they had committed in the last year. Six-month waves were combined by placing the youth at the highest level attained across the two waves. One-year stability ranged between $r = .27$ and $r = .55$. Previous studies have shown

of this measure are adequate (Farrington, Loeber, Stouthamer-Loeber, Van Kammen, & Schmidt, 1996).

Parent-child relationship quality. Using the relationship with primary caretaker questionnaire (Stouthamer-Loeber, Loeber, Wei, Farrington, & Wikstrom, 2002), the affective quality of the parent-child relationship was assessed in terms of negative and positive aspects of the relationship. Boys filled in 13 items (e.g., 'How often have you liked being your mother's/father's child?', see also Appendix 1). Answers were rated on a 3-point Likert scale: 1 = *Almost never*, 2 = *Sometimes*, and 3 = *Often*. Sum scores were used. Internal consistency of this scale ranged between $\alpha = .73$ and $\alpha = .87$ and 1-year stability ranged between $r = .46$ and $r = .61$. Previous studies have shown that this scale has adequate construct and convergent validity in the prediction of delinquency (e.g., Loeber, Farrington, Stouthamer-Loeber, Moffitt, & Caspi, 1998; Stouthamer-Loeber et al., 2002).

Joint activities. From the supervision/involvement questionnaire (Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998), we extracted a four-item scale, assessing frequency of joint leisure activities of boys and their parents. Boys answered items, such as 'How often do you and your mom do things together at home?' (When fathers were the primary caretaker, boys' reports on fathers were included in the scale-score). Items were scored on a 3-point scale (1 = *Almost never* to 3 = *Often*), and were summed to create a scale-score. Cronbach α 's ranged between $\alpha = .63$ and $\alpha = .79$. Temporal stability ranged between $r = .34$ and $r = .54$.

Analyses

First, we aimed to find the optimal number of distinct developmental trajectories in boys' delinquency between ages 7 and 19. Using *Mplus* version 4.0 (Muthén & Muthén, Los Angeles, CA), delinquency was modeled as a function of initial levels (intercepts), rate of change (linear slopes) and nonlinear change (quadratic slopes). To take the nonnormal distribution of delinquency into account, we used Poisson modeling with Robust Maximum Likelihood estimation (Piquero, 2007). Although our seriousness classification is not strictly a count measure, one-sample Kolmogorov-Smirnov tests over all measurement waves confirmed that the Poisson distribution fitted our data adequately. Cases with partially missing data were included in the analyses using Full Information Maximum Likelihood. We started with a model without variation around trajectories, as is a common approach in criminological research (Latent Class Growth Analysis; LCGA; Nagin, 2005). As the former model may be overly simplistic (for arguments: Piquero, 2007), we increased model complexity by allowing children in each trajectory to vary on initial levels or rate of change (Growth Mixture Modeling; GMM; Muthén & Muthén, 2000).

We ran these different model types while specifying one up to six trajectories, thereby aiming to find the best model in terms of type of modeling (GMM vs. LCGA) and in terms of number of trajectories. The optimal model has the lowest Bavesian Information Criterion

significantly improve the model according to the Lo-Mendell-Rubin Likelihood Ration Test (LMR-LRT). The accuracy of classification of individuals in latent groups was judged with Entropy.

Second, we examined and compared levels and developmental changes in parent-child relationships for boys in different offending trajectories. For that purpose, we used Latent Growth Curve Modeling on joint activities and on relationship quality (Duncan, Duncan, Strycker, Li, & Alpert, 1999), with grouping based on offending trajectories. To facilitate interpretation, we examined linear development for three time-periods separately (ages 7–10, ages 10–13, and ages 13–16). All model fits were adequate: Chi-square values ranged from 23.32 to 40.26 with $df = 25$, Tucker Lewis Indices (TLI) and Comparative Fit Indices (CFI) ranged from .95 to 1.00, and the Root Mean Square Error of Approximation (RMSEA) fell between .00 and .08. To test for the hypothesized group differences in the levels at ages 7, 10, 13, and 16, and changes in parent-child variables between age 7–10, 10–13, and 13–16, we created dummy variables, comparing non-delinquents to each of the other offending trajectories, and serious persistent offenders to adolescent-limited offenders.

Results

Distinct offending trajectories

To examine the number of offending trajectories between ages 7 and 19, we used three types of modeling: LCGA, GMM with variation around intercepts, and GMM with variation around linear slopes. A further GMM-model with variation around intercepts and linear slopes did not converge probably due to model complexity. We consistently found five developmental trajectories to be optimal. Out of the three 5-trajectory models, there was strong evidence that GMM with variation around linear slopes had the best fit: The BIC value was nine points lower than the LCGA-model, and seven points lower than the model with variance around the intercepts. Moreover, stringent LMR-LRTs confirmed that five trajectories were preferred over four trajectories; however, six trajectories were not preferred over five. Entropy of this model was .62, which is acceptable. Moreover, cross tabulation of individuals using LCGA and GMM with variance around linear slopes indicated substantial agreement between both classifications (contingency coefficient = .87, $p < .001$). Trajectories are visually presented in Figure 1. Model fit estimates of these analyses are available from the first author upon request.

The first trajectory (24%) consisted of boys with very low levels of delinquency throughout childhood and adolescence; hence, they were labeled *non-delinquents*. The second trajectory (29%) showed moderate levels of delinquency in childhood; however, low levels in adolescence, and was labeled *moderate childhood delinquents*. Boys in the third trajectory (9%) had relatively low levels of delin-

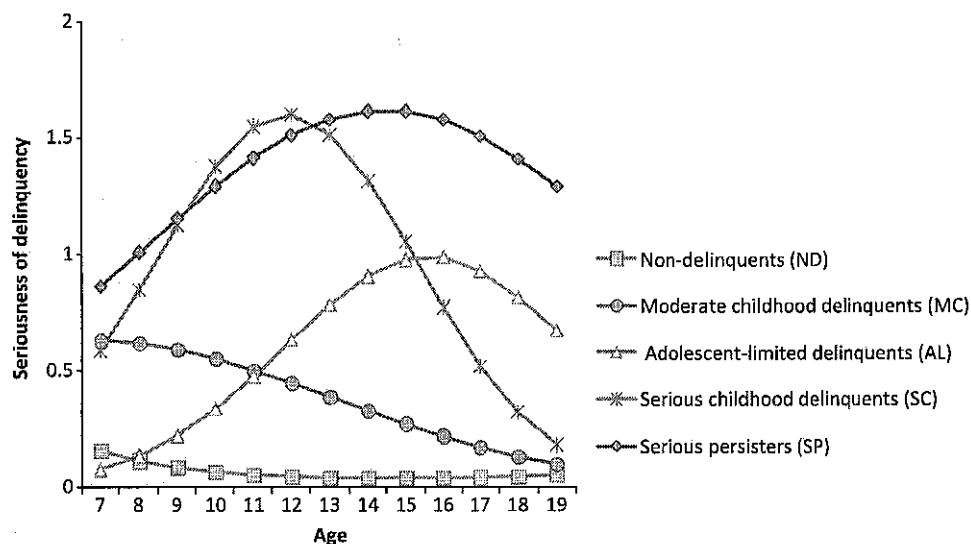


Figure 1 Five trajectories of seriousness of boy's delinquency from childhood into late adolescence

adolescence, with a peak around age 16. Although we could not define whether these youths actually desist after adolescence, this trajectory was named *adolescent-limited delinquents* to be consistent with the existing literature. The fourth trajectory (24%) was comprised of boys with high levels of childhood delinquency peaking at age 12, but moderately low levels of delinquency in adolescence. They were labeled *serious childhood delinquents*. Boys in the fifth trajectory (13%) displayed serious delinquency from childhood into late adolescence, with highest values around age 15 and were labeled *serious persistent delinquents*. Background characteristics of these trajectories are provided in Appendix 2.

Development of parent-child relationships for different offenders

To examine whether the development of the quality and nature of parent-child relationships from childhood into late adolescence would differ for boys

according to their offending trajectory, we examined levels and developmental changes in boys' reports of joint activities with their primary caretaker and the quality of this relationship.

Relationship quality. Offending groups differed in mean levels of relationship quality in childhood and adolescence (Table 1 and Figure 2). In childhood, non-delinquents and adolescent-limited delinquents did not differ, but boys in childhood delinquent trajectories scored poorer on relationship quality than non-delinquent boys. Group differences in childhood were small-to-medium-sized. At ages 13 and 16, boys in all offending trajectories, including adolescent-limited offenders scored the relationship to be of worse quality than nondelinquent boys. Scores on relationship quality at age 13 and at age 16 of adolescent-limited offenders and serious persistent offenders were not statistically different from one another. Medium-to-large group differences were found in adolescence.

Table 1 Development of quality of parent-child relationships for different offending trajectories

Estimates	Model 7-10		Model 10-13		Model 13-16		Level Age 16
	Level Age 7	Change Age 7-10	Level Age 10	Change Age 10-13	Level Age 13	Change Age 13-16	
Group							
ND	34.66***	0.47***	35.94***	-0.20	35.20***	-0.16	34.79***
MC	33.67***	0.21*	34.37***	-0.42***	33.12***	-0.10	33.08***
AL	34.71***	0.20	35.36***	-0.81***	32.44***	0.04	32.61***
SC	33.14***	0.25	33.96***	-0.89***	31.27***	0.17	31.94***
SP	33.36***	0.15	33.71***	-0.64***	31.28***	-0.12	31.05***
Group differences (Effect size)							
ND versus MC	-1.04 (0.32)**	-0.26	-1.49 (0.46)***	-0.25	-2.44 (0.77)***	0.09	-1.71 (0.48)***
ND versus AL	-0.05	-0.27	-0.37	-0.71**	-3.74 (1.18)***	0.32	-2.18 (0.61)**
ND versus SC	-1.50 (0.47)***	-0.13	-1.86 (0.57)***	-0.73***	-3.94 (1.24)***	0.31	-2.85 (0.80)***
ND versus SP	-1.23 (0.38)**	-0.30	-1.99 (0.61)***	-0.65**	-4.12 (1.29)***	0.16	-3.74 (1.05)***
AL versus SP	-1.24 (0.41)**	-0.14	-1.85 (0.72)***	0.23	-1.15	0.00	-1.56

Note. Example dummy coding: ND = 0 versus MC = 1. Effect sizes of significant effects are presented in Glass's Δ : .20 is small effect, .50 is medium effect, .80 is large effect.

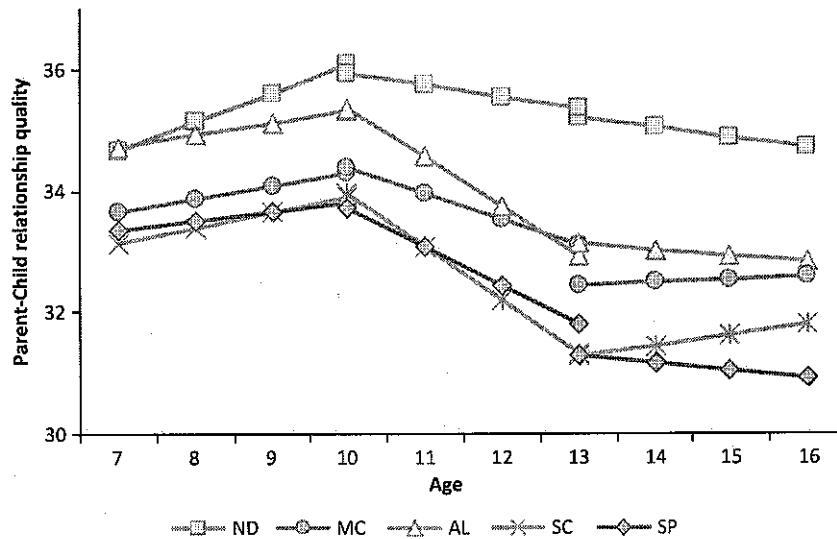


Figure 2 Development of parent-child relationship quality from childhood into adolescence for boys in five offending trajectories

In addition to these mean level differences, more pronounced developmental changes in relationship quality were found for offenders than for non-offenders. In childhood, parent-child relationship quality increased for non-delinquents and moderate childhood offenders, but not for any of the other groups. No significant differences in the rate of change were found between offending groups in this age period. Between age 10 and 13, distinct developmental changes for different offending groups were found: Whereas nondelinquent boys did not report significant changes in relationship quality with their parents, relationship quality decreased significantly for all offending groups. Moreover, in early adolescence, serious childhood offenders, serious persistent offenders, and adolescent-limited offenders all reported significantly stronger decreases in relationship quality than did non-delinquents. This decrease

in relationship quality between ages 10 and 13, however, was statistically equivalent for adolescent-limited and serious persistent offenders. Between ages 13 and 16, relationship quality was stable for both non-offenders and for all types of offenders, and none of the between-group contrasts in the rate of change were significant.

Joint activities. As indicated in Figure 3 and Table 2, boys in the two serious offending trajectories generally scored fewer joint activities with their mothers than the nonoffending boys: At ages 7, 10, 13, and 16 serious persistent offenders and/or serious childhood offenders reported fewer joint activities than non-delinquents. Effect sizes of significant differences were generally small-to-moderate. At ages 7 and 10, adolescent-limited offenders reported levels that were comparable to

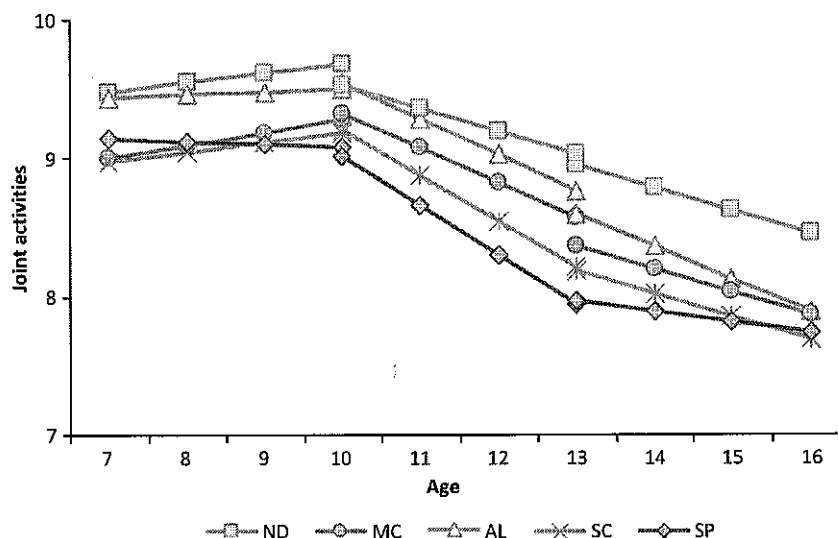


Figure 3 Development of joint activities between parents and children from childhood into adolescence for boys in five offending

Table 2. Development of joint activities for different offending trajectories

Estimates	Model 7-10		Model 10-13		Model 13-16		
	Level Age 7	Change Age 7-10	Level Age 10	Change Age 10-13	Level Age 13	Change Age 13-16	Level Age 16
Group							
ND	9.48***	0.07	9.53***	-0.17**	8.95***	-0.16**	8.44***
MC	9.01***	0.09	9.33***	-0.25***	8.59***	-0.17**	8.07***
AL	9.44***	0.02	9.54***	-0.26**	8.36***	-0.23*	8.00***
SC	8.98***	0.07	9.21***	-0.33***	8.19***	-0.17**	7.86***
SP	9.14***	-0.02	9.01***	-0.36***	7.97***	-0.08	7.96***
Group differences (Effect size)							
ND versus MC	-0.48 (0.34)**	0.03	-0.20	-0.08	-0.35	0.00	-0.37
ND versus AL	-0.07	-0.04	-0.01	-0.08	-0.58	-0.05	-0.44
ND versus SC	-0.50 (0.36)**	0.01	-0.34	-0.15*	-0.76 (0.41)***	0.00	-0.58 (0.36)*
ND versus SP	-0.34	-0.09	-0.52 (0.34)*	-0.20	-0.97 (0.52)***	0.10	-0.49
AL versus SP	-0.27	-0.06	-0.50	-0.10	-0.43	0.18	-0.04

Note. Example dummy coding: ND = 0 versus MC = 1. Effect sizes of significant effects are presented in Glass's Δ : .20 is small effect, .50 is medium effect, .80 is large effect.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

non-delinquents; however, at ages 13 and 16 adolescent-limited offenders more closely resembled serious persistent offenders in terms of joint activities.

Despite these mean level differences, developmental changes were similar across groups. For boys in each trajectory, joint activities with the mother remained stable in childhood (between ages 7 and 10), and the groups did not differ on the rate of change. Between ages 10 and 16, joint activities significantly and linearly decreased for both non-offenders and offenders. For serious persistent offenders, the decrease in levels of joint activities stabilized by age 13. One group difference in rate of change was, however, found: Serious childhood offenders reported somewhat stronger decreases in joint activities between ages 10 and 13 than non-offenders.

Discussion

Transformations in parent-child relationships from childhood to late adolescence can run smoothly, but in some families parent-child relationships become impaired during adolescent years. This is in agreement with theoretical ideas and empirical studies that show a linkage between a problematic parent-child relationship and juvenile delinquency. From the perspective that different types of offenders can be differentiated according to their unique risk factors (Moffitt, 1993; Moffitt et al., 1996), the current study was the first of its kind to test the hypothesis that changes in the nature and quality of parent-child relationships would differ for boys in different offending trajectories. Findings indicated five offending trajectories, which differed in their parent-child relationships: Under the general condition of decreasing involvement of parents in their children's lives during the course of development, differential

depending on the offending trajectory of boys. The theoretical and practical implications of these findings will be discussed.

Parent-child relationship transformations for different offenders

In families of non-delinquents the relationship quality remained stably high during adolescence, however, parent-child involvement decreased linearly. These findings are in accordance with the developmental perspective that parent-child relationships in childhood transform gradually and smoothly during adolescence, with parents spending less time with their sons in joint activities without damaging the affective bonding (e.g., Collins & Steinberg, 2006), however, contradicts with earlier empirical work that does not distinguish delinquent from nondelinquent youth (e.g., De Goede et al., 2009; Keijsers et al., 2011). Our findings suggest that a decline in parental involvement is normative, but that such decline is not necessarily accompanied by a normative decrease in the affective quality of the parent-child relationship among nonoffending adolescents. In fact, theoretical ideas on normative developmental changes may not generalize to families in which children engage in offending, for instance because minor adolescent delinquency negatively affects the quality of parent-child relationships (e.g., Frijns, Keijsers, Branje, & Meeus, 2010; Laird, Pettit, Bates et al., 2003). Future research in which non-offenders and offenders are distinguished is needed to confirm this idea.

Adolescent-limited offenders reported high-quality relationships with their primary caretaker with parental involvement during childhood measured equally high as non-offenders. In adolescence, the relationship quality worsened considerably, however, thereby resembling the profile of serious per-

findings largely confirmed our hypotheses and also agree with recent study indicating that strongly declining affective qualities of parent-child relationships in adolescence co-occur with the development of moderate forms of adolescent delinquency for low-risk boys (e.g., Keijsers et al., 2009; Keijsers, Branje, Van der Valk et al., 2010; Laird, Pettit, Bates et al., 2003). Findings also suggest that from age 13 onwards, adolescent-limited offenders and serious persistent offenders are more difficult to distinguish from one another on the basis of parent-child relationship problems.

Confirming our hypotheses, serious persistent offenders had low-quality relationships lacking parental involvement in childhood, and these poor circumstances degenerated under the burdens of adolescence. In fact, findings revealed a divergent picture, in which the relationship problems of serious persistent juvenile offenders deteriorated with increasing age. This fits the notion that family processes can be an ongoing downward spiral of worsening family interactions, and that disruptive parent-child relations early in life are maintained and exacerbated throughout the process, in which of problem behavior manifest and intensify in the group of early-onset persistent offenders (Granic & Patterson, 2006; Patterson, Forgatch, Yoerger, & Stoolmiller, 1998; Patterson et al., 1990).

There was also a substantial group of boys who exhibited antisocial behavior in childhood, yet, abstained from delinquency in adolescence. In the current study, these individuals were labeled as serious and moderate childhood delinquents. Boys in these trajectories resembled the serious persistent offenders in terms of level of and developmental changes in parent-child relationships. This suggests that while the coercive family processes in which childhood problems may hinder healthy relationship development in adolescence may be taking place for these groups as well (Granic & Patterson, 2006; Patterson et al., 1990), other factors are protecting them from the delinquent track in adolescent years.

Together these findings suggest that different parent-child processes, as described in different theoretical accounts, occur for offenders in distinct trajectories. Whereas early coercive family processes (Granic & Patterson, 2006; Patterson et al., 1990) may be taking place for boys in the more serious trajectories, such processes do not seem to be present for adolescent-limited offenders. In fact, developmental changes in parent-child relationships for boys following an adolescent-limited trajectory seem well-captured by the recent reinterpretations of the monitoring literature (e.g., Keijsers et al., 2009; Keijsers, Branje, Van der Valk et al., 2010; Laird, Pettit, Bates et al., 2003). Furthermore, theoretical perspectives on smooth parent-child relationship development (e.g., Collins & Steinberg, 2006) may largely apply to non-offenders. When studying

ships, it thus seems essential to distinguish youths who are involved in serious offending, transient adolescent offending, and youths who are not engaged in delinquent behaviors.

Limitations

This study also had several limitations. First, the sample was drawn from boys who predominantly indicated their mothers as their primary caretaker. These findings may not generalize to girls and to children's relationships with their fathers. Second, findings of group-based offending trajectories should be interpreted with caution (Nagin, 2005). Individuals who are 'assigned' to a trajectory may not actually follow this trajectory in real life. In addition, the number of trajectories, while quite robust between studies (Piquero, 2007), may vary as a function of the number of measurements, age ranges, samples characteristics, and operationalization of delinquency. Third, there is an ongoing scientific debate regarding which dimensions of parent-child relationships are related to child and adolescent norm-breaking and delinquency (review: Racz & McMahon, 2011). The current study could not address all relevant aspects of parent-child relationships, but rather used measures to assess two broad dimensions of parent-child relationships. Although tapping the quality of relationships and the level of joint activities may be relevant to our understanding of general developmental changes in parent-child relationships, future studies should also utilize more specific dimensions of relevance, such as adolescent voluntary disclosure, adolescent secrecy, and parental monitoring behaviors, including parental control and solicitation (Frijns et al., 2010; Stattin & Kerr, 2000). Furthermore, developmental changes in these specific behaviors (Keijsers et al., 2009; Keijsers, Branje, Frijns et al., 2010; Laird, Criss, Pettit, Bates, & Dodge, 2009; Laird, Pettit, Dodge, & Bates, 2003; Masche, 2010; Wang, Dishion, Stormshak, & Willett, 2011) may differ for boys in distinct offending trajectories. Also, measures with more items should be used, to better assess these dimensions. Finally, the current study did not aim to test whether problematic relationship transformations were the result of children's engagement in delinquency, or whether engagement in delinquency was the result of problematic family processes. Due to its design, causal inferences cannot be made from the current study (see also Keijsers et al., 2011). Using a descriptive method, we aimed to provide a detailed picture of the different relationship transformation problems that may occur in families with boys in different offending trajectories.

Practical implications

Our finding that the developmental course of the

fers for different offenders may have some implications for practitioners working with adolescent offenders. In practice, it can be a challenge to differentiate adolescent-limited from serious persistent offenders on basis of their levels of delinquency (Moffitt et al., 1996). The current study, moreover, indicates that relationship problems of adolescent-limited and serious persisting offenders are also alike during adolescent years. Developmental changes in parent-child relationships from childhood into adolescence were distinct, however, and could therefore provide a promising means by which adolescent-limited and serious persistent offenders may be differentiated in practice. In particular, whereas serious persistent juvenile offenders seem to have poor quality relationships with their caretakers in childhood, and even more so in adolescence, adolescent-limited offenders report good quality relationships until age 10. Hence, a retrospective assessment of the developmental changes in parent-child interactions from childhood into adolescence may provide unique and valuable information, and could be used to determine more accurately the offending trajectory of a given adolescent offender. This information could assist practitioners in deciding whether an intervention is needed, or whether the offending behavior should be considered a transient phenomenon as part of normal development towards adulthood that does not require immediate intervention.

Conclusion

In summary, this is the first study of its kind to show the unique developmental dynamics in parent-child relationships among boys with different patterns of offending. This suggests that a general theory on how parent-child relationships transform and how these transformations relate to adolescents' engagement in delinquency does not adequately describe variations among offenders. In fact, several theoretical perspectives on parent-child relationship development may largely apply to non-offenders only, and theoretical ideas on the role of parent-child relationships in the development of delinquency may apply solely to those in specific offending trajectories. Findings further suggest that a retrospective assessment of parent-child relationship transformations could help practitioners to determine more accurately the offending trajectory of a given adolescent offender.

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Correspondence to

Loes Keijsers, Faculty of Social Sciences, Research Centre for Adolescent Development, Utrecht University, PO Box 80.140, 3508 TC Utrecht, The Netherlands; Tel: +31 30 253 2712; Fax: + 31 30 253 7731; Email: l.keijsers@uu.nl

Key points

- It is theoretically assumed that different types of offenders exist, with their own unique etiologies, for instance in terms parent-child relationship development.
- This is the first study to examine whether transformations in parent-child relationships from childhood into adolescence vary between different offenders.
- The developmental course of the quality of parent-child relationships was different for non-offenders, adolescent-limited offenders, and serious persistent offenders.
- Findings suggest that practitioners can use a retrospective assessment of the developmental changes in parent-child relationships from childhood into adolescence to determine more accurately the offending trajectory of a given adolescent offender.

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Appendix 1: Questionnaires

Relationship quality

In the past year, how often have you....

1. Thought your mother was really good?
2. Thought your mother really bugged you a lot?
3. Felt proud of your mother?
4. Wished that you had a different mother?
5. Thought that your mother gave you problems?
6. Felt that your mother was easy to get along with?
7. Felt that your mother loved you?
8. Felt that your mother was too strict or hard on you?
9. Wished that your mother would just leave you alone?
10. Liked being your mother's kid?
11. Felt that your mother was happy?
12. Felt that when your mother said something, she really meant it?
13. Felt that when your mother punished you, you got the punishment that you deserved?

Joint activities

1. How often do you and your mom do things together at home?
2. On weekdays, how often do you do something together with your mom, like making something, playing a game, talking, or going out together?
3. And on weekend days?
4. How often do you help your mom?

Appendix 2: Background characteristics of five distinct developmental offending trajectories from childhood to late adolescence

Trajectory	Background		
	% caretaker = biological mother	High-risk at screening (%)	Black ethnicity (%)
Non-delinquents	97.5	24.2	45.8
Moderate childhood delinquents	96.6	52.7	57.4
Adolescent-limited delinquents	97.9	31.9	55.3
Serious childhood delinquents	95.8	70.0	69.2
Serious persistent delinquents	97.0	73.1	61.2
Total	96.8	50.8	57.8

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PAPER

Parent- and child-driven effects during the transition to adolescence: a longitudinal, genetic analysis of the home environment

Laurie J. Hannigan, Tom A. McAdams, Robert Plomin and Thalia C. Eley

King's College London, UK

Abstract

Theoretical models of child development typically consider the home environment as a product of bidirectional effects, with parent- and child-driven processes operating interdependently. However, the developmental structure of these processes during the transition from childhood to adolescence has not been well studied. In this study we used longitudinal genetic analyses of data from 6646 UK-representative twin pairs (aged 9–16 years) to investigate stability and change in parenting and household chaos in the context of parent–child bidirectional effects. Stability in the home environment was modest, arising mainly from parent-driven processes and family-wide influences. In contrast, change over time was more influenced by child-driven processes, indicated by significant age-specific genetic influences. Interpretations of these results and their implications for researchers are discussed.

Research highlights

- Parent-driven processes and family-wide factors are found to exert predominantly stable influences on children's perceptions of their home environment as they enter adolescence.
- Child-driven processes, indicated by the influence of children's genes, operate primarily age-specifically and are involved in driving change in perceived parenting and household chaos across this period.
- Evidence of age-specific child-driven processes illustrate the effects of behavioural and perceptual change on children's experiences of their home environment in early adolescence.

Introduction

The home environment has long been a central focus of study in child development. It is a broad concept, encompassing the range of processes and relationships that exist within a household (Bronfenbrenner, 1977, 1979; Sameroff, 1986). Taken together, these factors

provide the primary context for child and adolescent development, and their significance is highlighted by extensive evidence of associations with behavioural, social and emotional outcomes (Bradley, Corwyn, Burchinal, McAdoo & García Coll, 2001a; Bradley, Caldwell, Rock, Ramey, Barnard *et al.*, 1989; Evans, 2006; Rutter, 1985a, 1985b). However, the home environment is not *only* contextual. It is also shaped by the child, whose traits and behaviours elicit responses from those around them in the household (Bell, 1979; Scarr & McCartney, 1983). The main goal of this research is to investigate the developmental structure of these child-driven processes, relative to that of parent-driven processes and family-wide factors, as they shape different aspects of the home environment during the transitional period between childhood and adolescence.

The home environment in child development: context and consequence

Many theoretical accounts of child development advocate considering the home environment as a collection of

Address for correspondence: Tom A. McAdams, King's College London, Medical Research Council, Social, Genetic & Developmental Psychiatry Centre, Institute of Psychiatry, Psychology & Neuroscience, De Crespigny Park, Denmark Hill, London, SE5 8AF, UK; e-mail: tom.mcadams@kcl.ac.uk

reciprocal processes and relationships (e.g. Bell, 1968, 1979; Cook & Kenny, 2005; Kenny & La Voie, 1984; Sameroff, 1975). This means that, instead of looking only at how aspects of the home environment can influence a developing child, attention must also be paid to how the characteristics and behaviour of the child may influence his or her home environment (Collins, Maccoby, Steinberg, Hetherington & Bornstein, 2000; Lollis & Kuczynski, 1997; Maccoby, 2000). Given that parents (and their parenting behaviours) represent such a central component of this environment, this kind of model is often operationalized in terms of *bidirectional effects* (e.g. Alemany, Rijdsdijk, Haworth, Fañanás & Plomin, 2013; Larsson, Viding, Rijdsdijk & Plomin, 2008). *Bidirectionality*, therefore, describes the way in which child-driven and parent-driven processes combine to shape the home environment.

Theories that emphasize the need to consider child-driven processes in the home environment are supported by consistent findings, from several decades of behavioural genetic research, which show that putatively environmental measures are subject to the influence of children's genes (Kendler & Baker, 2007; Jaffee & Price, 2007). A recent meta-analysis of genetically sensitive, children-as-twin studies of parenting found that more than one-fifth (23%) of the variance in parenting was associated with children's genes (Avinun & Knafo, 2014). In studies of this kind, genetic influence on parenting can be interpreted as evidence of the effects of children's genetically influenced behaviour on the parenting that they receive (Plomin & Bergeman, 1991; Scarr & McCartney, 1983). Associations between children's genotypes and environments that are mediated in this manner are known as *evocative gene-environment correlations* (Plomin, DeFries & Loehlin, 1977). This term connotes the role of child behaviours in *evoking* a response from the environment – in this case, via their parents. The concept of evocative gene-environment correlation aligns with the child-driven processes described in bidirectional models of parenting and child development (Collins *et al.*, 2000). Consequently, behavioural genetic designs able to detect gene-environment correlations offer a useful test of the extent to which aspects of the home environment can be considered as truly *environmental* contexts for child development (Klahr & Burt, 2014).

The inherent potential of behavioural genetic designs for investigating the relative importance of parent- and child-driven processes makes them an important tool in developmental research. In one respect, this is because accounting for genetic influence on putative environmental measures is necessary to distinguish potentially causal associations with child developmental outcomes

from those that arise as a result of shared genes (Jaffee, Strait & Odgers, 2012). Crucially though, this is also because the processes of gene-environment interplay that underpin genetic influence on environmental measures may be developmentally important in their own right (Rutter, 2007). By actively studying these processes, researchers are able to pose more nuanced questions about how genes and environments contribute interdependently to developmental change.

Stability and change in the home environment between childhood and adolescence

The transitional period between childhood and adolescence is a time of particularly intense physiological, psychosocial and emotional change (Simmons, Burgeson, Carlton-Ford & Blyth, 1987; L.P. Spear, 2000; Steinberg, 2005). Underpinned, biologically, by the onset of puberty and accompanying hormonal changes and, socially, by an increase in autonomy and peer involvement, this period also sees changes in the role of an individual's home environment in their life (Laursen & Collins, 2009; Laursen, Coy & Collins, 1998; Paikoff & Brooks-Gunn, 1991; Steinberg, 2000). When considering bidirectionality in the relationship between the developing individual and their home environment, we could conceive of this period as a likely time for an increase in child-driven processes, with individuals increasingly inclined and able to exert an influence on the other members of their household through their behaviour. Equally, we could envision the transition into adolescence as a time when parents may seek to impose new rules or disciplinary approaches, or even to consciously reduce their influence in their children's lives. Furthermore, just as changes in both parent- and child-driven processes can underpin change in the home environment across this period of development, so too can their stability dictate which aspects of it remain consistent. If parents' values and views about parenting are fixed and stable, the nature of their influence on the home environment should not change as the child enters adolescence. Similarly, stable aspects of the child's temperament or personality might mean that some child-driven processes endure right across development. These are empirical questions – and they can be addressed, at least in part, by examining the developmental aetiology of aspects of the home environment across this period.

Longitudinal, genetically sensitive designs allow for an examination of genetic and environmental influences and their interplay within a developmental context (Jaffee, Hanscombe, Haworth, Davis & Plomin, 2012). When the same phenotype is measured on multiple

occasions, correlations between measurement occasions indicate the phenotypic stability of the trait or behaviour under study. For example, in the case of parental discipline, this would represent the extent to which individual differences in the way children experience discipline from their parents are stable across development. To the extent that variance in a variable is *uncorrelated* with earlier occasions of measurement, it can be considered as novel – i.e. individual differences in parental discipline at a given age that are unrelated to those in play earlier in development. In a genetically informative (e.g. twin) sample, the genetic and environmental components of both stable and age-specific variance can be ascertained.

In child-based twin studies, genetic influence on environmental variables is indicative of child-driven processes. When these processes operate stably across development, this manifests as genetic influence on phenotypic stability. For the parental discipline example introduced above, this could indicate the same child behaviours and characteristics influencing the discipline he or she receives at different ages. Conversely, if *different* genes are involved at different ages, this manifests as genetic influence on phenotypic change. For parental discipline, this could indicate that child-driven processes are operating to influence parents' disciplinary strategies via behavioural *change* at different ages.

Parent- and child-driven processes in early adolescence: dynamic or stable?

To date, only two studies have utilized longitudinal behavioural genetic designs to investigate the role of parent and child effects in shaping the home environment across early adolescent development. Both made use of data from the Minnesota Twin Family Study (MTFS) to examine the changing aetiology of the parent-child relationship between the ages of 11 and 17. The first found that the importance of child genetic factors in explaining variance in the parent-child relationship increased between the ages of 11 and 14 (McGue, Elkins, Walden & Iacono, 2005). The second study applied growth curve models to these data (incorporating additional data from age 17), and found that initial genetic factors were strongly associated with genetic influences on change over time (Ludeke, Johnson, McGue & Iacono, 2013). These findings can be interpreted as indicating a consistent role for child-driven processes at these ages. However, further investigation of the transitional period between childhood and adolescence is needed to ascertain whether these processes are the same as those operating earlier in development.

Furthermore, the incorporation of different measures of parenting and the home environment will allow for comparative consideration of the developmental role of parent- and child-driven processes in shaping the home environment at these ages.

Present study

In the present study, we compared the developmental aetiologies of three different measures of aspects of the home environment often considered important to child and adolescent development: parents' discipline of their child, parents' feelings towards their child, and household chaos. Specifically, we used structural equation models to derive estimates of genetic and environmental influences on stable and age-specific variance in children's reports on these measures, collected between the ages of 9 and 16 years. Where genetic and environmental factors from early waves continued to explain variance in the home environment throughout development, this would indicate contributions to stability across the measured period of childhood and adolescence. Conversely, evidence of new factors at later waves of measurement would indicate a developmentally dynamic mode of aetiological influence driving phenotypic change.

Overall, the primary aim of this study was to examine the respective influences of parent- and child-driven processes in the home environment across late childhood and into adolescence. The isolation of child-driven processes is possible because of the fact that, in models applied to data from children as twins, only the influences of the *child's* genes appear as genetic factors (Klahr & Burt, 2014). It is this facet of the design of the current study that allows parent-driven processes and other factors that influence children's perceptions of their home environments to be differentiated from child-driven processes, and their relative influence to be compared.

Method

Sample and procedure

The sample used in this study was taken from the ongoing Twins Early Development Study (TEDS; Haworth, Davis & Plomin, 2013). TEDS is a UK-representative, population-based, longitudinal study of more than 10,000 twin pairs born in England and Wales between 1994 and 1996. The zygosity of twins was determined by parent ratings of similarity, which yielded 95% accuracy when compared to zygosity as determined

by DNA markers (Price, Freeman & Craig, 2000). DNA testing was also used to confirm zygosity in ambiguous cases. Data collection was performed with the informed consent of all participants. The project has ethical approval from the Institute of Psychiatry Ethics Committee.

The study sample consisted of those TEDS families who provided data via postal and online questionnaires at the 9-, 12-, 14- and 16-year data collection waves. The overall sample size ($N = 13,292$) includes all individuals who contributed data to the main analyses. Within this number, sample sizes vary by wave and measure and are presented in Table 1. Only two of the three birth cohorts into which the TEDS sample is divided (based upon year of birth between 1994 and 1996) were contacted at the age 9 data collection wave. This is the reason for the increase in sample size between the 9- and 12-year waves, with all three cohorts being studied at the 12-, 14- and 16-year waves. In all, 3330 individuals had data available at each wave of the study, with a further 2018 having data available at all the three-cohort waves (12-, 14- and 16-year). The sample was 48.7% male, and 92.8% participants were white European. Monozygotic (MZ) twins made up 34.8% of the sample. Attrition in TEDS is significantly associated with lower SES, non-white ethnicity, dizygotic (DZ) zygosity and male gender, although the effects are small and the sample remains broadly representative of the population (Haworth *et al.*, 2013). Of the current study sample, 3.8% were subject to

medical exclusion for at least one of the four waves of data collection, with a further 3.6% excluded for other reasons, such as lack of zygosity information.

Measures

Household chaos

Perceived levels of household chaos were assessed using a shortened version of the Confusion, Hubbub and Order Scale (CHAOS; Matheny, Wachs, Ludwig & Phillips, 1995). The original scale, assessing the levels of noise and confusion and the degree of routine in the household, consists of 11 items and has been shown to demonstrate high internal consistency (Cronbach's $\alpha = .79$; Dumas & Nissley, 2005). The number of items was reduced to six in the short form of the questionnaire used in this study. Children were asked to respond 'Certainly true', 'Somewhat true' or 'Not true' on the following items (items 4–6 in this list are reverse-scored): 'You can't hear yourself think in our home'; 'It's a real zoo in our home'; 'There is usually a television turned on somewhere in our home'; 'I have a regular bedtime routine'; 'We are usually able to stay on top of things'; 'The atmosphere in our house is calm'. The internal consistency for this measure in our study was moderate and similar across all ages (Cronbach's α range = .55–.59). The shortened CHAOS was administered at all four waves of data collection.

Table 1 Descriptive statistics and sample sizes for raw and (standardized) transformed data

Variable	Age		Mean	SD	Skew	Kurtosis	N (MZ)	N (DZ)
CHAOS	9	Raw	4.46	2.32	0.4	−0.14		
		Transformed			−0.18	−0.15	2228	3746
	12	Raw	3.99	2.04	0.48	0.25		
		Transformed			−0.03	−0.07	3908	6878
	14	Raw	3.75	1.95	0.52	0.22		
		Transformed			0.03	−0.13	2352	3756
	16	Raw	4.08	2.03	0.52	0.32		
		Transformed			0.02	−0.06	1864	2920
Parental discipline	9	Raw	3.19	1.57	0.37	−0.21		
		Transformed			−0.13	−0.23	2180	3622
	12	Raw	3.12	1.49	0.41	0.05		
		Transformed			−0.14	0	3952	6930
	14	Raw	3.04	1.43	0.31	0.11		
		Transformed			−0.26	0.15	2298	3678
	16	Raw	3.08	1.36	0.39	0.48		
		Transformed			−0.22	0.4	1164	1718
Parental feelings	9	Raw	4.34	2.24	0.41	0.1		
		Transformed			−0.22	0.04	2080	3598
	12	Raw	3.72	2.43	0.66	0.25		
		Transformed			0.15	−0.3	3896	6822
	14	Raw	3.66	2.66	0.84	0.52		
		Transformed			0.29	−0.37	2344	3742

Note: N = number of individuals (not twin pairs).

Parental discipline

Parental discipline was assessed via children's responses on a four-item measure adapted from the parenting domain of a semi-structured interview (see Deater-Deckard, Dodge, Bates & Pettit, 1998). On a three-point scale ('Not true'; 'Quite true'; 'Very true'), children rated the frequency with which parents employed four different disciplinary strategies (smacking/slapping; telling off/shouting; explaining; being firm/calm) to deal with their misbehaviour. Two items were reverse-scored to allow higher mean scores on the scale to reflect harsher parenting. On average across all ages, the internal consistency for this measure in our study was moderate (Cronbach's α range = .38–.46). Parental discipline was assessed by child-report at all four waves of data collection.

Parental feelings

Children's perceptions of their parents' feelings towards them were assessed using a shortened, seven-item version of the Parental Feelings Questionnaire (PFQ; Deater-Deckard & O'Connor, 2000). The original, 31-item scale consisted of positivity and negativity sub-scales, each with good internal reliability (Cronbach's α = .84/.90, respectively) and which are substantially negatively correlated with one another (r = -.61; Deater-Deckard, Smith, Ivy & Petrill, 2005). In the shortened version used in this study, three positive items ('I feel happy about my relationship with my Mum/Dad'; 'My Mum/Dad finds me funny – I make him/her laugh'; 'I feel close to my Mum/Dad') are retained alongside four negative items ('My Mum/Dad gets impatient with me'; 'My Mum/Dad sometimes wishes I would leave him/her alone for a few minutes'; 'I make my Mum/Dad angry'; 'I make my Mum/Dad feel frustrated'). Participants again responded with 'Not true', 'Quite true' or 'Very true' and, after reverse-scoring of the three positive items, higher scores on this measure represented more negative feelings. On average across all ages, the internal consistency for this measure in our study was good (Cronbach's α range = .63–.75). This variable was assessed at the 9-, 12- and 14-year waves of data collection only.

Statistical analyses

Data preparation

All data were regressed on age and sex to ensure that twin correlations were not artificially inflated by twins being the same age and sex (McGue & Bouchard, 1984). Residuals were then square-root transformed – in order to approximate normal distributions required for genetic

analyses – and standardized. Descriptive statistics for the raw and transformed variables are presented in the results section.

Genetic analyses

The classical twin method uses information from MZ and DZ twin pairs to estimate the relative importance of additive genetic influences (A), shared environmental influences (C) and non-shared environmental influences (E) in contributing to variation in a trait. MZ and DZ twin pairs differ in terms of their genetic relatedness, sharing 100% of their genetic material and 50% of their segregating genetic material, respectively, but sharing their rearing environment to the same extent. Consequently, additive genetic influences on a phenotype make MZ twins more similar to one another (relative to DZ twins), whereas shared environmental influences make both types of twins more similar to one another (to the same extent). Accordingly, non-shared environmental influences incorporate anything that makes twins in the same family different from one another – including measurement error. Structural equation modelling (SEM) of the variance (within-twin) and co-variance (across-twin) of a given phenotype allows for estimates of each of the variance components to be produced based on this information (Rijsdijk & Sham, 2002).

Longitudinal analyses employed a multivariate Cholesky decomposition, wherein phenotypic variances are decomposed into genetic, shared environmental and non-shared environmental components for each observed variable. These variance components are then allowed to influence all subsequent variables in the model. As a result, the first observed variable is influenced only by its own variance components, the second by the variance components of the first and its own novel variance components, and so on (see Figure 1). The Cholesky decomposition is well suited to the analysis of longitudinal data, as the order of variables is predetermined by their chronology. The influence of, for example, genetic factors from age 9 on variance in the same trait at later waves is interpretable as a genetic contribution to phenotypic stability.

Figure 2 provides an example of how the results of such analyses could appear. In the simulated results displayed in the figure, a different developmental pattern is shown in each component (genetic, shared environmental and non-shared environmental) of variance of a single variable measured at four ages (9, 12, 14 and 16 years):

- 1 Stable genetic influences from age 9, explaining a decreasing proportion of phenotypic variance across

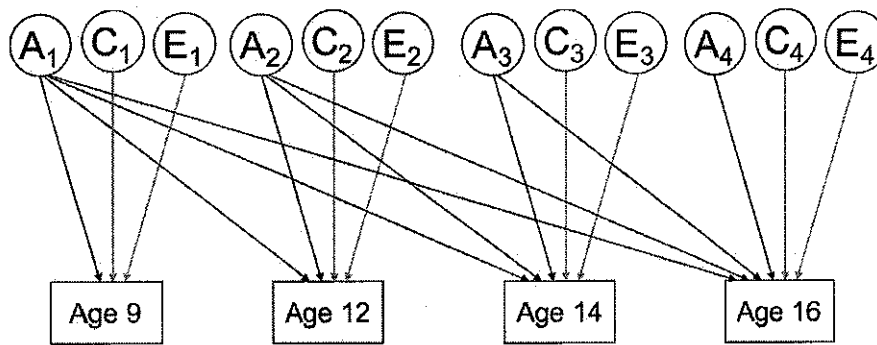


Figure 1 Longitudinal model: Cholesky decomposition across four waves.

Note: A = genetic factors; C = shared environmental factors; E = non-shared environmental factors; Diagonal paths – shown here for A only – estimated for all variance components.

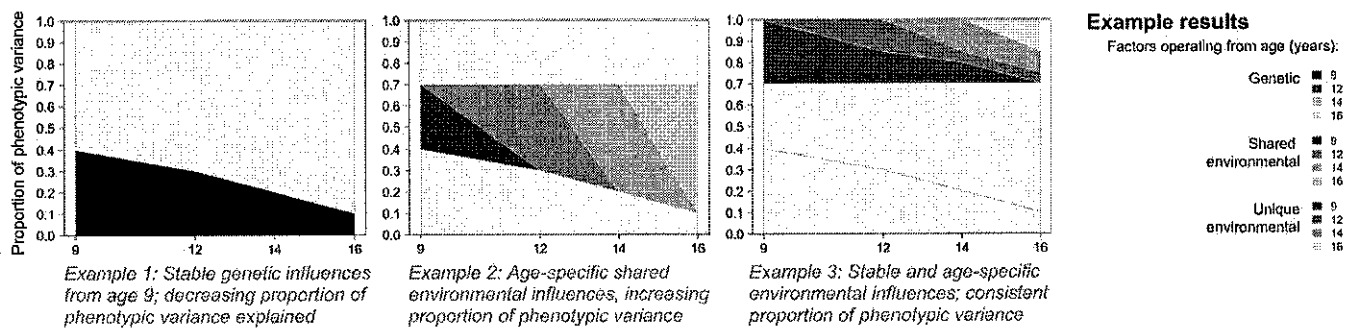


Figure 2 Simulated results for a single variable, with different patterns of stability and change illustrated for each aetiological component.

time, with no evidence of new genetic factors emerging (Figure 2, left panel);

- Age-specific shared environmental influences at all waves, explaining an increasing proportion of phenotypic variance across time, with no evidence of stability (Figure 2, centre panel);
- Non-shared environmental factors contributing to both change and stability and explaining a consistent proportion of variance across time (Figure 2, right panel).

It is important to note that different patterns are assigned to each variance component here for illustrative purposes only; in reality, any such patterns (or a combination) could occur for any of the variance components.

A scalar was included in models to account for sex differences in variance. This allows the overall magnitude of variance to differ between the sexes, while constraining the proportion of variance attributable to genetic and environmental parameters to be equal for males and females. All model fitting analyses were carried out in R using OpenMx (Boker, Neale, Maes, Wilde, Spiegel *et al.*, 2011). OpenMx uses full-information maximum

likelihood (FIML) to estimate model parameters from raw data. The use of FIML reduces the impact of bias from selective attrition in the sample by avoiding list-wise deletion (Enders & Bandalos, 2001).

Results

Summary of the main data

Table 1 shows descriptive statistics and the number of twin pairs for whom data was available for each scale, at each age. Means and standard deviations are shown for raw data only as, by definition, they are equal to 0 and 1, respectively, for standardized variables. Mean change over time was generally small, but included significant ($p < .001$) decreases in: household chaos at ages 12 and 14 (followed by a significant increase at 16); harsh parental discipline between 9 and 16; and negative parental feelings between 9 and 12. Some evidence of selective attrition was seen for CHAOS scores, as mean scores at age 9 were higher among those who did not provide data at 16 ($M = 4.67$, $SD = 2.35$) than for those who provided data at all waves ($M = 4.37$, $SD = 2.30$).

There was no evidence of selective attrition for either parenting variable.

Phenotypic analyses

The within-variable, across-time phenotypic correlations are presented in Table 2. Correlations between variables at adjacent ages (e.g. 9–12) were invariably larger than those across a lengthier interval (e.g. 9–16). Longitudinal correlations were generally moderate in magnitude (range for adjacent waves: .32–.55), meaning that, overall, more phenotypic change than stability was evident in the data.

Twin correlations

Table 3 presents the MZ and DZ twin correlations for all variables. MZ correlations were consistently higher than DZ correlations, indicating an aetiological role for additive genetic factors in all cases. However, DZ correlations tended to be greater than half the magnitude of MZ correlations, indicating shared environment effects making twins more similar to one another. This is consistent with the fact that the variables under study are measures of the home environment.

Genetic analyses

Longitudinal genetic analyses were undertaken to examine the relative contributions of additive genetic, shared environmental and non-shared environmental factors to the phenotypic stability (indexed by the correlations in Table 2). Standardized, squared path estimates were produced using longitudinal Cholesky models for all variables and are presented, along with their 95% confidence intervals, in Table 4. These results are described, by variable, in the text below. In the table, genetic, shared environmental and non-shared environmental influences factors are grouped by the age at which they originate within the model. Factors that emerge at one age and then are significant at later ages (i.e. when reading down a column) indicate contributions

to phenotypic stability (as indexed by the correlations in Table 2). The within-time influences of novel factors emerging at later waves can be interpreted as contributions to change in the phenotype.

CHAOS

The proportion of variance in CHAOS explained by different genetic, shared and non-shared environmental factors at – and across – each of the four ages is presented in the top section of Table 4. Genetic factors originating at age 9 explained 24% of the variance at age 9, but were not significant in explaining variance at any of the later ages. In contrast, age 9 shared environmental factors were found to influence phenotypic stability in CHAOS. These factors accounted for 42% of the variance at age 9 and remained important at all subsequent waves: age 12 (39%); age 14 (27%); and age 16 (21%). Non-shared environmental factors from age 9 exclusively explained within-time variance (34%), with no evident contributions to stability over time. As well as being influenced by shared environmental factors from age 9, CHAOS scores at age 12 were influenced by significant new genetic (15%), shared environmental (12%) and non-shared environmental factors (35%). None of the new aetiological factors that came online at age 12 explained significant (or, in the case of non-shared environmental factors, >1%) variance at any later ages. Variance in CHAOS scores at age 14 that was unexplained by earlier factors was accounted for by significant, novel aetiological factors of each type (A = 10%; C = 15%; E = 42%). Of these, shared and non-shared environmental factors each contributed to phenotypic stability by explaining 14% and 3% of the variance at age 16. Only non-shared environmental factors were significant in explaining age-specific variance at 16 (41%).

The results for household chaos at all waves are illustrated graphically in Figure 3. This figure (as subsequent figures) shows the composition – in terms

Table 3 Within-time MZ and DZ twin correlations

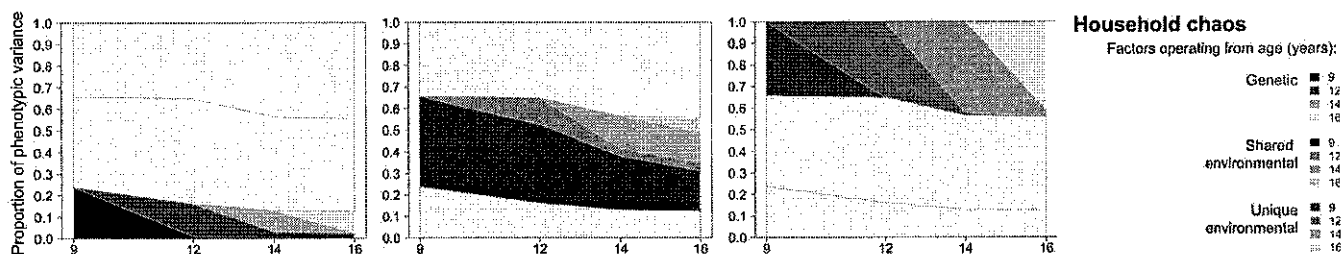
	Age	MZ	DZ
CHAOS	9	0.67	0.57
	12	0.65	0.60
	14	0.58	0.50
	16	0.55	0.50
Parental discipline	9	0.54	0.43
	12	0.49	0.41
	14	0.48	0.36
	16	0.46	0.31
Parental feelings	9	0.59	0.49
	12	0.52	0.40
	14	0.54	0.36

Table 2 Within-variable, across-time phenotypic correlations for all variables

Age	CHAOS			Parental Discipline			Parental Feelings	
	9	12	14	9	12	14	9	12
12	0.42			0.32			0.40	
14	0.37	0.49		0.25	0.38		0.33	0.44
16	0.33	0.43	0.55	0.17	0.30	0.48	-	-

Table 4 Standardized, squared path estimates (and 95% confidence intervals) from longitudinal genetic analyses

Variable	Age	9			12			14			16		
		A	C	E	A	C	E	A	C	E	A	C	E
CHAOS	9	.24 (.16-.32)	.42 (.35-.48)	.34 (.31-.37)									
	12	.01 (.00-.05)	.39 (.30-.51)	.00 (.00-.00)	.15 (.09-.21)	.12 (.01-.22)	.35 (.33-.37)						
	14	.01 (.00-.06)	.27 (.18-.39)	.00 (.00-.00)	.02 (.00-.09)	.03 (.00-.15)	.01 (.01-.02)	.10 (.01-.18)	.15 (.06-.22)	.42 (.39-.46)			
	16	.01 (.00-.05)	.21 (.13-.31)	.00 (.00-.00)	.02 (.00-.09)	.04 (.00-.17)	.00 (.00-.01)	.00 (.00-.09)	.14 (.04-.28)	.03 (.01-.05)	.10 (.00-.19)	.07 (.00-.17)	.41 (.38-.45)
Parental Discipline	9	.23 (.13-.34)	.29 (.21-.37)	.48 (.44-.52)									
	12	.03 (.00-.12)	.16 (.08-.26)	.00 (.00-.01)	.20 (.09-.28)	.10 (.01-.19)	.51 (.48-.54)						
	14	.12 (.02-.29)	.03 (.00-.10)	.00 (.00-.00)	.03 (.00-.12)	.16 (.02-.29)	.01 (.00-.02)	.08 (.00-.22)	.05 (.00-.18)	.53 (.49-.57)			
	16	.04 (.00-.19)	.02 (.00-.08)	.00 (.00-.00)	.02 (.00-.12)	.08 (.00-.20)	.01 (.00-.02)	.03 (.00-.34)	.02 (.00-.13)	.05 (.03-.08)	.23 (.00-.28)	.00 (.00-.04)	.51 (.46-.57)
Parental Feelings	9	.38 (.28-.48)	.20 (.12-.28)	.42 (.38-.45)									
	12	.11 (.04-.21)	.13 (.05-.23)	.00 (.00-.01)	.22 (.11-.32)	.08 (.00-.16)	.47 (.44-.50)						
	14	.06 (.02-.15)	.12 (.04-.20)	.00 (.00-.01)	.10 (.03-.23)	.00 (.00-.08)	.01 (.01-.02)	.27 (.15-.32)	.00 (.00-.07)	.44 (.41-.47)			

**Figure 3** Genetic, shared environmental and non-shared environmental influences on stability and change in child-reported CHAOS.

of the age at which constituent factors first emerged – of genetic, shared environmental and non-shared environmental contributions to variance at each age. Contributions to stability are indicated by early factors (darker shading) continuing to account for a proportion of the phenotypic variance at later ages. New factors coming online at later ages are represented by areas of lighter shading. The proportion of variance accounted for by all factors stacked together at a given age is equivalent to a cross-sectional estimate of genetic, shared environmental and non-shared environmental influences at this age.

Parental discipline

Aetiological influences on change and stability in children's perceptions of parental discipline are also shown

in Table 4. Age 9 genetic factors accounted for 23% of the within-time variance but were only significant at one later age (age 14: 12% variance explained). Age 9 shared environmental factors were also significant in explaining within-time variance in parental discipline (29%) and variance at one later age (age 12: 16%). Low phenotypic stability in this variable meant that most of the variance at later ages was explained by novel factors coming online. At 12, all age-specific factors made significant contributions to variance ($A = 20\%$; $C = 10\%$; $E = 51\%$). Age 12 shared environmental factors continued to explain variance at age 14 (16%) and thus influenced phenotypic stability across this period. Remaining variance in parental discipline at age 14 was explained by new aetiological factors coming online; of these, only non-shared environmental factors (53%) reached significance. Variance in the parental discipline

measure at age 16 was also significantly accounted for by non-shared environmental influences. Predominantly, these originated at 16 (explaining 51% variance), but age 14 non-shared environmental influences also accounted for 5% variance at this age. Figure 4 summarizes the results from the longitudinal models for this variable.

Parental feelings

Substantial overall influence of genetic factors on variance in the parental feelings variable contributed to both stability and change. Genetic factors from age 9, which explained 38% of the variance at that age, also continued to influence children's reports of parental feelings significantly at ages 12 and 14 (11% and 6% of the variance accounted for; Table 4). Age 9 shared environmental factors were also a source of stability, accounting for 20% within-time variance and a further 13% and 12% of the variance at respective subsequent waves. Age 9 non-shared environmental factors were again significant, substantial and entirely age-specific, accounting for 42% of the within-time variance only. Novel genetic and non-shared environmental factors at age 12 explained, respectively, 22% and 47% of the variance in parental feelings at this age, while age 12 shared environmental factors were not significant. Genetic factors at age 12 explained 10% of the variance at age 14 (as well as 1% from age 12 non-shared environmental factors). All remaining variance in parental feelings at age 14 was accounted for by novel, age-specific genetic (27%) and non-shared environmental influences (44%). These results are shown graphically in Figure 5.

Discussion

Ours is the first longitudinal, genetically informative study to examine stability and change in different measures of the home environment across childhood and adolescence. We found evidence of child-driven processes underpinning change in measures of the home

environment during this transitional period of development. In contrast, parent-driven processes and family-wide factors were the main source of stability in child reports of parenting and household chaos at this time. This apparent difference in the developmental structure of child-driven *versus* parent-driven processes in shaping the home environment has several implications for developmental theory and research into early adolescent development. These are discussed in detail below.

Stability and change in the home environment

We observed moderate stability in children's reports of parenting and household chaos across the period of study, from late childhood to early adolescence. Some continuity within the home environment across development is expected, even during the transition to adolescence, and is typically understood in relation to the stability of attachment, interdependence and communication patterns between parents and children (Laursen & Collins, 2009). Estimates of stability, given that they are derived from the phenotypic correlations between individuals' scores on the same scale at different measurement occasions, are necessarily subject to test-retest reliability. This means that a portion of the discontinuity observed here is likely due to occasion-specific measurement error (see Limitations section below for a further discussion of this point). Nonetheless, a finding of substantial discontinuity in the home environment at this period of development is also in line with evidence from previous work in this area (Laursen & Collins, 2009; Laursen *et al.*, 1998; Paikoff & Brooks-Gunn, 1991; Steinberg, 2000). In order to begin to interpret these patterns of phenotypic stability and change in terms of underlying bidirectional processes, we now turn to a discussion of the aetiological results.

Genetic influences on stability and change in measures of the home environment

Child genetic factors were found predominantly to drive change, rather than stability, in all measures of the home

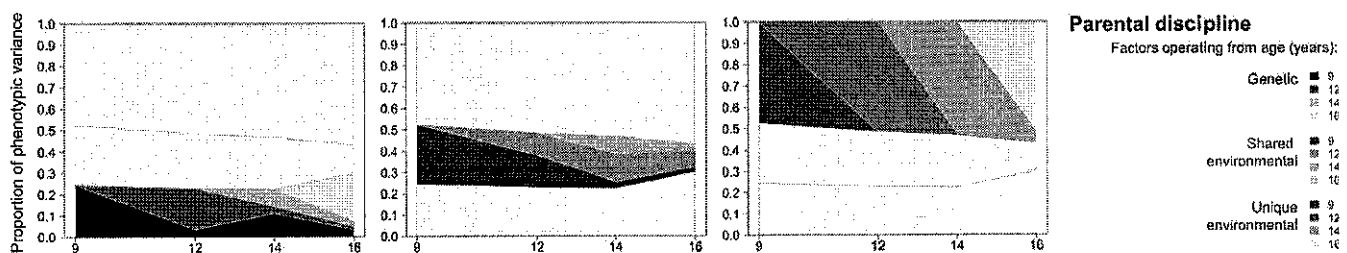


Figure 4 Genetic, shared environmental and non-shared environmental influences on stability and change in child-reported parental discipline.

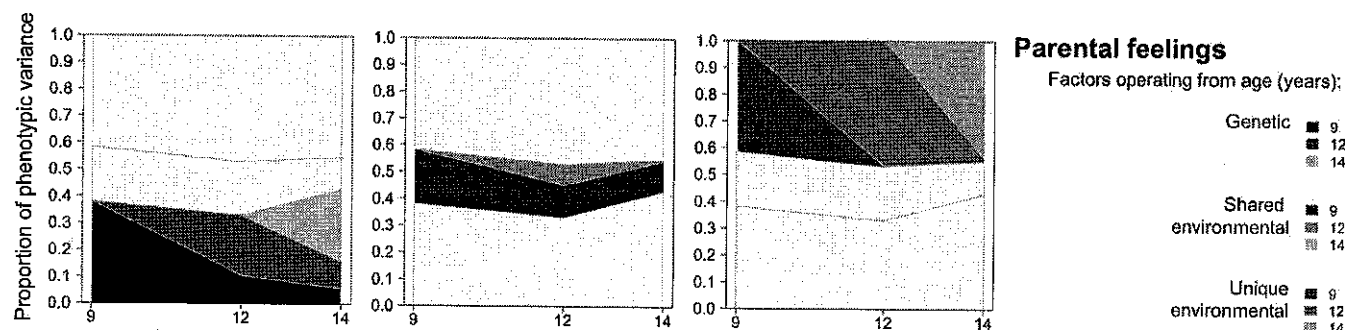


Figure 5 Genetic, shared environmental and non-shared environmental influences on stability and change in child-reported parental feelings.

environment. The contribution of genetic factors primarily to change in our home environmental variables is in stark contrast to the findings regarding influences on stability and change in emotional and behavioural development. These studies have primarily shown genetic factors to account for stability and environmental factors to account for change (e.g. Haberstick, Schmitz, Young & Hewitt, 2005; Hoekstra, Bartels, Hudziak, Van Beijsterveldt & Boomsma, 2008; Trzaskowski, Zavos, Haworth, Plomin & Eley, 2012; Waszczuk, Zavos & Eley, 2013; see Hannigan, Walaker, Waszczuk, McAdams & Eley, 2016). The influence of different genetic factors across development has been shown in some behavioural studies, and conceptualized as evidence of a 'developmentally dynamic genome' (e.g. Kendler, Gardner & Lichtenstein, 2008; Kendler, Gardner, Annas, Michael, Eaves *et al.*, 2008; van Beijsterveldt, Bartels, Hudziak & Boomsma, 2003; Zavos, Gregory & Eley, 2012). Nonetheless, our finding of genetic influence on change consistently *exceeding* that on stability appears to be a characteristic of these environmental variables that differs from commonly studied behavioural and cognitive phenotypes.

The broad discrepancy between these results and the results of studies of behavioural phenotypes is particularly striking given the typical interpretation of genetic influence on measures of the environment in child-based designs: as the effect of children's genetically influenced *behaviour* shaping aspects of their home environment (Avinun & Knafo, 2014; Plomin, Loehlin & DeFries, 1985; Scarr & McCartney, 1983). The implication of our finding, that these effects of child behaviour are developmentally dynamic, is that different genes are influencing environment-shaping behaviours at different stages of the transition to adolescence. For example, hormonal changes during puberty may result in prominent new behavioural characteristics that evoke entirely different responses from caregivers or siblings from those evoked earlier in development. Given the relative lack of genetic

stability in our variables, this possibility that *change* in children's behaviour shapes their home environment in a way that stability does not is intriguing and worthy of further investigation.

As children develop, their capacity to influence characteristics of their environments through their behaviour increases (Scarr & McCartney, 1983). For example, an older child's ability to engage in meaningful interactions with – and evoke responses from – parents and other caregivers will be greater than that of a prelinguistic infant. Similarly, adolescents are likely to experience increasing levels of independence and be able to exert more control over when, how and with whom they spend their time in the household (Beyers & Goossens, 1999; H.J. Spear & Kulbok, 2004; Steinberg & Silverberg, 1986). Change in the ways in which developing individuals can shape their environment has been posited as a potential explanation for the overall increases in genetic influence seen for many behavioural traits in adolescence (Bergen, Gardner & Kendler, 2007; Hanscombe, Haworth, Davis, Jaffee & Plomin, 2010; Rice, Harold & Thapar, 2003). Of note, the 'genetic amplification', in which stable genetic influences account for increasing proportions of the variance across time, that was identified in a previous longitudinal study of the aetiology of the parent–child relationship (Ludeke *et al.*, 2013) was largely absent in our sample.

A potential alternative interpretation of the finding of widespread genetic influence on change across development must also be considered. This is that genetic factors influenced children's scores on measures of the home environment via the perceptual (or subjective) element of their reporting. If this was the case, new genetic influences on our home environmental variables at ages 12, 14 and 16 could relate to developmental changes in the way in which children perceived their environment, rather than in the environment *per se*. For example, increasing exposure to a wider range of social experiences may, in tandem with developing social cognition

abilities, result in children recruiting different perceptual processes in their appraisal of their home environment (Blakemore & Choudhury, 2006; Eccles, Midgley, Wigfield, Buchanan, Reuman *et al.*, 1993).

These two mechanisms by which children's genes may influence their scores on measures of the home environment – behaviour and perception – are not mutually exclusive. Indeed, as far as theoretical approaches to child development are concerned, both fall into the category child-driven processes. Certainly, neither represents a model of direct environmental influence on the individual as a passive recipient. Instead, they relate to the engagement – behavioural or perceptual – of the individual with the environment around them. As such, either may relate functionally to the developmental outcomes with which such environmental phenotypes are often associated. Future work could incorporate observer and/or parent reports into the developmental genetic design in order to attempt to distinguish behavioural and perceptual effects in this regard. Alternatively, this question could be addressed by comparing the aetiological overlap between aspects of the home environment and measures of both behaviour and perception longitudinally.

Before moving to discuss the results for environmental factors, it is worth noting that despite the consistency of the pattern of genetic factors predominantly driving change rather than stability across the variables in the study, we did find differences in the overall magnitude of genetic influence on each variable. Genetic factors were most influential for parental feelings (explaining, on average, 38% variance at each age), slightly less for parental discipline ($\approx 25\%$ variance explained) and less again for household chaos ($\approx 17\%$). To some extent, this aligns with expectations for these variables, in terms of child-driven effects. In the case of the parenting variables, it has been shown previously that parents' feelings towards their children are more influenced by children's genetic factors than are their disciplinary strategies (see Kendler & Baker, 2007, for a review), although a recent meta-analysis found this difference to be significant only for parent-reports and not child-reports or observational data (Avinun & Knafo, 2014). The greater heritability of parental feelings is usually attributed to the fact that the emotional responses children evoke in their parents are automatic, and not subject to the parent's deliberate control (Klahr & Burt, 2014). Although the discipline a child receives may also be correlated with their genotype via this process, this aspect of parenting is thought to be more subject to parents' conscious, strategic control, and to external factors, such as culture (Shikishima, Hiraishi, Yamagata, Neiderhiser & Ando, 2012). This difference could explain these results in the current study, with the

further reduction in child-driven effects on household chaos attributable to its focus on the wider home environment, rather than any interactions with one specific child. Despite the intuitive nature of these interpretations of differences in the magnitude of genetic influence between the variables, it is important to note that differences in the reliability of measures hampers the extent to which firm conclusions can be drawn (see the Limitations section below for further discussion on this).

Environmental influences on stability and change in measures of the home environment

Shared environmental factors were found to be most important for driving stability in measures of the home environment, though it should be reiterated that overall stability was only moderate for these measures, with correlations between time points ranging from .32 to .55. For household chaos, the fact that shared environmental factors were seen primarily to produce stability ties in with what is known about specific influences on household characteristics that are, themselves, predominantly stable (e.g. SES, neighbourhood characteristics; Bradley, Corwyn, McAdoo & García Coll, 2001b; Dumas, Nissley, Nordstrom, Smith, Prinz *et al.*, 2005). Indeed, the large influence of stable shared environmental factors is consistent with the origins of the CHAOS measure, which was intentionally designed as an index of aspects of the home environment that are largely expected to be shared by cohabitants.

Wider cultural and environmental factors may also explain the prevalence of shared environmental factors in producing stability in the parenting variables. However, stable parental characteristics, such as personality traits, are also likely to have influenced parenting, and these would also manifest as stable shared environmental influences. This is true irrespective of the fact that such characteristics of parents are likely to be genetically influenced because, in a child-based design, only the influence of the *child's* genes load on the genetic component of the models (Klahr & Burt, 2014). The importance of parental characteristics is supported by theoretical accounts of the role of parent-driven processes in shaping the dyadic relationship with their child, which hold that personality characteristics influence the relationship both directly and via a feedback loop relating to the parent's own exposure and sensitivity to stress and support (Belsky, 1984; Darling & Steinberg, 1993). Findings of predominant stability in adult personality (e.g. Caspi, Roberts & Shiner, 2005; Costa & McCrae, 1988, 1997) are consistent with this idea that parent-driven processes may operate somewhat stably to

bring continuity to the child's home environment across development.

As well as stability, there was some indication of change in shared environmental influences; in particular, for parental discipline. This could be interpreted as evidence that parents, at least to some degree, seek to employ age-specific (rather than child-specific) disciplinary strategies. Even if this is the case, the greater magnitude of non-shared environmental influences at each wave indicates that children experience these strategies somewhat differentially. The consequences of this kind of discrepancy, in terms of associations between (actual or perceived) differential parenting and developmental outcomes, have not yet been fully explored (e.g. Burt, McGue, Iacono & Krueger, 2006; Feinberg & Hetherington, 2001; Mullineaux, Deater-Deckard, Petrill & Thompson, 2009; Reiss, Hetherington, Plomin, Howe, Simmens *et al.*, 1995). Parent-driven processes remain plausible explanations for such associations, as has been shown elsewhere (e.g. Bornovalova, Cummings, Hunt, Blazei, Malone *et al.*, 2014; Narusyte, Neiderhiser, Andershed, D'Onofrio, Reiss *et al.*, 2011; see Maccoby, 2000, for a review).

As indicated above, non-shared environmental influences were significantly influential for all variables at all ages, and operated almost exclusively to drive phenotypic change. Interpretation of the results from this component of the models is hampered by confounding from occasion-specific measurement error, which makes twins' responses differ from one another in an unsystematic way. However, the results of previous studies indicate that some influence of 'real' non-shared environmental factors is likely, and may be related to children spending increasing amounts of time outside of the household (Mullineaux *et al.*, 2009; Pike, Reiss, Hetherington & Plomin, 1996; Turkheimer & Waldron, 2000). Measurement error is thought to reduce in adolescence as children become more reliable reporters (Ludeke *et al.*, 2013) and it is noteworthy that, in the present study, wave-to-wave stability increased with age for each variable (see Table 2). This is consistent with the presence of some 'real' non-shared environmental influences. Nonetheless, the true magnitude of the role of non-shared environmental influences in producing differences in children's perceptions of their home environment cannot be determined here. Our interpretation of these results is therefore constrained to the non-trivial observation that non-shared environmental influences are not a source of stability in the children's perceptions of their home environments during the transition from childhood to early adolescence.

Limitations

As well as sharing all limitations and assumptions that are inherent to the twin design, such as the now well-explored equal environments assumption (e.g. Derks, Dolan & Boomsma, 2006), this study had some specific limitations. First, the exclusive use of child-report data means that results are most informative as to children's *perceptions* of household chaos and parenting. Although these perceptions could be qualitatively different from, for example, parents' perceptions of the same phenotypes, they are, conceivably, of particular importance in developmental terms. This is because, whether a child's report on their home environment represents an accurate reflection or a subjective perception, it will likely reflect their developmental experience. Nonetheless, this facet of the design prohibits us from being able to disentangle the respective roles of children's behaviour and their perception in producing genetic influence on the environmental variables, and this is a limitation. Quantifying the relative objectivity and subjectivity of these reports would therefore be beneficial, and further work using data from multiple raters could enable this. Furthermore, other study designs, such as the children-of-twins design (in which parents are twins), might be also well placed to investigate these phenotypes from the parent perspective (McAdams, Neiderhiser, Rijdsdijk, Narusyte, Lichtenstein *et al.*, 2014).

A second, related limitation concerns the relationship between measurement reliability and the non-shared environmental contributions of variance estimated in the models. Internal consistencies (Cronbach's α) were generally lower than is considered satisfactory in the development of psychometric measures, with only the parental feelings scale consistently reaching this level. This coefficient relates to the clustering of items within scales, so a low coefficient may relate to the breadth of the construct being assessed, as well as poor reliability. However, given the imperfect reliability of our measures, it is very likely that some error of measurement was included in the data from each measure. In behavioural genetic models, measurement error loads onto non-shared environmental estimates (because error is essentially random and so does not correlate within families). Given the pattern of non-shared environmental influences in the current study, it is also evident that any measurement error was not correlated across time. Therefore, occasion-specific measurement error in our study would have loaded onto estimates of non-shared environmental contributions to change and decreased the amount of stable, 'real' variance available for decomposition. However, this limitation could only

result in an under-estimation of genetic or shared environmental influences and thus the results of this decomposition remain interpretable as lower bound estimates of genetic and shared environmental stability and change in the home environment. While the imperfect reliability of our measures serves as a limitation to our study, it is important to note that it cannot explain the longitudinal results. That is, measurement error would not explain the contrast between the primary pattern of results in the current study (genetic influence on change, common environmental stability) and those typically found in longitudinal genetic studies of behavioural and cognitive phenotypes (i.e. predominant genetic stability; Hannigan *et al.*, 2016).

Finally, genetically informative, child-based investigations of parenting, such as the present study, are well equipped to address genetic confounding mediated through evocative effects that associate with the child's genotype. However, the influence of passive gene-environment correlation – i.e. parents providing both genes and environments for children – is not quantified in such designs (Avinun & Knafo, 2014). Instead, as noted in the interpretation of the environmental results, some of the effects of parents' genes will accumulate in the shared environmental components of models. Genetic confounding of measures of children's environments that is mediated through parents' genes can be investigated using other behavioural genetic designs, such as the children-of-twins design (McAdams *et al.*, 2014).

Conclusions

The results of this study highlight the importance of considering the home environment as both a context for child development and a consequence of the behavioural and cognitive change that accompany it. Developmentally dynamic genetic influences on measures of the home environment across early adolescence indicate that different child-driven processes may be important at different stages of development. In contrast, parent-driven processes may operate to provide more developmental stability in the home environment during the transition between childhood and adolescence. We have shown longitudinal genetic models to be a powerful tool for the investigation of parent- and child-driven processes across development, allowing variance in home environmental measures to be decomposed aetiologically (in terms of the genetic and environmental influences) and temporally (in terms of when these influences may first 'come online' and subsequently endure or wane). Understanding the dynamics of the bidirectional processes that shape the home environment developmentally

is a challenge that will require the integration of methodological approaches from across the full breadth of developmental science.

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Change and Predictors of Change in Parental Self-Efficacy From Early to Middle Adolescence

Terese Glatz

Wake Forest University and Örebro University

Christy M. Buchanan

Wake Forest University

Parental self-efficacy (PSE) describes parents' beliefs about being able to handle developmentally specific issues and being able to influence their child in a way that fosters the child's positive development and adjustment (Bandura, 1997). Parents of adolescents have been shown to feel less efficacious than parents of preadolescent children (Ballenski & Cook, 1982), but little is known about the factors behind low levels of PSE among parents of adolescents. This study examined mean-level changes in PSE and predictors of change among parents of adolescents. The sample was derived from a 3-wave longitudinal data set of 398 parents of children starting spanning early (11 or 12 years) to middle (14 or 15 years) adolescence (47% boys). Latent growth curve analysis was performed, and it was hypothesized that theoretically driven predictors reflecting the developing child, as well as the ecological context, would predict the level of PSE. Despite generally high levels of PSE across all time points, parents decreased in PSE during the developmental period. Some predictors were of particular importance for the level and amount of change in PSE, such as physical changes in the child, parents' target-based expectations for risk taking during adolescence, the quality of parent–adolescent communication, and ethnicity. This study adds insight into the development of PSE during the critical transitional period of early and middle adolescence. The findings advance theory of PSE, as it illuminates why some parents' decrease in PSE more than do other parents.

Keywords: parental self-efficacy, adolescent development, parent–child relationships

Parental self-efficacy (PSE) refers to parents' feelings of competence in their parenting role, including beliefs about being able to handle developmentally specific issues and being able to influence their child in a way that fosters the child's positive development and adjustment (Bandura, 1997; for a review, see Jones & Prinz, 2005). Limited research (Ballenski & Cook, 1982) suggests that PSE differs as a function of the child's age, and that parents of adolescents report lower PSE than do parents of younger children (Ballenski & Cook, 1982). During adolescence, higher levels of PSE predict more positive parenting practices that in turn predict lower adolescents' externalizing (Glatz & Buchanan, 2015), and thus it is important to examine changes in PSE as well as predictors of changes during this developmental period.

Theoretically, PSE should be a product of factors within two broad categories. A first category encompasses characteristics of

and experiences with one's child (e.g., children's personality and behavior, quality of the parent–child relationship; Ardel & Eccles, 2001; Bandura, 1997; Jones & Prinz, 2005). As children enter and develop through adolescence, they experience changes in several domains (e.g., biological, social, behavioral) that might predict changes in PSE. A second category encompasses the ecological context (Ardelt & Eccles, 2001; Bandura, 1997, 2002; Jones & Prinz, 2005), which is often represented by demographic factors such as socioeconomic status (SES), ethnicity, gender, or other "social addresses" that can influence the parenting experience (e.g., Bronfenbrenner & Morris, 1998). In this study, we examine the development of PSE among parents of children from early through middle adolescence, and we examine several theoretically driven predictors of changes in PSE reflecting the developing child as well as the ecological context.

The Development of PSE

Similar to children, parents develop over time (e.g., Azar, 2003). Parental development includes changes in parents' beliefs about parenting, such as their PSE. Only one study, to our knowledge, has compared levels of PSE among parents of children in different age groups (Ballenski & Cook, 1982). In their cross-sectional study, Ballenski and Cook (1982) examined parents' feelings of competence, operationally defined as comfort in addressing developmentally relevant tasks, among parents of infants (birth to 13 months), toddlers (14 to 36 months), preschoolers (3 to 5 years), school-age children (6 to 12 years), and adolescents (13 to 18 years). Although statistical tests were not used, two groups were noticeably different from the others: Parents of preschoolers re-

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Terese Glatz, Department of Psychology, Wake Forest University, and Center for Developmental Research at School of Law, Psychology, and Social Work, Örebro University; Christy M. Buchanan, Department of Psychology, Wake Forest University.

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Correspondence concerning this article should be addressed to Terese Glatz, Department of Psychology, Wake Forest University, 415 Greene Hall, P.O. Box 7778, Reynolda Station, Winston-Salem, NC 27109, or Center for Developmental Research at School of Law, Psychology, and Social Work, Örebro University, Fakultetsgatan 1, SE – 701 82 Örebro, Sweden. E-mail: glatztd@wfu.edu

ported the highest level of PSE and parents of adolescents reported the lowest. In line with these results, two studies using longitudinal data to model mean-level changes in PSE have shown that PSE increases over infancy and the preschool years (Deković et al., 2010; Weaver, Shaw, Dishion, & Wilson, 2008). Hence, from the limited data available, it appears that during the early childhood years, parents feel increasingly competent, but that this competence declines thereafter to a nadir at adolescence.

In Ballenski and Cook's (1982) study, the largest decline in PSE took place between what they called the school-age period (6 to 12 years) and the adolescent period (13 to 18 years). Although these results illuminate potential age differences in PSE, the grouping of ages is broad and provides limited insight into the developmental timing of the suggested decline. In the current study, we focus on the development of PSE over the early adolescent years (age 11 to 14) to see whether we find evidence of a decline over this transitional time. In contrast to Ballenski and Cook (1982), we model mean-level changes in PSE over this developmental period in an attempt to replicate and gain insight into the possible suggested decline in PSE. In addition, we predict levels of PSE with constructs drawn from the theoretically based categories outlined next.

The Developing Child at Early Adolescence

The early adolescent period is a time of tremendous change in characteristics of and experiences with children that have the potential to affect PSE. In this section, we review some prominent changes. To start with, physical changes of puberty are significant, and include development of primary and secondary sexual characteristics (breast and body hair) and increases in height and weight. Visible signs of puberty tend to appear between 8 to 13 years in girls and between 9 to 14 years in boys (Strauss & Barbieri, 2009). In the social domain, changes take place in the parent-child relationship, such as changes in parent-child communication (Branje, Laursen, & Collins, 2013; Collins & Laursen, 2004). On average, parents and children experience increased communication difficulties in early and middle adolescence. Further, parent-centered unilateral socialization processes decline (e.g., Dornbusch, Ritter, Mont-Reynaud, & Chen, 1990; Gutman & Eccles, 2007), allowing the child a more active role in decision making (Larson, Richards, Moneta, Holmbeck, & Duckett, 1996; Wray-Lake, Crouter, & McHale, 2010). Perhaps as a result, parent-child conflicts and negative emotions during conflicts increase during the early years of adolescence (for a review, see Branje et al., 2013). There are also emotional and behavioral changes in the child during adolescence. On average, positive emotions decrease, and negative emotions and depressive symptoms increase, over the adolescent years (e.g., Garber, Keiley, & Martin, 2002; Larson et al., 1996), as does risk taking or externalizing behavior (e.g., Johnston, O'Malley, Bachman, & Schulenberg, 2013). In sum, the early years of adolescence include notable developmental changes in the physical, social, and behavioral domains.

Another change that might occur at adolescence concerns parents' expectations for their children's behavior. Despite average changes in the characteristics described in the former paragraph the absolute levels of problematic emotions, behaviors, and relationship difficulties among adolescents are low. Most adolescents do not engage in high levels of problem behavior, and most

parent-child relationships are characterized by high warmth and low conflict overall (Buchanan & Hughes, 2011; Nichols & Good, 2004). Nonetheless, consistent with the notion that adolescence is a time of "storm and stress" (Arnett, 1999; Hall, 1904), parents and others hold stereotypes of adolescent behavior that are more negative than those of younger children (Buchanan & Holmbeck, 1998; Holmbeck & Hill, 1988). These stereotypes, or category-based beliefs, can influence parents' expectations for their own children (i.e., target-based expectations) independent of the child's actual current and past behavior (Buchanan, 2003; Jacobs, Chhin, & Shaver, 2005). Thus, parents' target-based expectations, which ultimately have the potential to influence the way parents react to and interact with their children (Jacobs et al., 2005), might shift in a negative direction during adolescence.

Implications of Early Adolescent Development for PSE

The changes taking place during adolescence have the potential to predict developmental declines in PSE among parents. For example, physical changes are powerful signals to parents that the child is entering adolescence. These changes might in themselves influence views of and expectations for the child (Paikoff & Brooks-Gunn, 1991). In Western societies, the entry to adolescence signals the arrival of many other changes, including increases in independence from parents and increased peer influence (Buchanan et al., 1990; Buchanan & Holmbeck, 1998; Hollenstein & Loughheed, 2013; Holmbeck & Hill, 1988). It is therefore possible that declines in PSE result directly from parents noticing pubertal changes in their children.

The typical changes in the parent-child relationship, such as communication, might also predict decreases in PSE. No existing study, to our knowledge, has examined the association between aspects of the parent-child relationship and PSE, but it seems logical to assume that increases in difficult parent-child communication during adolescence could predict decreased parental beliefs about their own competence and influence.

The average changes in children's behaviors over early adolescence are also likely to predict average declines in PSE. In studies using community-based samples, higher internalizing (e.g., anxiety; Hill & Bush, 2001) in children and adolescents has been related to lower levels of PSE (for a review, see Jones & Prinz, 2005). Additionally, higher child and adolescent externalizing (Slagt, Deković, de Haan, van den Akker, & Prinzie, 2012), aggression (de Haan, Soenens, Deković, & Prinzie, 2013), attention-deficit hyperactivity disorder symptoms (Glatz & Stattin, 2013; Glatz, Stattin, & Kerr, 2011), and the extraversion personality trait (Egberts, Prinzie, Deković, de Haan, & van den Akker, 2015) have all been linked to lower levels of, or rank-order decreases in, PSE. Similarly, intervention studies focusing on reducing problematic child behaviors have shown to be effective in increasing PSE (for a review, see Jones & Prinz, 2005). Hence, both internalizing and externalizing behaviors in the child are linked to lower levels or decreases in PSE. It seems reasonable to examine the impact of children's behavior on changes in PSE over early and middle adolescence and simultaneously examine the possible impact of other relevant predictors of PSE.

In addition to the impact of biological, relational, and behavioral characteristics of the child, parents' expectations for behavioral changes during adolescence might be important predictors of de-

clines in PSE. Culturally based stereotypes of adolescence are characterized by beliefs about difficulty, including that adolescents are more influenced by friends, media, and fads, and more likely to question or even rebel against parents, than are younger children (Buchanan & Holmbeck, 1998). As noted, these culturally based views of adolescents can influence expectations for one's own adolescent (Buchanan, 2003), which have the potential to influence other parenting beliefs concerning that child. Thus, parents' target-based expectations for their child in early adolescence might have implications for changes in PSE over and above the impact of the child's characteristics.

The Ecological Context and Its Implications for PSE

Various aspects of the ecological context have been suggested to undermine or enhance the development of PSE (Bandura, 2002; Jones & Prinz, 2005). The ecological context is often represented, albeit crudely, by demographic characteristics or "social addresses" (e.g., Bronfenbrenner & Morris, 1998) specific to the child (e.g., the child's sex and grade in school), to the parent (e.g., ethnicity, sex, age, marital status, educational level, and previous parenting experience), or to the family (e.g., family income; Jones & Prinz, 2005). On the one hand, the ecological context can make the conditions for parenting more or less difficult, which ought to relate to PSE. On the other hand, different ecological contexts reflect different cultural values and ethnotheories concerning the parental role, which might affect PSE (Bandura, 2002).

Socioeconomic disadvantage is one example of an ecological context that arguably undermines the development of PSE because of difficulties in parenting created by limited financial resources or living in unsafe neighborhoods (Jones & Prinz, 2005). Parents with high economic pressure (e.g., low SES) have been shown to report lower PSE than parents with low economic pressure (e.g., Elder, Eccles, Ardelt, & Lord, 1995; Shumow & Lomax, 2002). Unmarried parenting (single parenting or parenting in the context of divorce) is another example of a contextual characteristic that might magnify the challenge of parenting and interfere with PSE. In contrast, when parents have previous experiences of parenting adolescents, the task of parenting a young adolescence should, on average, seem less difficult. Previous parenting experiences offer the opportunity for mastery, which is the most effective way of increasing a person's self-efficacy (Bandura, 1977). In support of this idea, parents with multiple children have shown to report higher levels of PSE than parents with only one child (Leahy-Warren & McCarthy, 2011; Ulfsdotter, Enebrink, & Lindberg, 2014).

Ethnicity is an example of an ecological context that might affect PSE because of ethnic differences in cultural values and ethnotheories concerning the parenting role. For example, using only Wave 1 data of this project, Buchanan, Grzywacz, and Costa (2013) found that African American parents reported higher PSE than did European American parents, and suggested that this was a result of a greater emphasis on parental authority and respect for elders in the African American community. Similar differences in PSE between European American and African American have been shown elsewhere (Pinderhughes, Hurley, & the Conduct Problems Prevention Research Group, 2008), although other studies comparing the same ethnic groups have reported no differences in PSE (Ardelt & Eccles, 2001; Elder et al., 1995).

In sum, PSE is likely to differ as a function of characteristics of the ecological context. Notably, previous studies of the ecological context as related to PSE have normally not examined multiple predictors simultaneously, and therefore it is unknown which predictors continue to be significant when controlling for other related predictors. Given the co-occurrence of ecological characteristics, multiple characteristics should be examined simultaneously to be able to understand the unique effect of each.

The Current Study

In this study, we examined changes in PSE among an ethnically and economically diverse sample of parents of 11- and 12-year-old adolescent children followed over 3 years. This is a meaningful developmental period to study, given the many changes of early adolescence as well as the noticeable difference in PSE between parents of school-age children (6 to 12 years) and parents of adolescents (13 to 18 years) in the study by Ballenski and Cook (1982). Based on Ballenski and Cook's results, we expected to find a decline in PSE over this developmental period. Additionally, we predicted initial levels of and amount of change in PSE using theoretically grounded characteristics of the early adolescent and the ecological contexts. The theoretical model is presented in Figure 1.

For predictors assessing the child's developmental changes in early adolescence, we used adolescents' pubertal status, parent-adolescent communication, and adolescents' emotions and behaviors. Extrapolated from the idea that children in early adolescence experience changes on average, but differ in the onset and severity of these (e.g., Buchanan & Hughes, 2011; Hollenstein & Loughheed, 2013; Nichols & Good, 2004), we hypothesized that variability in the characteristics would predict differences in the timing and trajectory of PSE. Specifically, we hypothesized that parents who reported higher levels of adolescents' physical maturity, less positive parent-adolescent communication, and more adolescent internalizing and externalizing would feel less efficacious initially and/or experience greater reductions in PSE over the subsequent years than would other parents. We also expected that more negative target-based expectations for internalizing and risk taking would be linked to lower PSE initially and/or over time, above and beyond the impact of adolescent actual behaviors.

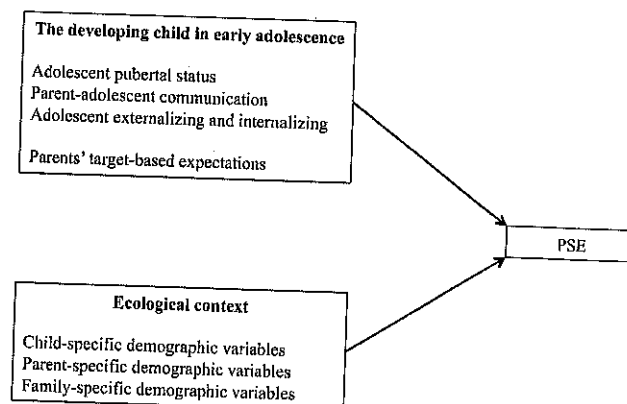


Figure 1. Theoretical model of the predictors within the two categories. PSE = parental self-efficacy.

For predictors assessing the ecological context, we examined several possible demographic variables. The ethnically and economically diverse sample used in this study is helpful, given the demographic predictors of PSE that have been identified in theory and research. We expected that parents who experienced more difficult parenting situations, such as parents with lower educational level and income, and unmarried parents, would report lower PSE than would parents with higher education and income, and parents who were married, respectively. Further, as a result of the "practice" that comes with parenting an adolescent child, we hypothesized that parents with earlier parenting experience would feel more efficacious than would parents who had not parented an adolescent child before. Finally, because previously reported results from Wave 1 of this project showed that African American parents reported higher levels of PSE than did European American parents, we expected to find the same ethnic difference with regard to the initial levels of PSE in the present study. Given ethnic differences in ethnotheories concerning parental authority, we expected that this difference might persist over time, yet the mixed results concerning ethnicity in other studies made us cautious in drawing this hypothesis.

Method

Participants and Procedure

Data for this study were derived from a three-wave longitudinal project including 284 mothers and 114 fathers ($N = 398$). The first time point (T1) of the data collection took place in 1999 to 2000, the second time point (T2) took place 1 year later, and the third time point (T3) took place an additional 2 years later. Parents were recruited through two public middle schools in the southeastern United States. In some families, two parents participated (47%), whereas in other families, only the mother (48%) or only the father (5%) participated. At T1 and T2, telephone interviews (approximately one hour in length) were conducted separately for each parent and adolescent. Participants were mailed the response scales that were used during the interview, as well as written questionnaires to be completed after the interview. At T3, no interviews were conducted; only survey data were collected through mailed questionnaires. At each wave of the study, mothers and fathers were each paid \$50 and adolescents were paid \$25 for their participation.

The parents were either European American (66%) or African American (33%). Family income was distributed as follows: over \$150,000 (2%); \$75,000 to \$150,000 (18%); \$40,000 to \$74,999 (38%); \$20,000 to \$39,999 (32%); and below \$20,000 (11%). At T1, the mean age for mothers was 39.2 years ($SD = 5.5$), and for fathers it was 41.4 years ($SD = 6.0$). Concerning parental education, 3% had less than a high school education, 20% had a high school education only, 48% had some college or vocational education, 23% had a college degree only, and 6% had a graduate or professional degree. More than half of the parents (61%) were married at T1, and about half of the parents (52%) had parented an adolescent already. Of the adolescents, 47% were boys and 53% were girls, and at T1 they were in either sixth (50%; $M_{age} = 12.12$; $SD = 0.37$) or seventh grade ($M_{age} = 13.15$; $SD = 0.38$).

Measures

In this study, we used parent reports about their PSE, various adolescent behaviors, and their expectations for behaviors during adolescence. Although parents' perceptions are not perfect predictions of "objective" levels of adolescent characteristics, it is parents' perception of these characteristics that should be the most powerful predictors of their PSE. For this reason, parents' reports were used in this study rather than adolescent reports. For all variables, higher values represent higher levels of the construct measured.

Parents' PSE. We used two task-specific measures available at the time of the data collection that were argued to assess parents' competence with respect to addressing developmentally relevant issues and abilities to influence adolescents' behaviors. Both measures were used at all three waves of data collection.

The first PSE measure was adapted from Ballenski and Cook's (1982) study reporting developmental differences in PSE. To replicate and extend their findings, it was critical to include this measure. On this measure, parents rated how comfortable they felt in "Dealing with discipline for the child," "Maintaining adequate limits for the child," "Adjusting to the child's demands for independence," "Dealing with the child's demands for privacy," "Dealing with moodiness in the child," "Dealing with rebellious or defiant behavior in the child," and "Dealing with conflicts with the child." Parents responded on a Likert scale ranging from 1 (*always comfortable*) to 6 (*never comfortable*). Cronbach's alphas were .86, .85, and .86, at T1, T2, and T3, respectively.

We used a second PSE measure developed by Freedman-Doan, Abreton, Harold, and Eccles (1993). Parents rated how much they thought they could influence their child in the following ways: "To get the child to stay out of trouble in school," "To help the child get good grades in school," "To increase the child's interest in school," "To prevent the child from getting in with the wrong crowd," and "To prevent the child from doing things they do not want him or her to do outside the home." Response options ranged from 1 (*very little*) to 7 (*a great deal*). Cronbach's alphas were .83, .85, and .88, at T1, T2, and T3, respectively.

Children's pubertal development. Parents' perceptions of their adolescents' pubertal status at T1 were assessed using the Pubertal Development Scale (PDS; Petersen, Crockett, Richards, & Boxer, 1988). For boys, scores on the PDS were the average of parents' reports concerning status in five areas: height, body hair, skin changes, voice changes, and facial hair. Cronbach's alpha was .82. For girls, the PDS scores were the average of parents' reports concerning the status in: height, body hair, skin changes, and breast development. Cronbach's alpha was .75. The response options ranged from 1 (*not yet begun/no*) to 4 (*has been completed/my child's skin did change but now it is back to normal/they [girls' breasts] have already finished growing/his voice has already changed completely*).

Parent-adolescent communication. Parents rated how well 15 statements described the quality of the communication with their children at T1 (Robin, Koepke, & Moye, 1990). Examples of these statements were "Your child listens to you even when you argue," "You and your child are able to have good talks," "Your child admits when he or she is wrong about something," "Your child is bossy when talking to you," and "The talks you have with

your child are frustrating." Parents responded on a Likert scale ranging from 1 (*never*) to 5 (*very often*). Cronbach's alpha was .90.

Adolescents' emotions and behaviors. Parents' perceptions of their adolescents' internalizing and externalizing behaviors at T1 were assessed via the Child Behavior Checklist (CBCL; Achenbach, 1991). For the Internalizing subscale, parents rated how well 31 statements described their adolescents' behaviors. Examples of these were: "Complains of loneliness," "Too fearful or anxious," "Shy or timid," "Cries a lot," "Withdrawn," and "Unhappy, sad, or depressed." Cronbach's alpha for this scale was .89. The Externalizing subscale included 33 descriptions of behaviors, such as: "Disobedient at home," "Gets in many fights," "Stubborn, sullen, or irritable," "Destroys things belonging to his or her family or others," "Temper tantrums or hot temper," "Uses alcohol or drugs," and "Teases a lot." Cronbach's alpha for this scale was .88. Response options for both subscales ranged from 0 (*not true [as far as I know]*) to 2 (*very true or often true*).

Parents' target-based expectations. Parents' target-based expectations at T1 were assessed with a measure of expectations for internalizing and risk-taking behaviors similar to those included in the Internalizing and Externalizing CBCL subscales (Buchanan & Holmbeck, 1998). This measure was, however, conceptually different, as it assessed *expectations* for one's child's future behaviors rather than perceptions of *actual* behaviors in the present. Parents reported how well they thought several characteristics would describe their child's personality and behaviors during adolescence. The six characteristics included in the Internalizing scale were "Awkward," "Anxious," "Insecure," "Confused," "Emotional," and "Depressed." Cronbach's alpha for this scale was .77. The nine characteristics included in the Risk-Taking scale were "Tests limits," "Rebellious," "Takes risks," "Reckless," "Stubborn," "Rude," "Impulsive," "Restless," and "Selfish." Cronbach's alpha for this scale was .85. For both these subscales, parents responded on a Likert scale ranging from 1 (*not very well*) to 10 (*very well*). Correlations at T1 between adolescent behaviors as reported on the CBCL and target-based expectations were moderate in size ($r_s = .51$ and $.67$, for Internalizing and Externalizing/Risk-Taking, respectively; see Table 1), indicating that these are related but independent measures.

Demographic variables representing the ecological context. Child-specific demographic predictors were the child's grade in

school (sixth or seventh grade) and sex. Parent-specific demographic predictors were ethnicity, sex, age, educational level, and earlier parenting experience. Family specific demographic predictors were parents' marital status, family income, and interfamily dependence (whether one or two parents from the same family participated in the project).

Statistical Analyses

We performed latent growth curve analysis using Mplus 7.11 (Muthén & Muthén, 1998-2012) with maximum likelihood (ML) estimator. This type of analysis examines an individual's change relative to his or her initial level (intraindividual change) and how this change compares with other individuals' change (interindividual change). Three indices were used to evaluate the fit of the models: the comparative fit index (CFI; Bentler, 1990), the Tucker-Lewis index (TLI; Tucker & Lewis, 1973), and the root mean square error of approximation (RMSEA; Browne & Cudeck, 1993). CFI and TLI values above .90 and RMSEA values of .06 or lower are considered indicators of a good fit between the hypothesized model and the observed data (Hu & Bentler, 1999). We examined initial levels of and changes in both PSE measures adapting *unconditional latent curve models*. Thereafter, we examined the *conditional latent curve models*, in which we included the variables within the two categories as predictors for initial level and change in PSE.

Missing Data

All parents reported on both PSE measures at T1, and the majority of the parents (87%) reported on both PSE measures at two or three time points (32% of the parents reported at T1 and T2, and 55% of the parents reported at all three time points). We performed a logistic regression analysis to examine whether parents with data on the PSE measures at all three time points (55%) differed from parents with some missing data (45%). We used all study variables at T1 as predictors of missing data. The results showed that only one of the variables significantly predicted missingness: Parents who were not married at T1 were more likely to have missing data on the PSE measures than did parents who were married at T1 ($OR = -.87, p = .001$). In all analyses, to handle missing data, full information maximum likelihood (FIML) was used. FIML uses all existing information to estimate the parameters and has been identified as the least biased method of estimating missing information (e.g., Little & Rubin, 2002; Schafer & Graham, 2002). In addition, we used the covariance coverage matrix in Mplus to examine the proportion of missing values on each pair of the study variables. The minimum recommended coverage is 0.10 (Muthén & Muthén, 1998-2012), and in this study, the coverage ranged from 0.55 to 1.00.

Results

Descriptive Results

In Table 1, means and standard deviations are reported for the predictors that assessed the child's developmental changes in early adolescence and PSE. Further, in Tables 2 and 3, zero-order correlations among all variables are reported. All predic-

Table 1
Means and Standard Deviations of All Study Variables

Variable	<i>M</i>	<i>SD</i>	<i>n</i>
Pubertal status T1	9.74	2.54	369
Parent-child communication T1	3.81	0.56	398
Externalizing T1	0.34	0.22	398
Internalizing T1	0.32	0.24	398
TB-expectations risk-taking T1	4.41	1.54	398
TB-expectations internalizing T1	4.45	1.47	398
1st PSE measure T1	4.54	0.84	398
1st PSE measure T2	4.51	0.79	346
1st PSE measure T3	4.44	0.79	222
2nd PSE measure T1	5.97	0.94	398
2nd PSE measure T2	5.89	0.95	346
2nd PSE measure T3	5.65	1.20	221

Note. TB-expectations = parents' target-based expectations; PSE = parental self-efficacy; T1, T2, T3 = Time point 1, Time point 2, Time point 3.

Table 2

Correlations Among the Predictors Assessing the Child's Developmental Changes in Early Adolescence and PSE

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Pubertal status	—											
2. P-C com T1	-.14	—										
3. Externalizing T1	-.14	-.66	—									
4. Internalizing T1	.12	-.48	.66	—								
5. TB-expect risk T1	-.02	-.59	.67	.38	—							
6. TB-expect intern T1	.08	-.47	.51	.51	.62	—						
7. 1st PSE T1	-.14	.55	-.41	-.36	-.43	-.37	—					
8. 1st PSE T2	-.11	.54	-.36	-.35	-.30	-.26	.64	—				
9. 1st PSE T3	.07	.49	-.31	-.33	-.20	-.18	.52	.64	—			
10. 2nd PSE T1	-.03	.32	-.32	-.23	-.30	-.25	.36	.21	.12	—		
11. 2nd PSE T2	.08	.40	-.35	-.28	-.30	-.22	.34	.35	.21	.48	—	
12. 2nd PSE T3	.07	.21	-.22	-.17	-.24	-.14	.14	.15	.30	.20	.38	—

Note. $ns = 221$ to 398 . Bolded correlations are significant. P-C com = parent-child communication; TB-expect = parents' target-based expectations; PSE = parental self-efficacy; T1, T2, T3 = Time point 1, Time point 2, Time point 3; 1st and 2nd = first PSE-measure and second PSE-measure.

tors were correlated with the two PSE measures in the expected directions.

The Unconditional Latent Curve Models

The models consisted of two latent variables: The *intercept* represented the initial level of PSE at T1 and the *slope* represented the change in PSE from T1 to T3. The factor loadings for the intercept were fixed at 1.0 at all time points, indicating an absence of growth. The factor loadings for the slope were fixed to 0 at T1, 1 at T2, and 3 at T3, representing the time interval between the time points (T2 took place 1 year after T1, and T3 took place 3 years after T1). For the unconditional model, three sets of results are of importance. First, the means of the intercept and slope describe the average initial level and the average change. Second, the variance of the intercept and the slope describe variability among parents in their initial level and change. Third, the correlation between the intercept and the

slope shows whether the initial level is associated with the amount of change.

Results for the first PSE measure. The final model showed a good fit to the data, $\chi^2 = 0.40$ (1), $p = .526$, RMSEA = .00, CFI = 1.00, TLI = 1.01. The slope in this model was significant (Estimate = $-.04$, 95% confidence interval [CI] [-0.07 , -0.01], standard error [SE] = 0.02 , $p = .008$), suggesting that there was a significant decrease in PSE over time (see Table 1 for means). Further, parents' scores varied significantly at T1 ($Est. = .47$, $SE = 0.05$, $p < .001$) and over time ($Est. = .03$, $SE = 0.02$, $p = .045$). Hence, not all parents started out at the same level of PSE and not all parents experienced the same amount of change in PSE. Finally, there was a significant and negative correlation between the intercept and the slope ($r = -.25$, 95% CI [-0.47 , -0.02], $SE = 0.12$, $p = .033$), showing that parents who had higher levels of PSE at T1 experienced a steeper decline in PSE from early to middle adolescence.

Table 3

Correlations Among the Predictors Assessing the Ecological Context

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Child's grade	—															
2. Child's sex	-.07	—														
3. Ethnicity	-.01	.09	—													
4. Parent education	-.02	-.12	-.05	—												
5. Marital status	.01	.08	.17	-.19	—											
6. Parents' sex	-.02	.07	.06	-.08	.23	—										
7. Parents' age	.05	.01	-.12	.26	-.32	-.18	—									
8. Earlier parenting	-.01	.02	-.02	-.04	.12	.03	-.31	—								
9. Family income	.10	-.12	-.32	.36	-.45	-.16	.29	-.18	—							
10. One or two parents	.01	-.08	-.12	.17	-.44	-.54	.12	-.02	.29	—						
11. 1st PSE T1	-.00	-.09	-.15	-.02	-.03	-.05	-.01	-.06	.06	-.02	—					
12. 1st PSE T2	-.05	-.04	.08	.03	-.11	-.01	-.06	.00	.03	.04	.64	—				
13. 1st PSE T3	.05	.03	-.01	-.03	.00	-.13	.04	-.11	.04	.04	.52	.64	—			
14. 2nd PSE T1	.11	.02	.06	-.04	-.05	.05	-.04	.04	.01	-.02	.36	.21	.12	—		
15. 2nd PSE T2	.02	.01	.10	-.04	-.05	.17	-.04	-.01	-.00	-.07	.34	.35	.21	.48	—	
16. 2nd PSE T3	-.09	.09	.11	-.07	.04	.04	.05	.00	-.01	-.05	.14	.15	.30	.20	.38	—

Note. $ns = 221$ to 398 . Bolded correlations are significant. Earlier parenting = whether or not parents have parented a child before. Child's grade, 1 = 6th grade; Child's sex, 1 = boys; Ethnicity, 1 = European American; Marital status, 1 = married; Parents' sex, 1 = fathers; Earlier parenting experience, 1 = have parented a child before; One or two parents, 1 = one parent reported. PSE = parental self-efficacy; T1, T2, T3 = Time point 1, Time point 2, Time point 3; 1st and 2nd = first PSE-measure and second PSE-measure.

Results for the second PSE measure. The final model involving the second PSE measure showed a good fit, $\chi^2 = 0.23$ (1), $p = .635$, RMSEA = .00, CFI = 1.00, TLI = 1.02. Parents declined in PSE over time ($Est. = -.13$, 95% CI [-0.18, -0.08], $SE = 0.03$, $p < .001$; see Table 1 for means), and there was significant variability in both the intercept ($Est. = .48$, $SE = 0.07$, $p < .001$) and the slope ($Est. = .08$, $SE = 0.03$, $p = .005$). Further, parents with higher levels of PSE at T1 experienced a steeper decline over time than parents who had lower levels of PSE at T1 ($r = -.32$, 95% CI [-0.56, -0.08], $SE = 0.12$, $p = .008$).

Summary. Parents showed a significant decrease on both PSE measures over time. As can be seen in Table 1, despite being statistically significant, the decreases are fairly small. Parents also varied in the initial level and amount of change over time, making it possible to predict initial level and degree of change from parents' scores on the predictors.

The Conditional Latent Curve Models

We used the unconditional latent curve models to examine whether the intercept and slope differed as a function of the predictors in this study. As a first step, we included all demographic variables as predictors of the intercept and slope of PSE. As a second step, we included the early adolescent variables and parents' target-based expectations to predict the intercept and slope of PSE while controlling for the significant demographic variables from the first step. All predictors were examined simultaneously, and the reported results are therefore the unique effects of each predictor when controlling for all other predictors. The

intercorrelations among all predictors were estimated in the analyses. For the significant predictors in the second step, we computed interactions and examined these as predictors of intercept and slope of PSE.

Results for the first PSE measure. The model including only the demographic variables showed an acceptable fit, $\chi^2 = 17.29$ (11), $p = .100$, RMSEA = .04, CFI = .98, TLI = .94. The significant predictors were the child's sex, ethnicity, and family income (see Table 4). At T1, parents of boys reported higher PSE than did parents of girls, African American parents reported higher levels of PSE than did European American parents, and parents with higher family income reported higher PSE than did parents with lower family income. Further, African American parents showed a steeper decrease in PSE over time than did European American parents, and parents of boys showed a steeper decrease than parents of girls.

The final model including the significant demographic variables from the first step (the child's sex, ethnicity, and family income) and all the early adolescent predictors showed a good fit, $\chi^2 = 8.01$ (10), $p = .628$, RMSEA = .00, CFI = 1.00, TLI = 1.01. The results from this model are presented in Figure 2. Ethnicity was the only demographic variable from Step 1 that remained a significant predictor of PSE (see Table 4). Four early adolescent predictors were significant and the results were mostly in line with our hypotheses. First, although pubertal status did not predict the intercept, it was a significant predictor of the slope. Parents who reported their adolescents to have a more advanced pubertal status at T1 reported a less steep decrease in PSE over time compared

Table 4
Results for the Demographic Control Variables Predicting PSE

Variable	Step 1: Only demographic variables				Step 2: Significant demographic variables from Step 1, and all early adolescent variables			
	I β	I p	S β	S p	I β	I p	S β	S p
First PSE measure								
Child's grade	-.03	.555	.04	.621	—	—	—	—
Child's sex	-.12	.041	.22	.021	-.07	.176	.16	.095
Ethnicity	.27	<.001	-.25	.021	.05	.364	-.23	.029
Parents' education	-.06	.313	.15	.155	—	—	—	—
Marital status	-.07	.299	-.04	.767	—	—	—	—
Parents' sex	-.04	.524	-.17	.116	—	—	—	—
Parents' age	-.07	.295	-.02	.857	—	—	—	—
Earlier parenting	-.02	.788	-.08	.419	—	—	—	—
Family income	.17	.018	-.22	.074	.07	.194	-.10	.311
One or two parents	-.05	.495	.04	.725	—	—	—	—
Second PSE measure								
Child's grade	.16	.008	-.24	.012	.19	.002	-.33	.004
Child's sex	.02	.707	.09	.345	—	—	—	—
Ethnicity	.13	.050	.17	.106	-.01	.918	.11	.322
Parents' education	-.02	.783	-.09	.381	—	—	—	—
Marital status	-.13	.086	.18	.168	—	—	—	—
Parents' sex	.12	.116	.01	.960	—	—	—	—
Parents' age	-.05	.493	.13	.262	—	—	—	—
Earlier parenting	.02	.728	-.04	.682	—	—	—	—
Family income	.00	.972	.18	.149	—	—	—	—
Interfamily dependency	.01	.953	-.02	.907	—	—	—	—

Note. Child's grade, 1 = 6th grade; Child's sex, 1 = boys; Ethnicity, 1 = European American; Marital status, 1 = married; Parents' sex, 1 = fathers; Earlier parenting experience, 1 = have parented a child before; One or two parents, 1 = one parent reported.

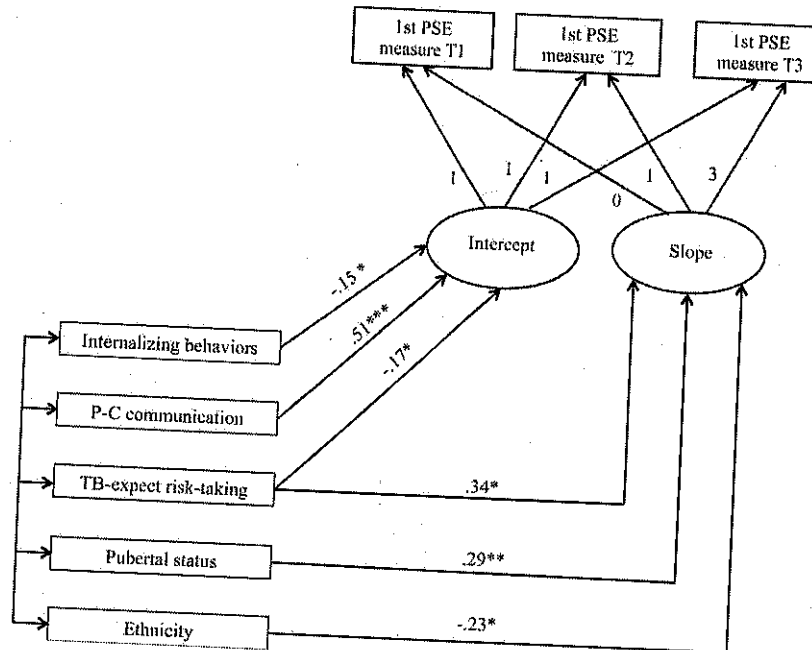


Figure 2. Significant standardized beta coefficients for the effects of the predictors on the intercept and slope of the first PSE measure. PSE = parental self-efficacy; P-C communication = parent-child communication; TB-expect risk-taking = Parents' target-based expectation for risk-taking.

with parents who reported their adolescents to be less physically matured. Second, more positive parent-adolescent communication predicted higher levels of PSE at T1, but did not predict the slope. Third, less internalizing predicted higher levels of PSE at T1, but did not predict the slope. Fourth, parents who reported fewer target-based expectations for risk taking reported higher levels of PSE at T1, but a steeper decrease in PSE compared with parents who reported more expectations for risk taking. No interactions were significant predictors of PSE.

Results for the second PSE measure. The model testing the impact of only the demographic variables showed a good fit, $\chi^2 = 9.54 (11), p = .572$, RMSEA = .00, CFI = 1.00, TLI = 1.03, and the significant predictors were the child's grade in school and ethnicity (see Table 4). Parents of children in seventh grade reported higher PSE at T1 and a steeper decrease than parents of children in sixth grade. Additionally, African American parents reported higher levels of PSE at T1 than did European American parents, but ethnicity did not predict the slope.

The results from the model testing for the impact of the early adolescent predictors on PSE, while controlling for the significant demographic variables from Step 1 (child's grade and ethnicity), showed a good fit, $\chi^2 = 6.85 (9), p = .653$, RMSEA = .00, CFI = 1.00, TLI = 1.03. These results are presented in Figure 3. Among the demographic variables, only child's grade remained significant. Two early adolescent predictors were significant, and the results were mostly in line with our hypotheses. First, pubertal status was a significant predictor for the slope, but not for the intercept. Parents who reported their adolescents to have a more advanced pubertal status at T1 reported a less steep decrease over time compared with parents who reported their adolescents to be less physically matured. Second, more positive parent-adolescent

communication was linked to higher levels of PSE at T1, but did not predict the slope. No interactions were significant predictors of PSE.

Discussion

PSE describes parents' feelings of competence in their parenting role, including beliefs about being able to perform developmentally specific parenting tasks and have an influence on the child's positive development and adjustment (Bandura, 1997). In this study, we examined mean-level changes in PSE among parents of children over 3 years in early through middle adolescence. As expected, and in line with earlier suggestions (Ballenski & Cook, 1982), PSE declined over this developmental period. Additionally, we used variables within two theoretically based categories: The developing child in early adolescence and the ecological context (Ardelt & Eccles, 2001; Bandura, 1997, 2002; Jones & Prinz, 2005), to predict the level of PSE initially and the amount of change in PSE over time. In general, more aspects of the child's development in early adolescence (especially parents' perceptions of the child's pubertal status, the quality of the parent-adolescent communication, and parents' expectations for risk taking during adolescence) were significantly linked to PSE than were the demographic characteristics used as indicators of the ecological context. The results of this study add to the understanding of the development of PSE during the critical transitional period of early to middle adolescence.

Changes in PSE From Early to Middle Adolescence

Despite generally high levels of PSE across all time points, the results showed that parents' PSE decreased significantly as chil-

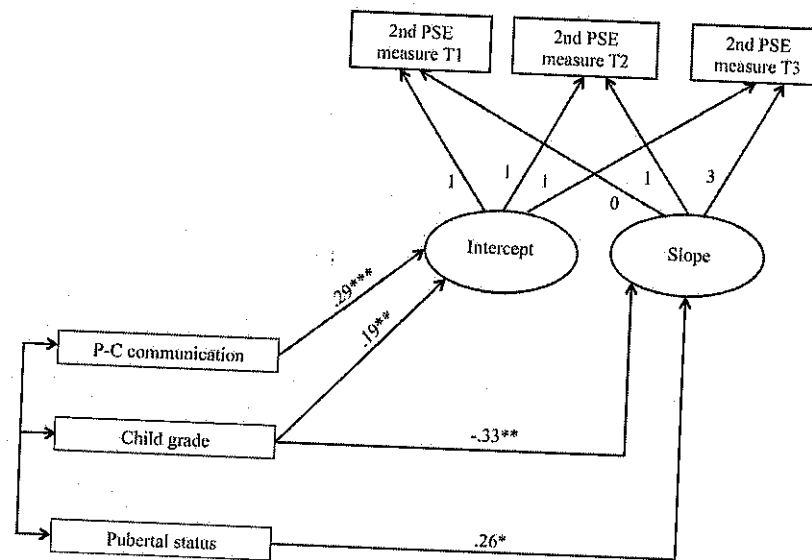


Figure 3. Significant standardized beta coefficients for the effects of the predictors on the intercept and slope of the second PSE measure. PSE = parental self-efficacy; P-C communication = parent-child communication.

dren moved from early to middle adolescence. This is consistent with earlier research showing that PSE is lower among parents of 13- to 18-year-olds than among parents of younger children (Bal-lenski & Cook, 1982), and might be a normative development as children reach an age at which they gain more autonomy (e.g., Wray-Lake et al., 2010). Additionally, because the reductions in PSE in this study were small in size, our findings do not imply that parents come to feel completely incompetent or unable to influ-ence their children. Nonetheless, because the level of PSE predicts the level of positive parenting practices among parents of adoles-cents (Glatz & Buchanan, 2015), even these small declines might have important implications for parenting and, ultimately, the child's behavior. Therefore, it seems useful to know more about general declines in PSE over this developmental period and why some parents decline more than others. Such information might provide insight in how to prevent or minimize declines, given that parents retain an influential role on their children's behavior dur-ing adolescence (e.g., Galambos, Barker, & Almeida, 2003; Van-dell, 2000).

Implications of Early Adolescent Development and the Ecological Context for PSE

Variations in parents' reports on the early adolescent variables and the demographic variables within the ecological context were related to differences in parents' initial levels of and amount of change in PSE. Some of these variables were linked to both PSE measures, which might describe general processes in which factors have an impact on both parents' feelings of competence and their perceptions of being able to influence their children. Other vari-ables were related significantly to only one of the PSE measures. This suggests that the measures used in this study capture two dimensions of an overall construct of PSE, as indicated by the different wordings in reference of PSE that was used in the two measures (influence and comfort).

Processes similar for both PSE measures. Two predictors were shown to be of particular importance for both parents' competence and their perceived ability to influence: Pubertal status and parent-child communication. First, parents who reported their children to be more physically matured showed a less steep de-crease over early and middle adolescence than did parents who reported their children to be less physically matured. This result was in contrast to our hypothesis, as we expected more physical maturity to predict lower PSE or a steeper decrease in PSE over time. However, parents who reported fewer pubertal changes in their children at the initial time point of the project likely had children who experienced more significant pubertal changes dur-ing the period studied, which might explain the greater decrease in PSE over this time compared with parents who had already expe-rienced pubertal changes in their children. This study is the first to show that parents' perceptions of their children's physical changes have an impact on perceived influence and competence among parents of children in early and middle adolescence, which con-tribute to the notion that such changes are powerful indications to parents that the child is entering adolescence (Buchanan et al., 1990; Buchanan & Holmbeck, 1998; Hollenstein & Loughheed, 2013; Holmbeck & Hill, 1988).

Second, parents who reported less positive parent-adolescent communication in early adolescence reported lower initial levels of PSE than parents who reported more positive communication. Increases in child behaviors that challenge parental authority, such as argumentation and refusals, are normative over this period, and parents normally allow more room for negotiations during adoles-cence than during earlier developmental periods (Parkin & Kuc-zynski, 2012). Nevertheless, parents might still view these changes as indications of lessened parental influence, which might explain the link to lower PSE. Taken together, adolescents' pubertal status and more difficult parent-child communication might both indi-cate changes in established roles in the parent-child relationship,

moving toward less parent-centered parenting practices and more child agency, which have an impact on PSE and the development of PSE.

Although the findings concerning parent-child communication provide partial support for our hypotheses, we expected an impact on both the intercept and slope (pubertal status predicted only the slope, and parent-child communication predicted only the intercept). The difference in predictions of intercept versus slope might reflect a short-term versus a longer term impact. Pubertal changes take place over time, and once changes occur, they are permanent in the sense that they do not fluctuate or reverse themselves, which might explain the impact of the development of PSE over time. In contrast, communication in the parent-adolescent relationship can continue to evolve. Although average developmental changes in adolescents at large indicate increases in difficult communication, individual families might experience both ups and downs over the early and middle adolescent years, and thus the communication quality in early adolescence might not have a stable long-term impact on PSE.

Processes specific to the first PSE measure. Some variables were significantly linked to only the first PSE measure: Adolescents' internalizing, parents' target-based expectations for risk taking, and ethnicity. With respect to adolescents' behavioral characteristics, higher internalizing predicted lower initial levels of PSE, but did not predict the slope, indicating that, similar to the quality of parent-child communication, internalizing might have a short-term association with, rather than a longer term impact on, parents' PSE over this time period. To our surprise, adolescents' externalizing was not a significant predictor of PSE initially or over time, which contrasts earlier research (de Haan et al., 2013; Glatz & Stattin, 2013; Glatz et al., 2011; Slagt et al., 2012), and suggests that the impact of externalizing for PSE might be less strong when examining other relevant adolescent characteristics simultaneously.

Interestingly, parents' target-based expectations for risk taking during adolescence were stronger predictors of PSE than were parental perceptions of the adolescents' current externalizing behaviors. Specifically, the more parents accepted or embraced target-based expectations consistent with cultural expectations for risk taking, the less comfortable they felt in addressing certain behaviors in their adolescent, regardless of the extent to which the child was currently exhibiting a tendency toward risk taking. This result is in line with earlier research suggesting that target-based expectations, which are shaped in part by cultural beliefs (Buchanan, 2003), have the potential to influence parents' beliefs about and interactions with their adolescent child (Buchanan & Hughes, 2009; Jacobs et al., 2005). In contrast, parents' target-based expectations for internalizing did not predict PSE, indicating that actual internalizing is more important for PSE than are expectations for internalizing, whereas expectations for risk taking are more important for PSE than are actual externalizing.

In sum, adolescents' internalizing and parents' expectations for future risk taking had an impact on parents' competence or comfort in dealing with developmentally relevant issues, but they did not have an impact on parents' beliefs about influence. Hence, difficult behaviors, or expectations for difficult behaviors, seem to make parents feel less comfortable in dealing with issues relevant to adolescents, perhaps because these are behaviors that parents have to address on a daily basis, but might not affect their beliefs

about ultimately having an actual influence on adolescents' behavior. Additionally, the fact that the measure of parenting competence (Ballenski & Cook, 1982) assessed comfort with behaviors and issues that are readily present within the home environment, whereas the measures of parenting influence (Freedman-Doan et al., 1993) asked about influence on behaviors outside the home environment (e.g., in school, with peers), might have contributed to the different results. These results make important theoretical contributions, as they suggest that child characteristics might have different impact on different efficacy-related parental beliefs or on PSE for different contexts (e.g., in vs. out of the home).

Ethnicity was also significantly predicting only the first PSE measure. In accordance with our hypotheses and earlier research (Buchanan et al., 2013; Pinderhughes et al., 2008), African American parents reported higher initial levels of PSE than did European American parents, but declined more in PSE over time than did European American parents. When we included the early adolescent predictors, however, ethnicity predicted only the slope, which suggests that other variables, such as parents' expectations, might explain the link between ethnicity and PSE. African American parents have been suggested to be less sensitive to negative stereotypes of adolescence and more influenced by the cultural emphasis on parental authority than European American parents (Buchanan et al., 2013). With this suggestion in mind, it is possible that parents' target-based expectations might mediate the link between ethnicity and PSE. Specifically, if African American parents endorsed less negative expectations for their adolescents' future risk taking than European American parents, this might have had a positive impact on African American parents' PSE. Additionally, the fact that we found ethnic differences only for parents' competence in addressing adolescent-related issues, and not for parental influence on adolescents' behaviors outside of the home, seems to be consistent with beliefs about parental authority, in which parents feel comfortable in addressing adolescents' behaviors that they are facing on an everyday basis and inside their home.

Processes specific to the second PSE measure. Despite a general decrease in PSE over the developmental period, there were differences in the amount of change in parents' perceived influence between parents whose children were in sixth versus seventh grade at the start of the study. In contrast to our hypothesis and to earlier research (Ballenski & Cook, 1982), parents of children in sixth grade reported lower levels of PSE than did parents of children in seventh grade. Because this was the only variable having a significant impact only on the second PSE measure, it might be a random cohort effect. However, age of the child might be one example of a demand characteristic (Bronfenbrenner & Morris, 1998) that has an impact on parents' beliefs about actual influence because of the direct parental expectations that it forms, such as expectations about how much influence parents can have on their children in different ages. More research in which PSE is examined among parents of children in different ages and over time would increase the knowledge about the association between children's age and PSE.

Unsupported hypotheses. Some predictors were not significantly related to PSE and therefore contrasted our hypotheses. For example, parents' income did not predict PSE as we thought it would. Although higher income predicted higher PSE when demographic variables were entered by themselves, income became

nonsignificant once characteristics of the adolescent were included. Thus, our findings indicate that PSE is more strongly linked to characteristics of the child or parent-child relationship, or to parents' target-based expectations than to parents' economic situation, which is consistent with the more proximal impact of microsystems than macrosystems for a person's (in this case, a parents') development, and with the reality that economic status as a "social address" is only a rough indicator of the processes that occur within that address (e.g., Bronfenbrenner & Morris, 1998). This result contrasts earlier research suggesting that low income status undermines the development of PSE, perhaps because of the greater difficulty it creates for parents (Elder et al., 1995; Shumow & Lomax, 2002). These earlier studies, however, did not simultaneously examine the impact of child and relational characteristics, and they were based on lower SES samples, which might explain the differences in the results.

Previous parenting experience was also not significantly linked to PSE. This result is in contrast to theory suggesting that experience leads to mastery and higher PSE, and to research showing that parents report higher PSE if they have parented a child before (Leahy-Warren & McCarthy, 2011; Ulfsdotter et al., 2014). Our study, however, examined parents of adolescents, whereas earlier studies have focused on parents of younger children. Given the range of experiences parents can have with adolescent children, it might be more important to examine the quality of any previous experience (Glatz & Stattin, 2013; Whiteman & Buchanan, 2002) rather than simply the presence of that experience on PSE. The results of our study indicate that PSE at adolescence might be more dependent on parents' perceptions of a particular child and his or her characteristics than on earlier parenting experiences.

Strengths, Limitations, and Future Directions

Reflecting on the contributions of this study, some aspects of our study deserve special attention. First, we deliberately used parents' reports of their adolescents' characteristics because of the belief that parents' perceptions would be most influential for PSE. Nonetheless, the use of parent reports only increased the risk of reporter bias, and this issue should be taken into account when interpreting the results. It might be useful in future research to contrast parent reports with others' reports of adolescent characteristics as predictors of PSE.

Second, this is the only study, to our knowledge, to examine mean-level changes in PSE and to illuminate predictors of the amount of change among parents of children in early adolescence. Despite the vast interest in changes in the parent-child relationship and children's characteristics during adolescence (Steinberg, 2001), longitudinal research on PSE among parents of adolescents is sparse. We examined predictors assessing children's development in early adolescence and the ecological context, and when doing so, we controlled for the influence of the other predictors. Hence, we were able to test which predictors were especially important in explaining the amount of change in parents' beliefs about influence during this period. However, because we had only three data points, we could examine only linear growth, as modeling quadratic and cubic growth requires more than three measurement points. It is possible that subtle changes in PSE are better captured with data including more frequent data points. This study, how-

ever, offers a first examination of changes in PSE as children move through early and middle adolescence.

Third, based on our results, we have speculated about the developmental processes that preceded the period assessed (e.g., steeper declines in PSE prior to the period we studied among parents of more physically matured adolescents). It is important to acknowledge that these speculations are just that, and that it would be valuable for future longitudinal work to follow youth from middle childhood into early adolescence and middle adolescence to test the validity of these speculations.

Fourth, the inclusion of fathers in this study is a strength, as earlier studies have mostly been based on samples with only mothers. Some of the parents came from the same family, however, and such dependency might influence the results. We controlled for the dependency in all analyses. Additionally, follow-up analyses using only mothers did not produce different results, which made us less concerned about this possible issue.

Fifth, in this study, parents were followed over time, and we were able to examine changes in PSE as children moved through early and middle adolescence. With the longitudinal data, we examined the timing of changes and not just differences at one given time point. The attrition in this study, however, was relatively high. To deal with the missing data, we used FIML, which is a widespread method that has shown to perform unbiased estimates.

Sixth, we examined changes in PSE over time, but the predictors were included only at T1, and therefore we did not examine bidirectional associations among the predictors and PSE. For some of these variables, however, reciprocal associations are likely, but examining these was out of the scope of this study. Future studies should examine possible bidirectional associations among these constructs. Additionally, some of the predictors were strongly correlated, which increased the risk of multicollinearity. All measures were, however, conceptually distinct, which made us less concerned about the strong intercorrelations. Nevertheless, the risk of multicollinearity should be taken into account when interpreting the results.

Conclusions

Early adolescence constitutes an important developmental period to study parents' PSE. Even with other sources of influence, parents continue to be significant socializing agents for their adolescents (e.g., Galambos et al., 2003; Vandell, 2000). Still, we have replicated findings suggesting that parents' PSE declines as their children develop through early and middle adolescence (Balsenki & Cook, 1982). The results of this study add to theoretical understanding of PSE by illuminating predictors of change among parents of adolescents. Knowing under what circumstances parents decline in PSE might also guide advice that is given to parents. It might be important to help parents realize that they do not have as much influence on their children's behavior as they had when their children were younger, but that they still are important in guiding their children through adolescence.

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Parent – Adolescent Communication and Delinquency: A Comparative Study in Kolkata, India

Tanusree Moitra

University of Calcutta, Kolkata, India

Indrani Mukherjee

University of Calcutta, Kolkata, India

Abstract

The present study assessed the impact of one of the dimension of parenting practices, parent-adolescent communication, on the development of delinquent behavior. The data was collected from 200 adolescents (100 delinquents and 100 non-delinquents) aged 11-18 years. Results suggested a significant difference between delinquent and non-delinquent adolescents - in terms of their perception of satisfactory parental communication. Further analyses revealed that both mother's and father's separate communication as well as their interaction effect was linked to the development of delinquent behavior. It was further noted that a satisfactory mother-adolescent communication was much more important compared to the father-adolescent communication in the present context. Furthermore, age of the adolescent was also related to delinquency and it was observed that early adolescence was a richer breeding ground of delinquency, although a satisfactory parental communication was crucial throughout the adolescent period to serve as a protective factor against delinquency. The theoretical and practical implications of the findings are discussed.

Keywords: Mother-Adolescent Communication; Father-Adolescent Communication; Age; Delinquency; Kolkata; India

Introduction

There is considerable evidence to suggest that the family plays an important role in the development of adolescent delinquent behavior. Family serves as an effective agent of socialization. From the very first day of a child's life the process of socialization begins, and parents are the primary source of this process. The period of adolescence is that phase of life when strong parent-child attachment is essential for both the normal development of adolescents, both biological and psychological, but it can also be a period that is disruptive for family socialization (Granic, Dishion, Hollenstein, & Patterson, 2002; Steinberg, 1988). Studies have shown that, if the bond with the parent is weakened, the probability of risk behavior increases. On the other hand, if this emotional bond is strengthened, the probability of a problem type of behavior decreases (Hirschi, 1969). Furthermore, parental bonding strongly decreases adolescent involvement in delinquency (Cernkovich & Giordano, 1987; Hirschi, 1969; Warr, 1993). Indeed, warm, loving and responsive parenting contributes to strengthen parent-adolescent bonds and reduces the likelihood of delinquent involvement (Smith & Krohn, 1995). The stronger this attachment bond, the more likely the adolescent is to take it into account when he or she contemplates a criminal act (Hirschi, 1969). Hirschi (1969) suggests that low levels of emotional attachment to parents predict involvement in delinquency regardless of race/ ethnicity, class or peers delinquency. Therefore a great deal of research has emphasized the importance of children's attachment with parental figures in decreasing the likelihood of delinquency (Bachman, 1970; Bandura & Walters, 1959; Glueck & Glueck, 1962; Gold, 1963; Hirschi, 1969).

Communication is a significant facet of parent adolescent attachment. For example, if parent adolescent communication is indifferent or negative, children are likely to encounter greater difficulties when growing up. It is through this process of communication that a child develops his or her patterns of cognition, knowledge, attitude toward the external world. It has been assumed that a child learns to regulate his or her emotions through specific cognitions, which in turn are developed on the basis of healthy parent child interactions (Garnefski, Rieffe, Jellesma, Terwogt, & Kraaij, 2007). Studies on parent adolescent communication reported that parental communication has a strong relationship to the well-being of the adolescent (Greenberg, Siegel, & Leitch, 1983), and the lack of closeness with parents (Kandel & Davies, 1982; Parker, Tupling, & Brown, 1979) or a lower level of parental influence (Chrispin, 1998) correlates with a higher degree of behavioral problems in adolescents.

In past decades numerous researches have consistently demonstrated that parent adolescent communication is positively related to the adolescents' academic achievement (Masselam, Marcus, & Stunkard, 1990), self-esteem (Brage & Meredith, 1994; Demo, Small, & Savin-Williams, 1987; Enger et al., 1994) and mental health (Collins, Newman, & Mckenry, 1995; Hanson, 1986), as well as inversely related to adolescent loneliness and depression (Brage & Meredith, 1994), drug and alcohol use, and other deviant behaviors (Barnes, Farrell, & Banerjee, 1994; Hawley, Shear, Stark, & Goodman, 1984; Johnson, Su, Gerstein, Shin, & Hoffman, 1995; Kafka & London, 1991; Miller, King, Shain, & Naylor, 1992). Also it has been observed that family communication between parents and adolescents, especially in socioeconomically disadvantaged families, play a significant role in the development of various kinds of psychosocial adjustment among adolescents and young adults (Rueter & Koerner, 2008).

Research on adolescents at risk of mental health or conduct problems, has identified healthy parent-child communication as a protective factor, whereas negative communication between parents and children act as a risk factor for various psychosocial adjustments in the case of adolescents (Liu, 2003; Musitu Ochoa, Estevez Lopez, & Emler, 2007). Open parent child communication has been linked with low levels of adolescent risk behavior and high psychosocial adjustment (Guilamo-Ramos, Jaccard, Dittus & Bouris, 2006; Kotchick, Dorsey, Miller, & Forehand, 1999; Yu et al., 2006). It is also reported that a positive parent child communication leads to less sexual risk-taking behaviors. Clark & Shields (1997) found that adolescents who lack open parental communication are more prone towards serious delinquency. So, overall an open communication between parent and adolescent may serve as a protective factor for children against the development of depression and anxiety and engagement in antisocial activities (Barnes & Olson, 1985). In addition, open communication between parent and adolescent is positively related with the development of the adolescent's moral reasoning, academic achievement and self-esteem (Hartos & Power, 2000; Holstein, 1972; Stanley, 1978). Johnson & Lobitz (1974) have demonstrated that those parents who engage in high rates of negative interactions with their children increase the deviant behavior of their children.

As such, the desirable benefits of open and clear parent adolescent communication are generally endorsed in the existing research literature. However, communication is a complex, dynamic and reciprocal process (Jaccard, Dodge, & Dittus, 2002), so to understand the process of communication from the perspective of both mother and father is essential, but only few studies have explored the gender of the parent as a

construct that might contribute to our understandings of how the parental attachment affects adolescent delinquency. Hoeve et al., (2009) found that studies generally focus on one parent or both parents without differentiating the gender of the parent. Although mothers usually spend more time taking care of their children, it is important to consider parenting effects of both mother and father - because apart from quantity of the time father and mother spend with their children, there are indications that parental involvement is also qualitatively different (Videon, 2005). For example, fathers more often tend to give instrumental care whereas mothers provide more emotional care (Youniss & Smollar, 1985). Therefore it may be desirable to examine data from both parents' perception of open and clear communication with their children. But no data are available to differentiate maternal and paternal communication with children and the development of delinquency (Xiao, Li, & Stanton, 2011). Research was conducted for instance on mothers' and fathers' communication in relation to adolescents' psychological health, e.g. depression (Liu, 2003) but not regarding delinquency. Also there are no studies that discuss the relationship between mother and father communication with their children in the development of delinquency in an Indian context. So, in the present study an attempt has been made to understand the relationship between mother/ father – adolescent communication and delinquency in India. More specifically, the research question addressed in this study is: Are there any differences between maternal and paternal communication with their adolescent child (as perceived by the adolescent) and how do they relate to the development of delinquent behavior?

Method

Sample

The data has been collected from two groups of adolescents living in the city of Kolkata, India. Kolkata is the commercial capital of Eastern India, located on the east bank of the Hooghly River. At present the population of the city is 4.4 million (Office of the Registrar General and Census Commissioner, 2011).

The first group consisted of 100 delinquent boys, residents of a Correction home located in the city of Kolkata. The age range for this group was 11 to 18 ($M = 15.52$ years; $SD = 1.62$). The second group used in the research consisted of 100 regular school adolescents who lived with their parents and had no history of delinquency and no police record. The age range for this group was again 11 to 18 ($M = 16.13$ years; $SD = 1.93$). The demographic characteristics of the participants are presented in Table 1.

Table 1 Demographic description of the sample

Demographic Variables	Delinquent	Non-delinquent
1. Education		
- No School	32	00
- Elementary School	41	18
- Middle School	25	72
- High School	02	10
2. Father's Education		
- No School	32	00
- Elementary School	56	24
- Middle School	00	45
- High School	12	31
3. Mother's Education		
- No School	69	18
- Elementary School	31	42
- Middle School	00	33
- High School	00	09
4. Mother's Employment Status		
- Working	73	22
- Non-working	27	78
5. Average no. of sibling	02	01
6. Average Family Income	4820 INR/per month App. £ 75/ per month	6500 INR/per month App. £ 100/ per month
7. Substance Abuse		
- Yes	94	03
- No	06	97

Measures

Independent Variable. Perception of Communication Satisfaction Questionnaire (PCS; Hecht, 1978) is a 19 item questionnaire, used to measure perceived satisfaction and dissatisfaction with parental communication as expressed by children. Participants are asked to use a 7-point agree-to-disagree scale to rate the degree to which each item

describes their communication with their parents. A score of 7 indicates 'most satisfactory communication' and score of 1 indicates 'least satisfactory communication'. The response to each item is categorized into 'high' or 'low' by median split, which is 57. Higher score represents greater satisfaction – and presumably a stronger attachment. A modified and adapted version of Hecht's original inventory has been used (Prof. I. Mukherjee, Dept. of Applied Psychology, University of Calcutta, India).

First, the original Perception of Communication Satisfaction scale by Hecht was translated into Bengali language (local language spoken in Kolkata, India). Two separate forms were prepared one for mother's PCS and another to measure father's PCS score. Second, these two scales were administered to 100 male school adolescents living with both parents. In order to determine the reliability of the modified version Cronbach's Alpha was computed. The coefficient was .84 for communication with mother and .78 for communication with father scale. Item-total correlations were computed for all the 19 items. Most of the items were significant at .05 level and a few of them significant at a .01 level.

Dependent Variable. Behavior Deviance Scale was developed by Chauhan & Aurora (1989), it is a 30-item scale designed to understand the extent of delinquent behavior present in the case of adolescents. Officially recorded delinquency has traditionally been the most common measure. However, official delinquency has the potential disadvantage that it may be a measure not only of delinquency but also of the behavior of police and court personnel (Lerman, 1968). Therefore, a standardized scale has been used along with the official delinquency measure. This measure is completed by two other persons (for each juvenile) who know the participant very well. In this study, it was completed by two other delinquents who were residing in the same Correction home and who knew the respondent closely. Items were arranged in a 5-point scale, from very high 5; high 4; moderate 3; low 2; and very low 1. The final score in this case is the average of the total scores given by both the juveniles. High score indicate lower deviance. Examples of the items: "to steal", "to be disloyal", "to form company with bad people" etc. The Cronbach's Alpha reliability score was .79 and the validity of the scale was .88.

Procedure

The study was divided into two phase. In the first phase, before visiting the Correction home, a written proposal was given to the Magistrate of the Juvenile Justice Board, Kolkata, West Bengal, India, explaining the purpose of the study. After getting the permission from the Magistrate, the Superintendent of the Correction home was contacted by the first author concerning the purpose of the study and seeking his permission to visit the home. After obtaining permission a tentative time schedule was developed in discussion with the staff of the home. Both measures (i.e. Perception of Communication Satisfaction and Behavior Deviance Scale) were administered directly to delinquent participants using the interview method under close supervision by the staff of the home. The interview session for each participant lasted for two days for approximately half-an-hour daily. In order to comply with APA's ethical guidelines, the interview was conducted only with those participants who gave their consent and also the name of the participants were not disclosed. As the instructions for completion of these two measures were in English, both scales were adapted to the local spoken language of the participants (Bengali). The reliability and validity of the adapted scale has been provided in the description of the measures above.

In the second phase of the study, the first author contacted school administrators concerning the purpose of the study. Only the Perception of Communication Satisfaction was directly administered to the non-delinquent participants in the school environment by the first author and under close supervision by teachers. In order to maintain the parity with the other group of the total sample, instructions were provided in the Bengali language to this group as well. Consent was taken from each of the students before initiating the procedure. After collecting the data, token gifts (worth 50 INR or £0.75) were provided to each of the participants.

Results

The statistical software SPSS version 17.0 was used to carry out the analysis. Firstly means, standard deviations and t-tests were calculated for both maternal and paternal perceived communication and the t-test result proved to be significant. The result is shown in Table 2 below.

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Table 2 Mean, Standard Deviation and t-test of Delinquent (n= 100) and Non-Delinquent (n= 100) Sample

	Mean	Standard Deviation	t-test
Mother's PCS			
- Delinquent	45.44	8.83	9.62**
- Non-Delinquent	61.86	6.3	
Father's PCS			
- Delinquent	46.21	7.52	7.61**
- Non-Delinquent	56.97	9.4	
No. of Siblings			
- Delinquent	3	3.32	2.93**
- Non-Delinquent	2	2.51	
Family Income			
- Delinquent	4820	394.08	23.84**
- Non-Delinquent	6500	584.33	

*p ≤ .05; **p ≤ .01

From the mean score of both the groups, it was clear that there is a discrepancy between them in terms of their perception of how satisfactory are the parental communication. The mean score for the non-delinquent group was higher by comparison to the delinquent group – the former's experiencing better PCS than the latter. The t-test was significant at a .01 level which led the researchers to believe that the perception of communication with parents was much better in the non-delinquent group as compared to the delinquent group. The Table also provided the t-test value for the delinquent and non-delinquent sample on some of the demographic variables, such as number of offspring and family income, and the t-test values are again significant in nature.

A three-way ANOVA (Table 3) was conducted on the scores obtained from the delinquent sample only, with perception of maternal communication, paternal communication and age as the independent variables, and delinquency (as measured by Behavior Deviance Scale) as the dependent variable.

Table 3 Three – way ANOVA analyses: Maternal communication by Paternal communication by Age as factors and Delinquency as the Dependent variable – Delinquent Sample.

Source	F – value	Sig.
<i>Factor</i>		
PCS (M)	5.11*	0.027
PCS (F)	4.29*	0.03
AGE	3.73*	0.05
<i>Interaction terms</i>		
PCS(M) * AGE	0.47	0.496
PCS(F) * AGE	0.17	0.89
PCS(M) * PCS(F)	3.38*	0.05

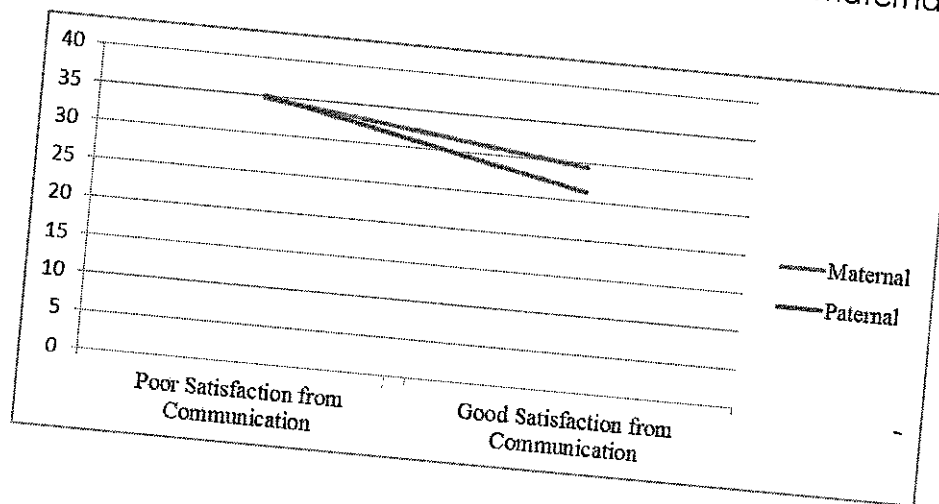
* $p \leq 0.05$; ** $p \leq 0.01$

A significant main effect was found for all the factors, i.e. perception of maternal communication, $F(1, 93) = 5.11$, $p < 0.027$; perception of paternal communication, $F(1, 93) = 4.29$, $p < 0.03$; age of the adolescent, $F(1, 93) = 3.73$, $p < 0.05$. This indicates that all three factors had an impact on the development of delinquent behavior among the adolescents from our group. No significant interaction effects were found between mother communication age and father communication age of the adolescent. Therefore, it can be inferred that a satisfactory parental communication is crucial throughout the adolescence period. A significant interaction effect was found between mother adolescent and father adolescent communication, $F(1, 93) = 3.38$, $p < 0.05$. This indicates that a particular level (low/high) of one independent variables (father's PCS) is associated with a particular level of the other independent variable's (mother's PCS) impact on delinquency, i.e. they both, in conjunction, raise or lower the magnitude of the dependent variable (the BDS score).

A graphical representation indicates the interaction effect clearly. Figure 1 depicts that when both PCS from mother and father was poor, behavior deviation scores were the highest. When both were high it was lowest. The combination of poor score from one parent and good score from another parent produces intermediate BDS scores.

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Figure 1 Line graph representing the interaction effect between Maternal and Paternal Communication



From the mean score, shown in Table 4 it can be observed that adolescents who declare a satisfactory communication with their mother have a lower delinquency score and those who experience unsatisfactory communication has higher delinquency scores. The situation is similar for father – adolescent communication. With respect to age, it was found that early adolescents (11-14yrs) had higher delinquency scores compared to late adolescents (15 – 18yrs).

Table 4 Descriptive statistics of the factors (Maternal communication, Paternal communication and Age) – Delinquent Sample

	Maternal Communication		Paternal Communication		Age	
	Low (n = 84)	High (n = 16)	Low (n = 87)	High (n = 13)	(11 – 14)	(15 – 18)
Mean	34.8	29.5	35.13	26.30	31.29	24.25
SD	4.23	3.77	3.91	5.24	2.12	2.58

Since the interaction effect between mother communication – father communication was significant in nature, individual t-tests were carried out between various combinations of maternal and paternal communication in order to understand which parenting combination is contributing most to the development of delinquency and which is the least contributing combination. Here as well in all the four conditions, the Perception of Communication Satisfaction was the Independent Variable and Behavior

Deviance Score was the Dependent variable. Table 5 represents the t-test values along with the Levene's test of homogeneity of variance (as the group size was very unequal).

Table 5 t-test representing the differences among various combinations of maternal and paternal communication – Delinquent Sample

Source	t-test	Levene's test
Poor Communication (M) * Poor Communication (F)	5.82**	.695
Good Communication (M) * Poor Communication (F)	2.44*	.611
Poor Communication (M) * Good Communication (F)	3.39*	.657
Good Communication (M) * Good Communication (F)	1.95*	.406

Note: M – Mother; F – Father. * $p \leq 0.05$; ** $p \leq 0.01$; PCS – Independent Variable, BDS – Dependent Variable.

All Levene's test values were non-significant in nature, indicating that the assumption of equality of variance has been met. It was observed from the t-tests, that adolescents indicating poor communication with both parents had the highest rate of delinquency; whereas adolescents indicating good communication with both the parents had the lowest rate of delinquency.

Discussion

The purpose of this study was to assess how perception of satisfactory maternal and paternal communication is separately, as well in combination, related to adolescent problem behaviors, such as delinquency. First of all a comparative analysis was conducted between delinquent and non-delinquent adolescents regarding their perception of satisfactory communication with their parents. A significant difference between the two groups of adolescents concerning parental communication was observed. Both mother and father (perception of) satisfactory communication is poor in delinquent adolescents as compared to their counterparts. These findings are consistent with those of earlier studies conducted by Barnes et al., (1994), Johnson et al., (1995), Clark and Shields (1997), Liu (2003), Musitu Ochoa et al. (2007). From the

sample characteristics it can be observed that the parents of delinquent adolescents are less educated, their number of offspring and as a result there is a higher economic strain in delinquent families as compared to families with non-delinquent adolescents. All these in turn hamper a healthy parent adolescent communication, as parents are not able to spend quality time with their children (Rueter & Koerner, 2008). According to Conger and his colleagues (Conger et al., 1992; Conger, Conger, & Elder, 1993; Conger, Ge, Elder, Lorenz, & Simons, 1994) economic hardship (often tied to parents' education level, number of dependents, etc.) is related to a lack of parent-adolescent bond and, in turn, strongly associated with developmental and adjustment problems in the case of adolescents.

In the next phase of the study, mother's and father's separate communication patterns with the delinquent adolescent were studied as well as how they are linked to delinquency. Adolescents' perception of satisfactory maternal as well as paternal communication was analyzed separately and suggested a significant relationship with delinquency. Therefore it can be said that both mother's and father's perceived satisfactory communication exerts a strong influence on delinquent behavior in the case of adolescents and therefore can also act as a protective factor against delinquency. These findings add to previous research conducted by Xiao et al., 2011 (as data were not available in the mentioned study to distinguish between maternal and paternal communication). From the present study it can be further concluded that both parents' communication had an interaction effect, which is significant in nature, indicating that if the adolescent receives satisfactory communication from at least one of the parents, then that may result in low levels of delinquency. Delinquent behavior is least found when the adolescent perceives satisfactory communication from both the parents. This finding is in line with a study conducted by Barnes and Olson (1985), in which they found that healthy communication may indicate an overall better relationship between parents and adolescents, which may serve as a protective factor for children against the development of depression and anxiety and engagement in antisocial activities. Therefore it can be said that perception of satisfactory communication from both parents is essential, but if the adolescent is having a satisfactory communication level with at least one of the parents, then that can compensate the lack or poor communication with the other parent (compared to the condition where both parents have a poor communication with their children).

Age was also found to have a significant effect on delinquency. The magnitude of mean score further suggested that delinquency rates are higher in early adolescence

(11 - 14 years) as compared to late adolescence (15 - 18 years). When children enter adolescence other people such as peers and romantic partners become more important than parents. It is during this phase when their transition into adulthood begins and they feel independent from their parents and also, due to this sudden 'freedom' from the stricter rules of childhood, they may get involved in deviant behavior. The present finding is consistent with previous research. There is substantial evidence that the early period of adolescence is associated with problem behaviors such as early sexual activity, delinquency, bullying, truancy, disruptive behavior and violent behavior (Caspi, Lynam, Moffitt, & Silva, 1993; Cota-Robles, Neiss, & Rowe, 2002; Flannery, Rowe, & Gulley, 1993; Graber, Lewinsohn, Seeley, & Brooks-Gunn, 1997; Haynie, 2003; Kaltiala-Heino, Marttunen, Rantanen, & Rimpela, 2003; Obeidallah, Brennan, Brooks-Gunn, & Earls, 2004). According to Jessor (1984), early adolescence is a period of rapid change, when adolescents are struggling to deal with issues such as identity development, peer group membership, pubertal development and changing social roles. Coupled with the earlier mentioned reasons, there seem to be an increased proneness to engage in risky behavior during this stage. Therefore, the findings of the present study hold true in a non-Western country as well. The interaction effect of age with maternal communication as well as paternal communication was non-significant in nature, indicating that a healthy parent adolescent communication is not only important in the early phase of adolescence, but it is crucial in late adolescence as well (Hoeve, Dubas, Gerris, Laan, & Smeenk, 2011).

Finally, individual t-tests were carried out in order to analyze more specifically which combination of parent-adolescent communication is linked to the highest rate of delinquency. These analyses revealed that perception of poor maternal as well as paternal communication is highly linked to delinquency, whereas perception of good maternal and paternal communication is linked to the lowest levels of delinquency. Also it was observed that perception of satisfactory mother adolescent communication is more important than father-adolescent communication. This finding is contrary to some previous studies (Jacob & Johnson, 1997). This rather unexpected finding can be explained on the basis of cultural background of the adolescents in this study. One of the central features of Indian family is the centrality of family, where interdependence is very high and each and every family member depends on others. In an Indian context the father is usually the bread earner of the family and the mother takes care of the children, she is the first love object in their life and children also depend on their mother for fulfillment of various needs and wishes. In fact this bond continues even in

adulthood, when the children take the consent of their parents for every major decision. In the absence of this mutual love, the child gets diverted toward delinquency. Therefore, good maternal communication and poor paternal communication may trouble the adolescent, but not up to an alarming state due to their mother's support, care and love. It seems to act as a buffer against deviant behaviors - such as delinquency. In contrast, poor maternal good paternal communication is not an equally protective buffer. So, a healthy mother-adolescent (boy) communication appears to be a stronger more protective factor against delinquency.

Some important limitations of this study should be noted. First, the sample only included Bengali families from an Eastern metropolitan city in India. As India is a diverse country, where every region has its own unique culture, the findings of this study may not be generalized to other part of the country. Second, this study was conducted only on male adolescents not female adolescents because of the unavailability of female delinquents in the police official records. Therefore, future research should be undertaken to extend this research on different sample. Third, this study only investigated parent - adolescent interaction and adolescent delinquent behavior and did not examine any other mediating factors, such as communication with siblings or grandparents. Moreover, it considered perceived communication rather than observing actual communication processes between parents and adolescents.

Despite these limitations, the biggest strength of this study is represented by the exploration of perceptions of satisfactory communication with both parent's. The current study also contributed to the paucity of research especially in an Indian context. Furthermore, it focused on the segment of uneducated and poverty stricken mass, who are generally unable to avail wealth and opportunities for holistic growth of their off-spring. It is suggested here that wholesome parent child relationships can be a real antidote against delinquency. Also both parents should be equally encouraged to enhance their communication skill with their son in order to develop a positive interpersonal/ social support system within the family. As this help the adolescent to develop a more mature and responsible attitude towards society. Hence various awareness programs should be implemented nationwide focused on family-life education. School, community leaders, agencies and organizations are in an ideal position to assist parents not only in improving their communication skills, but also in augmenting their marital and family strengths.

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About the authors

Tanusree Moitra, M.A. (Research Fellow), Doctoral Fellow in the Department of Applied Psychology, University of Calcutta, India. Her major interest is to understand the causes of juvenile delinquency in India. She completed are undergraduate in Psychology at Delhi University, India. After that she did her Master's in Applied Psychology at the University of Calcutta. She also completed a certificate course in Psychology at Northeastern University, Boston. USA. Currently pursuing her doctoral research from University of Calcutta with a National Fellowship for her work from the Bureau of Police Research & Development, Ministry of Home Affairs, Govt. of India on Oct'2009. Email: tanusree_moitra@yahoo.co.in

Indrani Mukherjee, Ph.D., Professor in the Department of Applied Psychology, University of Calcutta, India. Her major research interests relate to women and adolescent-related social issues in India. She gained her undergraduate, Master's and Ph.D from the University of Calcutta and currently she is been teaching at the University along with being involved in research. Email: Cal1kol@yahoo.co.in

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