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Lability in the Parent's Hostility and Warmth Toward Their Adolescent: Linkages to Youth Delinquency and Substance Use

Melissa A. Lippold¹, Andrea Hussong¹, Gregory M. Fosco², and Nilam Ram²

¹The University of North Carolina at Chapel Hill

²The Pennsylvania State University

Abstract

According to family systems and life course theories, periods of intense change, such as early adolescence, can disrupt stable family systems, leading to changes in family relationships. In this longitudinal study, we investigate 2 types of change in parental hostility and warmth towards their children during early adolescence (Grades 6 to 8)—developmental trends (linear declines) and lability (within-person fluctuations around developmental trends)—and their linkages to youth substance use and delinquency in Grade 9 ($N = 618$). We also test if the linkages between lability and youth risky behavior are moderated by youth gender. After controlling for between-person differences in level and developmental trends, we find greater lability (more fluctuations) in youth-reported parents' warmth and hostility are associated with greater youth delinquency, tobacco use, and polysubstance use initiation. The associations between youth-reported lability in mother and father hostility and polysubstance use demonstrated an inverted U shape pattern: Moderate levels of lability were associated with higher substance use but very low and high lability was associated with relatively lower rates of substance use. Many of the linkages between lability and youth delinquency were significant for girls but not boys. Fewer effects of lability on youth outcomes were found using parent reports. Developmental trends in parents' warmth and hostility were also associated with youth delinquency. Lability has unique implications for youth adjustment, yet appears to differ by youth outcome, gender, and reporter. The discussion focuses on mechanisms that might link changes in parent–youth warmth and hostility to youth risky behavior.

Keywords

parent–youth relationships; parenting; parenting lability; substance use; delinquency; early adolescence

Corresponding Author Melissa Lippold, Ph.D., The University of North Carolina at Chapel Hill, The School of Social Work, Tate-Turner-Kuralt Building, 325 Pittsboro St CB#3550, Chapel Hill, NC 27599-3550, Phone: 919-962-6405, mlippold@unc.edu.
Andrea Hussong, Ph.D., Professor, Psychology Department, Director, The Center for Developmental Science, The University of North Carolina at Chapel Hill, CB #3270 UNC-CH, Chapel Hill, NC 27599-3270, Phone: (919) 962-6593, hussong@unc.edu
Gregory Fosco, Ph.D., Assistant Professor, Human Development and Family Studies, The Pennsylvania State University, 226 Health and Human Development East, University Park, PA 16802, Phone: 814-865-5622, gmf19@psu.edu
Nilam Ram, Ph.D., Associate Professor, Human Development and Family Studies, The Pennsylvania State University, 407 Biobehavioral Health Building (BBH), University Park, PA 16802, Phone: 814-865-7038, nur5@psu.edu

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Parent–youth relationships are reorganized during the adolescent transition as youth individuate from their parents. Longitudinal evidence has suggested that predictable developmental trends exist in parenting behaviors associated with this transition: parental warmth generally decreases and hostility increases during early adolescence (Keijsers, Loeber, Branje, & Meeus, 2012; Trentacosta et al., 2011). Beyond linear characterizations of change over time, this reformulation of the parent–youth relationship is likely to contain “ups and downs” in parental warmth and hostility, characterized by within-person fluctuations, which we label *lability*. Recent studies have suggested that higher lability (more fluctuation) in parental knowledge of youth activities was associated with more youth risky behavior, especially among girls (Lippold, Fosco, Ram, & Feinberg, 2016; Lippold, McHale, Davis, & Kossek, 2015). However, little is known about how parental warmth and hostility fluctuates within families during early adolescence or the linkages of such lability to youth risky behavior. In this study, we examined two types of change in parents’ warmth and hostility towards their children — developmental trends and lability—and how these types of change were associated with boys’ and girls’ substance use and delinquency during early adolescence.

A Developmental Perspective of The Family Context in Early Adolescence

According to Family Life Cycle Theory (McGoldrick & Shibusawa, 2012), families may undergo many developmental changes as they progress through time. Early adolescence is a period marked by many change processes occurring simultaneously in biological, psychological, and social domains (Steinberg & Morris, 2001). Early adolescents spend more time with their peers and less time with their parents (Lam, McHale, & Crouter, 2012). Peers become a central influence on youth, as adolescents select, imitate, and share information with them (Brown, 2004). Many youth transition to middle schools where they are exposed to new peer groups and typically have less supervision by adults (Eccles, 2004). During early adolescence, puberty triggers dramatic changes to youths’ physical appearance and increases in affect intensity and lability (Buchanan, Eccles, & Becker, 1992). A primary developmental task of early adolescence is individuation: youth seek to psychologically separate from their parents and to develop their own identity. Thus, adolescents seek autonomy and independence in their thoughts, emotions, and behaviors (Zimmer-Gembeck & Collins, 2003).

According to Family Systems Theory (Cox & Paley, 1997) and Family Life Cycle Theory (McGoldrick & Shibusawa, 2012), periods of intense change such as early adolescence can disrupt stable family systems and lead to changes in relationships between family members. From this perspective, families form multilevel, adaptive, and regulatory systems (Cox & Paley, 1997; Magnusson & Cairns, 1996). Family systems seek stability, leading to continuity in family interaction patterns (Magnusson & Cairns, 1996). However, family systems do change, with the greatest disruption to family systems occurring at key developmental transitions. These disruptions require families to adapt and reorganize (Cox & Paley, 1997; Magnusson & Cairns, 1996; Ram, Shiyko, Lunkenheimer, Doerksen & Conroy, 2014). Youths’ increased independence during early adolescence may require parents to have different boundaries and roles with their youth— allowing youth to have autonomy over decisions and the freedom to develop and explore new values and ideas.

These role changes may be stressful for parents and may result in changes in their interactions, including changes in their warmth and hostility towards their adolescent (McGoldrick & Shibusawa, 2012).

Parent-child conflict may be a central mechanism by which youth seek autonomy and the parent-youth relationship becomes more egalitarian (De Goede et al., 2009). Thus, the adolescent transition may be a period with high parent-child conflict and instability in parents' warmth and hostility, as family roles shift. However, parent-youth relationships should reach a new homeostasis and improve, as family systems adapt to new roles, restructure relationships, and resolve conflicts. Studies have shown temporary decreases in parental warmth and increases in hostility and conflict during early adolescence specifically (Marceau et al., 2015; Feinberg, McHale, Crouter & Cumsille, 2003; Laursen, Coy, & Collins, 1998; Shanahan, McHale, Oscood & Crouter, 2007b; Allen et al., 1994; Wickrama, Lorenz, & Conger, 1997; Laursen et al., 1998). Many of the increases in conflict are temporary, however, highlighting the tensions that can occur during the adolescent transition specifically.

Changes in the Parental Warmth and Hostility: Developmental Trends and Lability

Changes in parental warmth and hostility towards their adolescent can be characterized as two types of change: developmental trends and lability (Figure 1; Lippold, Fosco, et al., 2016). Developmental trends capture the overall rate of change in parenting trajectories over multiple years during early adolescence. Notably, between-family differences can exist in the rate at which parents increase or decrease in their warmth or hostility during their child's transition to adolescence. For example, as illustrated in Panels A and B of Figure 1, some parents might experience only small long-term decreases in warmth across early adolescence (depicted as the dotted line in Figure 1), whereas others, such as those in Panels C and D, might experience larger long-term decreases in warmth.

In the midst of these overall developmental trends in parental warmth and hostility, parents can also experience lability (Lippold, Davis, Lawson, & McHale, 2016; Lippold, Fosco, et al., 2016). The term lability captures the extent to which a parent's warmth and hostility fluctuates around their developmental trends (depicted in Figure 1 as a solid line fluctuating around the dotted, best-fitting linear trajectory). For example, parents high in lability, such as those in Panels A and C of Figure 1, experience many fluctuations with ups and downs in warmth or hostility over the adolescent transition, experiencing high levels some years, and low levels in others. Youth with parents who have high lability in parental warmth and hostility might experience different, fluctuating levels of parental warmth and hostility from year-to-year. In contrast, low-lability parents, such as those in Panels B and D, have few fluctuations in warmth and hostility over time. A youth with a low lability parent is more likely to experience parental warmth or hostility that remains consistent. Such within-person fluctuations might be captured only by assessing lability in addition to developmental trends.

From a family systems perspective (Cox & Paley, 1997), lability may reflect the degree to which families have restabilized their relationships after a disruption such as the adolescent

transition. A small amount of lability in parental warmth and hostility may be normative during adolescence and indicative of a healthy process of reestablishing family roles and boundaries. Yet, parents with high lability might experience difficulty reforming a stable family system that consistently accommodates youth autonomy and maintains a strong parent–youth connection (Lippold, Fosco et al., 2016). For a high lability parent, parental warmth might be intermittent. High lability parents may experience temporary periods when new demands of adolescence exceed the family’s capability to adapt (Patterson, 2002) creating sporadic periods of crisis.

Together, the complementary information provided by examining both developmental trends and lability in parental warmth and hostility during adolescence can provide a more complete picture of how parenting transforms during the adolescent transition. For example, parents with the same developmental trends might have different indicators of lability (e.g., Figure 1, Panels A and B) and parents with the same levels of lability might have different developmental trends (e.g., Panels A and C). Thus, it is important to explore both developmental trends and lability in parental warmth and hostility and to assess how each type of change relates to youth risky behavior during this critical developmental period.

Changes in Parent’s Warmth and Hostility: Implications for Youth Risky Behavior

Changes in parental warmth and hostility—both developmental trends and lability—can have important linkages to youth delinquency and substance use. Changes in parental warmth and hostility might influence youth risky behavior via several mechanisms. High warmth from their parents might lead youth to feel safe and protected, which in turn, could help youth learn to self-regulate their stress and affect and decrease risk for externalizing problems (Grusec & Davidov, 2010). Warmth from parents can promote youths’ internalization of prosocial norms and values, which might act as an internal deterrent to engage in risky behaviors (e.g., substance use, delinquency; Catalano & Hawkins, 1996). In contrast, fluctuations and increases in parental hostility can have the opposite effect by reducing youth feelings of safety and inhibiting the development of regulation skills; thus, increasing risk for externalizing problems. Fluctuations and increases in hostility might be stressful for youth, leading to disengagement from the family (Dishion, Nelson, & Bullock, 2004; Fosco, Stormshak, Dishion, & Winter, 2012). Hostility can also inhibit the internalization of prosocial norms, which increases risk for youth risky behavior (Catalano & Hawkins, 1996).

Thus, developmental trends that reflect increases in parental hostility and decreases in warmth should be linked to higher levels of youth risky behavior, such as delinquency and substance use (Laursen et al., 1998). Studies have found that parents differ in developmental trends of warmth and hostility during early adolescence. Further, larger decreases in warmth and increases in hostility and conflict were associated with greater risky behavior outcomes, such as delinquency and antisocial behavior (Keijsers et al., 2012; Trentacosta et al., 2011).

Greater lability in parents’ warmth and hostility should also be associated with increased youth risky behavior. Experiencing very high lability in parental hostility and warmth can be

indicative of difficulty with the adolescent transition that may impede a youths' internalization of protective norms and reduce their perceptions of safety, thereby increasing the risk for negative outcomes. Although there are few studies on lability, three recent studies found higher levels of parenting lability to be linked to negative youth outcomes (Lippold, Fosco et al., 2016; Lippold, McHale et al., 2015; Lippold, Davis et al., 2016). For example, Lippold, Fosco et al. (2016) found that, even when controlling for developmental trends in parental knowledge, greater lability in parental knowledge was associated with increased risk of youths' substance use and delinquency. Similar work using daily diary studies have found that greater day-to-day fluctuations in parenting were linked to youths' increased risky behavior and physical health problems (Lippold et al., 2015; Lippold, Davis et al., 2016). Together these studies suggest that greater lability in parents' warmth and hostility may be linked to more youth risky behavior.

However, very low lability in parental warmth and hostility may also be linked to higher levels of youth risky behavior. As previously stated, some lability in parents' warmth and hostility may be normative as families adapt to new roles. Parents that experience no lability, or very low levels of lability in hostility or warmth may be demonstrating a lack of flexibility to their adolescent's growing developmental needs. Rigidity in parenting may also be an indicator of difficulty with adapting to new roles. And rigidity in parent-child interactions has been linked to increased risk of youth problem behaviors in other studies (Hollenstein, Granic, Stoolmiller, & Snyder, 2004; Lunkenheimer, Olson, Hollenstein, Sameroff, & Winter, 2011). Thus, youth in families with very low lability may also engage in risky behavior—in this case as a mechanism to assert their independence (Moffitt, 2003).

Given the small amount of literature on lability, more work is needed to expand our understanding of lability across different aspects of parenting - especially lability in the affective aspects of parenting, such as parental hostility and warmth. Further, extant studies have focused primarily on linear linkages between lability and youth outcomes. However, given that both very low and very high levels of lability may be maladaptive, more studies are needed that assess possible quadratic linkages between lability and youth risky behavior.

Gender Differences

Changes in parental warmth and hostility might have different linkages to risky behavior for boys and girls. Girls are socialized to be more relationship-oriented than boys, and therefore, might be more strongly affected by changes in parental warmth and hostility than boys (Leaper, 2002). In fact, some research has suggested that as compared with boys, girls are more attuned to and affected by family relationships (Davies & Lindsay, 2004) and have stronger stress responses to problems with their parents than do boys (Hankin & Abramson, 2001; Lippold, McHale et al., 2014). Further, some studies report stronger linkages between parent-youth relationships and delinquency for girls than for boys (Lippold, Fosco et al., 2015; Webster-Stratton, 1996). Lability in parental warmth and hostility, in particular, may have different associations with youth risky behavior for girls and boys. Prior studies have found that higher lability in parental knowledge of youth activities was linked to youth delinquency for girls, whereas such lability had weaker, and in some cases nonsignificant, linkages to the same outcomes for boys (Lippold et al., 2015; Lippold, Fosco et al., 2016).

In addition, the linkages between parental warmth and hostility and youth risky behavior might differ for mothers and fathers. Adolescents, especially daughters, report being closer to their mothers than fathers (McHale, Crouter, & Whiteman, 2003) and mothers tend to take on the majority of caretaking responsibilities for youth. Father–youth relationships tend to involve more leisure activities and play (Larson & Richards, 1994). Such leisure activities may involve more egalitarian exchanges between fathers and youth, and therefore, be important for youth autonomy development (Parke & Buriel, 2006). However, the literature is mixed regarding whether mothers' and fathers' parenting is differentially linked to youth outcomes. Studies have linked both mother and father relationships to youth adjustment (Grossmann, Grossmann, Fremmer-Bombik, Kindler, & Scheuerer-Englisch, 2002; Lamb, 2004), suggesting that changes in warmth and hostility are similarly linked to youth outcomes for mothers and fathers. However, some evidence has suggested that as compared with father–youth relationships, negative mother–youth relationships are particularly stressful during adolescence (Lippold, McHale, Davis, Almeida, & King, 2014) and more consistently related to negative youth outcomes. In contrast, other research has found fathers become particularly important for youth adjustment during adolescence (Flouri, 2005). Few studies include fathers, making it difficult to understand gender differences. One study on lability has found that pubertal timing and tempo had different linkages to lability in mother and father relationships (Marceau et al., 2015). However, prior studies of the associations between parenting lability and youths' risky behavior have not differentiated mother and father relationships (Lippold et al., 2015; Lippold, Fosco et al., 2016), leaving an important gap in the literature.

Present Study

This study examined changes in parents' warmth and hostility towards their adolescent across Grades 6 to 8 and the associations of these changes with youth risky behavior reported in Grade 9. First, we tested whether lability and developmental trends in parental warmth and hostility predicted later youth delinquency and substance use. We hypothesized that developmental trends characterized by greater decreases in parents' warmth and greater increases in parents' hostility would be associated with increased youth delinquency and substance use. We also expected that, even when controlling for developmental trends, greater lability in parents' warmth and hostility (more fluctuations) would be associated with more youth delinquency and substance use. However, we expected the linkages between lability and youth risky behavior to be quadratic, with very high and low levels of lability associated with higher levels of youth risky behavior—and moderate levels of lability associated with lower levels of risky behavior (e.g., a U-shaped relationship between lability and youth risky behavior). Second, we tested whether the linkages between lability and youth risky behavior differed by youth gender, hypothesizing that the associations between lability and youth risky behavior would be stronger for girls than boys.

We examined youth and parent reports of lability in mothers' and fathers' warmth and hostility separately, which allowed us to investigate parent gender differences as well as differences by whether parenting was reported by parents or youth. We ran separate models for parental warmth and hostility because positive and negative experiences between parents and youth are often conceptualized as distinct constructs (Dallaire, et al., 2006). Warmth and

hostility are not opposite ends of the same continuum and show only small to moderate correlations in other studies (Dallaire et al., 2006). Therefore, lability in warmth and hostility may have different linkages to youth risky behavior. Further, studies suggest that parents and youth often have different perceptions of parenting behaviors, and that correlations between parent and youth reports of parenting are often small to moderate (De Los Reyes & Kazdin, 2005). Parent and youth reports of parenting often have different linkages to youth outcomes, with more consistent linkages being found with youth, rather than parent reports. Therefore, even though prior studies have focused primarily on youth reports of parenting, in this study we examine lability using both parent and youth perceptions of parents' warmth and hostility.

Method

Study Design and Participants

This analysis used data obtained from a sample of early adolescents in two-parent homes and their parents who participated in at least 3 of 4 waves of in-home data collection as part of the PROSPER project (Promoting School-Community-University Partnerships to Enhance Resilience; Spoth, Greenberg, Bierman, & Redmond, 2004). PROSPER was a large-scale effectiveness trial of preventive interventions and their diffusion into rural communities, with the aim of reducing substance-use initiation among adolescents in 28 rural communities and small towns in Iowa and Pennsylvania. Families of students in the second cohort of the project were randomly selected and recruited for participation in an in-home assessment that included a videotaping of a family interaction and survey questionnaires completed independently by the youth, mother, and, if present, father ($N=977$ for full sample at baseline, plus 3 participants who were added at later waves). In-home assessments occurred over five waves: fall of Grade 6, and spring of Grades 6 through 9. Retention rates were moderate at all waves, ranging from 83% at Wave 2 to 76% at Wave 5. Youth also completed in-school questionnaires at each wave. Parents provided consent and youth assented for in-home data collection. This study was deemed exempt by the Institutional Review Board at The University of North Carolina at Chapel Hill because the project uses deidentified secondary data and the Project PI has never had access to identifying information. The original project grant was approved by the IRB at The Pennsylvania State University.

To maintain precision in our measurement of lability, analyses were limited to those families in which youth and parents provided three or more waves of data on a particular dyadic relationship (e.g., youth and mothers both reported on maternal hostility for three or more waves). Given our interest in both mother and father warmth and hostility, our analytic sample was limited to two-parent homes. We also removed parents where the reporter changed across waves: 25 fathers were removed because the reporter changed from biological father to stepfather; 6 mothers were removed because the reporter changed from biological mother to stepmother. Thus, our final sample included 618 families with 598 mothers and 476 fathers.

The demographics of the analytic sample at Wave 1 are as follows. Youth (52% female) resided in Iowa (61%) and Pennsylvania (39%), and were, on average, 11.3 years old ($SD =$

49) at Wave 1. The mothers' mean age was 38.8 years ($SD = 5.58$) and fathers was 41.08 years ($SD = 6.75$). Average household income in 2003 was \$58,738 and 60% of parents had some postsecondary education. Households had an average of three children ($SD = 1.56$). The majority of youth (68%) were living with both biological parents. Eleven percent of fathers were stepparents, and 1% of mothers were stepparents. Less than 2% were adoptive parents (1.6% of fathers; 1.2% mothers). Most youth were Caucasian (90%), Hispanic (4%), African American (2%), Native American (1%), Asian (1%), and other (3%).

Measures

Measures were adapted from the Iowa Youth and Families Project (Conger, 1989; McMahon & Metzler, 1998; Spoth, Redmond, & Shin, 1998) and the National Youth Survey (Elliott, Ageton, & Huizinga, 1982). Based on research that indicated youth are more likely to report problem behavior when asked in school rather than at home, we used in-school assessments of youth outcomes (Redmond, Schainker, Shin, & Spoth, 2007), which were gathered within months of the home visit. This analysis used four waves of data for parental warmth and hostility (Fall of Grade 6, Spring of Grades 6, 7, and 8) collected as part of the in-home data collection and used data on youth outcomes from the in-school data collection at Grade 9. Measures of parental hostility and warmth assessed youth and parent perceptions of parental behavior towards their children. Measures of youth outcomes were reported by youth.

Parental hostility—Youth and parent perceptions of parental hostility toward their adolescent were measured using three items (e.g., “How often did you and this child have serious arguments”) that were answered on a 7-point Likert scale ranging from *never* (1) to *always* (7). Higher scores indicated greater levels of parental hostility toward the adolescent. Across reporters and waves, average Cronbach's α was .83 (range .77 – .91).

Parental warmth—Youth and parent perceptions of parental warmth toward their adolescent were measured using three items (e.g., “How often did you act loving and affectionate towards this child”) that were answered on a 7-point Likert scale ranging from *never* (1) to *always* (7). Across reporters and waves, average Cronbach's α was .86 (range .77 – .98).

Delinquency—Youth involvement in deviant behaviors in the past 12 months was assessed using 12 items that measured behaviors such as whether the youth had taken something worth less than \$25 or physically fought with someone out of anger. Responses were dichotomized (0 = *never*, 1 = *once or more*) and summed as a total delinquency score ($\alpha = .90$).

Tobacco use—Two dichotomous items asked about lifetime cigarette use (i.e., ever smoked cigarettes) and cigarette use in the past month. Responses (0 = *no*; 1 = *yes*) were summed to create an index of tobacco use ($\alpha = .74$).

Polysubstance initiation—Initiation of polysubstances was assessed by asking participants to indicate whether they had ever used seven different substances (e.g.,

cigarettes, ecstasy, glue, Vicodin). Responses were coded (0 = *no*; 1 = *yes*) and summed ($\alpha = .77$).

Control variables—Control variables included demographic variables that were associated with youth risky behavior in prior literature (Greenberg & Lippold, 2013): gender (0 = *female*; 1 = *male*), dual biological parent status (0 = *not living with biological parents*; 1 = *living with both biological parents*), average parental education (years in school including secondary education, $M = 13.19$, $SD = 2.18$). Models also included intervention condition (0 = *control*; 1 = *intervention condition*) and baseline levels of youth risky behavior.

Data Analysis

Our data analysis proceeded through three steps. In Step 1, we derived individual scores for each person's intercept, developmental trend, and lability. To derive these scores, we modeled parental warmth and hostility using a linear growth model (McArdle & Nesselroade, 2003; Ram & Grimm, 2015), implemented as a 2-level multilevel model in SAS 9.3 (proc mixed). For example, parental warmth across Grades 6 to 8 was modeled as

$$\text{Parental Warmth}_{ti} = \beta_{0i} + [\beta_{1i}(\text{time}_{ti})] + [e_{ti}] \quad \text{Level 1}$$

$$\begin{aligned} \beta_{0i} &= \pi_{00} + u_{0i} \\ \beta_{1i} &= \pi_{10} + u_{1i} \quad \text{Level 2} \end{aligned}$$

where youth i 's reports of parental warmth at Wave t were modeled as a function of a person-specific level (intercept), β_{0i} , a person-specific rate of change (developmental trend) in warmth with respect to time_{ti} (time-in-study coded in years), β_{1i} , and "residual" fluctuations, e_{ti} . Person-specific coefficients were modeled as sample means (π_{00} and π_{10} , sample-level fixed effects) and person-specific deviations around those means (u_{0i} and u_{1i} , random effects). Based on prior literature, both linear and quadratic growth models were tested. Eight separate models were run for youth and parent reports of mother and father warmth and hostility.

The linear growth model provided a superior or equivalent fit to the four-occasion data than the quadratic model for most of the measures (lower AIC, BIC). Fit statistics are given in Table 1. Although the quadratic model provided better fit for mother's self-reported hostility, the findings were identical when using the linear model parameters. Therefore, for consistency across models, parameters derived from the linear model were used in all subsequent analyses.

We then used these linear growth models to obtain person-specific scores for the intercept, developmental trend, and lability for each person in our sample using Proc Mixed in SAS, following procedures described by Marceau et al. (2015) and Ram, Gerstorf, Lindenberger, and Smith (2011). For example, we obtained the estimates of each individual's *parental warmth level* (β_{0i}) and *parental warmth developmental trend* (β_{1i}) from the linear growth

model above. Liability scores were calculated as the within-person standard deviation of using each person's residuals (e_{ti}) from the growth model.

$$\text{Liability}_i = \sqrt{\sigma_i^2} = \sqrt{\frac{1}{T-1} \sum_{t=1}^T (e_{ti} - \bar{e}_i)^2}.$$

Individuals higher in liability had relatively large deviations from their estimated developmental trends in parental warmth across waves, whereas those lower in liability had relatively small deviations from the estimated trends. The same steps were used to derive scores for parental hostility.

We decomposed the total variance into components (Snijder & Bosker, 1999) to ascertain the amount of variance in parental hostility and warmth captured by developmental trends versus liability. For each model, we calculated the percentage of variance in parental warmth and hostility that was explained by developmental trends as the difference in residual errors between a model that included time, σ_e^2 , and an empty model without time $\sigma_{e(\text{base})}^2$.

$$\% \text{Long-term Change} = \frac{(\sigma_{e(\text{base})}^2 - \sigma_e^2)}{\sigma_{e(\text{base})}^2}.$$

In Step 2, we used Poisson regression to examine the association of liability in parental warmth and hostility with Grade 9 measures of youth risky behavior (e.g., substance use, delinquency). Predictors included the three change scores derived from the growth model (i.e., level, developmental trend, and liability score) and control variables. Because we hypothesized the linkages between liability and youth risky behavior would be U-shaped, we also included a quadratic term for liability (liability score*liability score). The Poisson model was:

$$\begin{aligned} \text{Log}_e(\text{Riskybehavior}_i) \\ = \alpha_0 + \alpha_1 \text{warmthliability}_i + \alpha_2 \text{warmthliability}_i * \text{warmthliability}_i \\ + \alpha_3 \text{warmthdevelopmentalchange}_i + \alpha_4 \text{warmth level}_i + \alpha_{5-10} \text{controls}_i + r_i \end{aligned}$$

where *riskybehavior_i* is the level of youth risky behavior in Grade 9 (i.e., substance use, delinquency) and *controls_i* included gender, dual biological marital status, condition, parental education, and initial levels (fall Grade 6 scores) of the specific problem behavior being examined. Of particular interest were the unique linear (α_1) and quadratic (α_2) associations of liability with each outcome.

Because liability scores were moderately correlated with the level of parental warmth and hostility, additional analyses were run to investigate the potential role of multicollinearity. For each model, we calculated the variance inflation factor (VIF), which assesses the extent to which the standard error of model estimates are inflated due to multicollinearity. The VIF ranged from 1.18 to 1.63, which is well below the recommended cutoff value of 10 (see Hair, Anderson, Tatham, & Black, 1995). Thus, multicollinearity was not likely to have biased our estimates.

Third, we tested whether the relations between lability and each risky behavior differed by youth gender. We tested for moderation for the main effect of lability by gender by including a $gender_i * lability_i$ interaction variable in each Poisson regression model. We also tested whether the quadratic effect of lability was moderated by youth gender by adding a $gender_i * lability_i * lability_i$ interaction term to our model.

Results

Fitting Growth Curve Models and Variance Decomposition

Results from the growth models of mothers' and fathers' warmth and hostility and descriptive statistics are shown in Tables 1 and 2. As expected, the average developmental trend for parental warmth showed decreases across Grades 6 through 8, with steeper decreases being reported by youth (for youth reports on fathers' $\pi_{10} = -.23, p < .001$; for youth reports on mothers' $\pi_{10} = -.16, p < .001$) than by parents (for fathers' $\pi_{10} = -.07, p < .001$; for youth reports on mothers' $\pi_{10} = -.06, p < .001$; see Table 1). Interestingly, hostility showed significant linear declines according to parents (fathers' $\pi_{10} = -.09, p < .001$ and mothers' $\pi_{10} = -.09, p < .001$) but increases according to youth about their fathers ($\pi_{10} = .05, p < .05$) and no significant change according to youth about their mothers. The percentage of variance captured by developmental trends ranged from 7.5% for fathers' hostility to 48% for mothers' hostility. Across all models, the average percentage of variance captured by developmental trends was 19% (see Table 1).

Descriptive statistics for our derived study variables (e.g., each individuals' level, developmental trend, and lability score) and youth outcomes are shown in Table 2. The lability scores had mean values ranging from .36 to .62, and an average standard deviation ranging from .20 to .45, suggesting that families differed substantially in their lability. Correlations between youth and parent reports of lability ranged from .08 to .20. More lability in fathers' warmth was associated with lower levels of warmth (youth-report $r = -.47$; father-report $r = -.24$) and, according to youth reports, steeper decreases in warmth (youth-report $r = -.34$). Higher lability in fathers' hostility was associated with higher levels of hostility (youth report $r = .65$, father-report $r = .30$) but had different associations with developmental trends based on reporter (youth report $r = .30$; father-report $r = -.26$).

Similar patterns were seen for mothers. More lability in mothers' warmth was associated with lower levels of warmth (youth-report $r = -.53$; mother-report $r = -.37$) and steeper decreases in warmth (youth-report $r = -.35$; mother-report $r = -.27$). Higher lability in mothers' hostility was associated with higher levels of hostility (youth report $r = .61$; mother-report $r = .34$) but had different associations with developmental trends based on reporter (youth report $r = .15$; mother-report $r = -.10$). Lability in mothers' and fathers' warmth was significantly associated with youth risky behavior according to youth report but not parent reports. Lability in mothers' and fathers' hostility was associated with youth risky behavior according to youth and mother, though not father, reports.

Linkages to Youth Risky Behavior

Father Models—Poisson regressions were used to examine the associations between fathers' developmental trends and lability scores and youth risky behavior (Table 3 and Figure 2). Importantly, models controlled for baseline (Grade 6) levels of youth outcomes as well as demographic variables. Higher lability in youth reports of fathers' warmth and hostility were associated with youth risky behavior, partially confirming our hypothesis-- but the specific nature of the relation varied by outcome and reporter. Linear linkages were found between youth-reported lability in fathers' warmth and tobacco use ($\alpha_1=.78$) and polysubstance initiation ($\alpha_1=.56$), such that greater lability was linked with more substance use as predicted. Higher lability in youth-reported father hostility was also associated with greater tobacco use ($\alpha_1=1.02$).

Some of the linkages between lability and youth risky behavior were quadratic in nature (See Figure 2). For example, the associations between youth-reported lability in fathers hostility and youth polysubstance initiation had both linear ($\alpha_1=.70$) and quadratic ($\alpha_2=-.85$) components. As seen in Figure 2, contrary to our hypothesis, the associations were not U-shaped but reflected an inverted U-shape such that moderate levels of lability in father's hostility were associated with greatest risk for polysubstance use. Both low and very high lability in father's hostility were associated with relatively lower risk for polysubstance use. However, it is important to note that most of the youth in our sample had low lability scores. Therefore, for the majority of youth, greater lability was associated with more substance use. Greater lability was only associated with lower substance use for a small percentage of our sample.

A similar quadratic pattern characterized the association between youth-reported lability in fathers' warmth and hostility and youth delinquency ($\alpha_2 = -.98$ warmth, $-.90$ hostility). Lability in father self-reports on their warmth and hostility exhibited no significant linkages to youth risky behavior.

Developmental trends in father's warmth and hostility were also associated with some youth outcomes. Greater declines in youth-reported fathers' warmth ($\alpha_3=-1.71$) and greater increases in hostility ($\alpha_3= 1.71$) were also associated with greater youth delinquency. Greater increases in father-reported hostility was associated with greater youth delinquency ($\alpha_3= 9.76$).

Mother Models—In models focusing on mothers (Table 4), even when controlling for baseline levels of youth outcomes, youth-reported lability in mothers' warmth exhibited a positive linear relationship with polysubstance use initiation ($\alpha_1=.33$), and tobacco use ($\alpha_1=.51$ $p=.06$), such that greater lability was associated with more substance use as predicted. However, contrary to our hypothesis, negative linkages were found between mother-reported lability in warmth and polysubstance use initiation ($\alpha_1=-.71$). Thus, youth and mother reported lability in warmth had different relationships with polysubstance use initiation: youth reports were positively associated with polysubstance use and mother-reports were negatively associated with polysubstance use.

Similar to fathers, some of the linkages between mothers' lability and youth risky behavior were quadratic in nature and showed inverted U-shape patterns of association. For example, moderate levels of lability in youth reports of hostility predicted higher risk for polysubstance use initiation relative to low and high levels of lability ($a_2 = -.58$). Again, similar to our father models, most youth had low lability scores. Therefore, for most youth in our sample, greater lability in mother's hostility was associated with greater substance use. Similar patterns were found for associations between lability in mothers' hostility and warmth and delinquency (for youth-reported warmth quadratic effects, $a_2 = -1.02$; mother-reported warmth, $a_2 = -2.44$; and youth-reported hostility, $a_2 = -.59$).

Developmental trends in mothers' warmth and hostility were also associated with youth risky behavior. Greater decreases in mothers' warmth were associated with greater delinquency according to both youth ($a_3 = -.60$) and mother ($a_3 = -2.51$) reports. Greater increases in mothers' hostility were associated with greater polysubstance use (youth reports $a_3 = .62$) and delinquency (youth reports $a_3 = 3.31$, mother reports $a_3 = 2.73$).

Moderation by Youth Gender

Youth gender did not moderate the linkages between lability in either parenting construct and tobacco use or polysubstance use initiation. However, many of the associations between youth and parent reported lability in parental warmth and hostility and youth delinquency were moderated by youth gender (Table 5) and follow-up tests (not shown) revealed that many of these linkages were significant for girls but not boys.

In our father models, youth gender moderated the linear and quadratic linkages between youth-reported lability in fathers' warmth and delinquency ($a_{10} = -1.66$, $a_{11} = 1.86$) as well as youth-reported father hostility ($a_{10} = -2.00$, $a_{11} = 3.12$). Follow up tests revealed that youth-reported lability in fathers' hostility had significant linear and quadratic linkages to delinquency for girls (linear $a_f = 1.71$, $SE = .52$, $p < .001$; quadratic $a_2 = -2.81$, $SE = .73$, $p < .001$) but not boys (linear $a_f = -.29$, $SE = .37$, $p = ns$; quadratic $a_2 = .31$, $SE = .56$, $p = ns$). Similar patterns were found for youth-reported lability in fathers' warmth, with significant linkages for girls (linear $a_f = 1.34$, $SE = .44$, $p < .001$; quadratic $a_2 = -2.17$, $SE = .58$, $p < .01$) but not boys (linear $a_f = -.31$, $SE = .30$, $p = ns$; quadratic, $a_2 = .32$, $SE = .49$, $p = ns$). Quadratic effects for girls were similar to those shown in Figure 2 and had an inverted U shaped pattern: Girls with moderate levels of lability demonstrated the highest level of delinquency, whereas those with low and very high levels of lability had relatively lower levels of delinquency.

In our mother models, youth gender moderated the effects of youth-reported lability in mothers' hostility ($a_{10} = -1.09$, $a_{11} = 2.11$) with follow-up tests revealing that lability had quadratic linkages to girls' delinquency (quadratic $a_2 = -1.43$, $SE = .48$, $p < .01$) but not boys (quadratic $a_2 = .68$, $SE = 1.43$, $p = ns$). Similar to other models, for girls, these quadratic effects demonstrated an inverted U-shaped pattern. Youth gender also moderated the linear linkages between mother-reported lability in hostility and youth delinquency ($a_{10} = -2.02$). Follow up tests revealed that mother-reported lability in hostility had linear associations with delinquency for girls (linear $a_f = 1.79$, $SE = .53$, $p = .007$) but not boys (linear $a_f = .23$, $SE = .49$) and neither girls nor boys had a significant quadratic component. Youth gender did not moderate the linkages between mother-reported warmth and delinquency.

Discussion

During early adolescence, family relationships and interaction patterns are likely to change in response to youths' changing developmental needs (Cox & Paley, 1997). Here we examine how mothers' and fathers' warmth and hostility toward their adolescent children changes across early adolescence. In particular, we were interested in understanding two types of change in parental warmth and hostility across Grade 6 through Grade 8—developmental trends (linear declines) and lability (within-person fluctuations around their trend)—and the association of these changes with youth risky behavior measured in Grade 9.

Developmental Trends and Youth Risky Behavior

Our study confirms prior work that developmental changes in parent–youth relationships have important linkages to youth risky behavior (Laursen et al., 1998; Shanahan et al., 2007a; Shanahan et al., 2007b). Similar to other studies, we found mother and father warmth toward their children decreased during early adolescence. Youth and parents differed in their perceptions of hostility over time: Youth reported increases in fathers' hostility whereas mothers and fathers reported declines in hostility. There have been some mixed finding in the literature regarding the trend in conflict over time. Whereas, most studies have found increases in conflict and negative affect during the transition to adolescence (Allen et al., 1994; Feinberg et al., 2003; Laursen et al., 1998; Marceau et al., 2015; Shanahan et al., 2007b; Wickrama et al., 1997), a small number of studies that examined conflict across the entire adolescent period have found small decreases in conflict during early adolescence (see Laursen et al., 1998; Shanahan et al., 2007b). Our study assessed hostility, which captures parent behavior toward the adolescent, rather than conflict, which captures an interactive parent–youth process, which may be in part why our study findings differ from some prior work. Nonetheless, developmental trends were linked to youth outcomes. Greater declines in mother and father warmth and greater increases in hostility were associated with more youth delinquency, similar to other studies (Keijsers et al., 2012; Trentacosta et al., 2011). Interestingly, linear trends in parent's warmth and hostility were only associated with substance use in one of our models: developmental trends in youth-reported mother hostility was associated with polysubstance use. Perhaps overall declines in warmth and hostility are more likely to affect the internalizing of parental norms around delinquent behavior rather than substance use. This study's unique focus on mothers' and fathers' developmental trends during this time period and the lability of their warmth and hostility makes it difficult to place this finding in the broader literature. These findings suggest that the overall trajectory of parental warmth and hostility—that is, whether relationships are improving or deteriorating—has important implications for youth delinquency in particular.

Lability and Youth Risky Behavior

Our study findings also suggest that (a) an additional type of change—lability—might be occurring in these families, and (b) capturing fluctuations in parent–youth warmth and hostility from year-to-year is important to understanding the transition to early adolescence. Our decomposition of variance (Snijder & Boskers, 1999) suggests that a substantial amount of variance in parental warmth and hostility might not be captured by developmental trends. Instead, some of the change in warmth and hostility might reflect lability and within-person

fluctuations. Thus, a more nuanced approach to understanding changes in the parent–youth relationship might be warranted; specifically, an approach that includes lability. Indeed many parents likely experience ups and downs in their relationships from year-to-year as youth transition into adolescence and family systems reorganize to accommodate new roles (Collins & Laursen, 2004; Cox & Paley, 1997). These findings support recent work that has reported substantial lability in parental knowledge and parental conflict during the adolescence period (Lippold et al., 2015, Lippold, Fosco et al, 2016; Marceau et al., 2014), as well as dynamic system studies that have found high variability in parent–youth relationships during the youth transition to adolescence (Granic, Hollenstein, Dishion, & Patterson, 2003). Thus, rather than smooth trends, changes in hostility and warmth can be characterized by many fluctuations.

Importantly, in our study, lability in warmth and hostility were linked to youth substance use, although the nature of these relations were nuanced. In general, greater lability in mother and father warmth (according to youth reports) was associated with elevated risk for youth tobacco use and polysubstance use. Greater lability in father hostility was also associated with greater tobacco use. Perhaps high lability in parental warmth indicates difficulty with a healthy reorganization of the parent-child relationship to accommodate autonomy at the transition to adolescence. Such lability may impede the internalization of positive norms that may prevent substance use, or may create a stressful family environment that may lead youth to seek out affiliations with deviant peer groups, thereby increasing the risk of substance use (Catalano & Hawkins, 1996). Further, youth may seek out substance use as a way to assert their autonomy in the absence of successful family adaptation to their new need for independence (Moffitt, 2003). These findings support a growing body of research that has found daily and yearly fluctuations in parenting to be associated with increased risky behavior (Lippold, Fosco, et al., 2016; Lippold, McHale et al., 2015; Lippold, Davis et al., 2016).

Interestingly, lability in youth-reported mother and father hostility had complex relationships with polysubstance use initiation. The highest rates of polysubstance use were found among youth who experienced moderate levels of lability in parental hostility. Lower rates of substance use were found for youth who experienced very little or very high levels of lability in hostility—which was contradictory to our hypothesis. Low levels of hostility lability, which we hypothesized may reflect parental rigidity, were not associated with more substance use, as we hypothesized. Instead in our models, very low levels of lability were associated with low levels of substance use. Thus, experiencing only a very small amount of lability in hostility may promote a sense of safety for youth in their family, leading to an increased capacity to self-regulate and to the internalizing of protective norms about substance use (Catalano & Hawkins, 1996; Lippold et al., 2016) while moderate amounts of lability may impede these processes. Importantly, our data also revealed that very high levels of lability in hostility were also associated with low levels of polysubstance use initiation. However, it is important to note that in our data, the vast majority of families had low hostility lability scores. High lability may only be associated with lower polysubstance use at very high levels—such as those in the top 10% of lability scores. Very high levels of youth-reported lability may indicate highly unstable hostile behaviors from parents towards their children. Under these conditions, youth may engage in less risky behavior in an effort

to avoid experiencing periods of high parental hostility. Alternatively, in families with very high lability, parents may be experiencing intermittent stress. Youth may be avoiding risky behavior in an effort to aid their parents in returning to emotional equilibrium—a form of adultification (Burton, 2007). Youth in families with high lability may also view their parents as unreliable, and therefore youth may avoid risky behavior because they recognize that they are their own primary caretakers. More work is needed to understand predictors of lability in parental hostility and the conditions by which lability is associated with greater risky behavior.

Differences Between Boys and Girls

Girls in particular appear to be affected by lability in parental warmth and hostility. Lability in youth-reported father warmth and hostility and youth-reported mother hostility were linked to greater delinquency for girls but not boys. These findings support those reported in other studies that have found linkages between lability in parenting and delinquency for girls but not boys (Lippold et al., 2015; Lippold, Fosco et al., 2016). Because girls are more oriented to relationships than boys, girls might be more likely to find fluctuations in their parents' behavior to be stressful, especially fluctuations in hostility (Hankin & Abramson, 2001; Lippold et al., 2014), with stronger implications for their adjustment. It is possible that girls are more likely to assume adult caretaker roles when parents are undergoing stress, especially their fathers (Leaper, 2002)—and henceforth at high levels of lability in hostility, girls may be more likely to engage in behaviors that help restore relationship equilibrium.

Reporter Differences

Our study integrated reports on parenting from both parents and youth. Youth reports of lability had more robust linkages to youth risky behavior than parent reports. For example, in our father models, youth reports of lability with fathers were consistently linked to youth risky behavior whereas father reports were not. Fathers may be less aware of their emotional state and fluctuations in their behaviors towards their children, which may be one reason for our lack of father findings (Garside & Klimes-Dougan, 2002). It is important to note that survey questions, like those used in this study, require parents and youth to retrieve memories and rate global perceptions of parents' behavior over the past month. Individuals are likely to recall and focus on memories that support their own view (De Los Reyes et al., 2005; Pasupathi, 2001). Therefore, it is likely that parents and youth recall and emphasize different information when rating parenting behaviors, which may lead to different ratings, and different linkages to youth outcomes (De Los Reyes, 2005; Pasupathi, 2001). For example, according to the Intergenerational Stake Theory (Giarrusso, Feng, & Bengston, 2004), parents and youth may have different goals, which likely creates bias in how they perceive their relationship (Bogenschneider, & Pallock, 2008). Parents' desire continued closeness in their relationship with their youth. Therefore, when reporting on parental warmth, parents may be more likely to recall information that supports their view of being consistently warm towards their children, leading to lower lability scores. In contrast, because youth seek autonomy from their parents, youth may be more likely to perceive and recall ups and downs in parental warmth and hostility, leading to higher lability scores. In line with this theory, youth reported higher mean levels in lability, and had more variance in

their lability scores than their parents, which may have also affected our ability to detect associations with youth outcomes.

In one of our models, youth and mothers had different patterns of association: Youth reports of lability in mothers' warmth were positively associated with substance use, whereas mother reports of lability in mothers' warmth were negatively associated with substance use. It is possible that mothers who report high lability in warmth are more likely to encourage youth autonomy development which may be protective against substance use. Prior studies on lability have focused solely on youth reports of parenting, making it difficult to place this finding in the broader literature. Given this finding is distinct from others in this study, replication is clearly needed. Additional studies that examine predictors and outcomes of discrepancies between parents and youth reports of lability may also help shed light on these reporter differences.

Limitations and Future Directions

This study has a number of limitations. First, as we studied primarily Caucasian rural adolescents living in Pennsylvania and Iowa, these findings may not be generalizable to other cultural groups or youth living in urban settings. Second, we did not have data on youth puberty, an important factor that may mark the early adolescent transition and that has been linked with more lability in parent-child relationships in other studies (Marceau et al., 2015). Studies that examine the adolescent transition as marked by pubertal status rather than grade may provide additional information about lability and its implications for youth risky behavior. Third, our study uses data from an intervention study. Although we controlled for condition in our analysis, future work is needed to assess possible intervention effects on parenting lability. Fourth, as youth and parents generally rated their relationships as being high in positive and low in negative characteristics, ceiling and floor effects may have limited our ability to fully capture lability. Our study did not assess youth autonomy, parental stress, or other processes that may help explain the mechanisms underlying our findings. Fourth, we cannot be certain of the direction of effect. We control for Grade 6 levels of outcome variables, which gives us confidence that our results are not fully explained by preexisting youth behaviors. However, it is likely that a transactional process exists between lability and youth risky behavior that was not fully captured in this study (Sameroff, 2009). As changes were only assessed on a yearly basis, studies that use ecological momentary assessments which capture parenting on shorter time scales may be needed to fully capture lability and understand its effects on youth adjustment (Lippold & McNamee, 2014).

This study illustrates the utility of assessing changes in parenting during adolescence both in terms of developmental trends and the degree to which parenting behaviors exhibit lability. Our findings suggest that linear trends and lability in parental warmth and hostility have different implications for adolescent risky behavior, depending on the gender of both the adolescent and the parent. Both types of change occurred during the early adolescent period and both had important linkages to youth behaviors. Lability in parental warmth and hostility was particularly relevant for youth delinquency and substance use, especially among girls. For most youth, higher lability was linked to more risky behavior. However,

youth in families with very high amounts of lability may be less likely to engage in risky behavior. More studies are needed to understand lability and conditions that predict it and that moderate its impacts on youth risky behavior.

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Figure 1. Differences in developmental trends and lability of parental warmth

Solid lines indicate raw data values for a particular individual at each time point. Dotted lines represent the linear slope or mean developmental trends in parental warmth from Grades 6–8. Panels A and B represent parents who have a small developmental trend (e.g., flatter slope) in parental warmth but different indices of lability. Panel A represents a parent who is high in lability (e.g., has many within-person fluctuations in warmth) and Panel B represents a parent low in lability. Panel C and D represent parents with larger developmental trends in warmth (e.g., steeper slopes), who also differ in lability. Parents with the same developmental trends in warmth may have different indicators of lability (i.e. Panels A and B) and families with the same levels of lability may have different developmental trends in warmth (i.e. Panels A and C).

Figure 2. Quadratic effects of fathers' hostility on youth polysubstance use initiation

The linkages between youth-reported lability in father's hostility and youth polysubstance use initiation had significant linear and quadratic components. Youth who experienced moderate levels of lability had higher levels of polysubstance use initiation. Youth who experienced relatively very low or very high levels of lability had lower levels of substance use initiation.

Table 1

Growth Curve Models for Parental Warmth and Hostility Across Grades 6–8

Parameter	Father Warmth			Father Hostility			Mother Warmth			Mother Hostility		
	Est.	SE	PR	YR	Est.	SE	YR	Est.	SE	YR	Est.	SE
Parental Warmth												
<i>Fixed effects</i>												
Intercept (π_{00})	5.91***	.06	5.46***	.05	1.97***	.05	2.72***	.04	6.03***	.04	2.12***	.04
Time (π_{10})	-.23***	.02	-.07***	.01	.05*	.02	-.09***	.01	-.16***	.02	-.06***	.01
<i>Random Effects</i>												
Intercept (σ^2_{u0})	1.32***	.11	.85***	.07	.75***	.07	.51***	.04	.75***	.06	.53***	.04
Time (σ^2_{u1})	.12***	.02	.03**	.001	.05***	.01	.00	.09***	.01	.02***	.01	.07***
Residual (σ^2_e)	.66***	.03	.29***	.01	.45***	.02	.20***	.01	.56***	.02	.20***	.01
<i>Fit Statistics</i>												
-2LL	5729		4215		4844		3373		6624		4490	
AIC	5737		4222		4851		3381		6632		4498	
BIC	5753		4239		4868		3397		6650		4515	
<i>Variance Decomposition</i>												
Baseline Residual ($\sigma^2_{e\text{base}}$)	.8810		.3229		.5061		.2158		.7065		.2242	
Residual with time	.6650		.2866		.4487		.1997		.5632		.2017	
% Long-term change	24.5%		11.2%		11.3%		7.5%		20.3%		10.0%	
% Liability	75.5%		88.8%		88.7%		92.5%		79.7%		90.0%	

* Note: $p < .05$ ** $p < .01$ *** $p < .001$

YR= youth report. PR= parent report. Est.=estimate, SE=standard error. Variance decomposition represents the proportion of variance accounted for by additional predictor of time (Snijders & Bosker, 1999).

Table 2

Means, Standard Deviations, and Correlations of Study Variables

	Fathers		Mothers		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
	Mean	Std.	Mean	Std.															
1. Warmth-labity: YR	.62	.45	.57	.43	1.00	.08	-.34	-.07z	-.47	-.21	.39	.11	.18	-.13	.37	.23	.14	.17	.17
2. Warmth-labity: PR	.44	.27	.36	.20	.19	1.00	.11	-.07z	-.12	-.24	.14	.21	.08t	-.18	.09	.16	.02z	.05z	-.00z
3. Warmth-developmental trend: YR	-.23	.23	-.16	.20	-.35	-.14	1.00	.24	.27	.22	-.20	-.06z	-.40	.05z	-.25	-.16	-.20	-.12	-.11
4. Warmth-developmental trend: PR	-.07	.08	-.06	.07	-.09	-.27	.29	1.00	.21	.30	-.11	-.01z	-.20	.02z	-.12	-.19	.00z	-.01z	.02z
5. Warmth-level: YR	5.91	1.05	6.03	.76	-.53	-.22	.42	.32	1.00	.43	-.32	-.09	-.20	.21	-.54	-.28	-.10	-.14	-.18
6. Warmth-level: PR	5.46	.87	6.07	.69	-.19	-.37	.27	.59	.47	1.00	-.15	-.08t	-.10	.30	-.26	-.37	-.10t	-.16z	-.03z
7. Hostility-labity: YR	.49	.40	.57	.42	.33	.08	-.29	-.08	-.21	-.09	1.00	.19	.30	-.26	.65	.35	.15	.22	.21
8. Hostility-labity: PR	.39	.22	.37	.24	.17	.12	-.12	-.02z	-.13	-.01z	.20	1.00	.07z	-.26	.17	.30	.03z	.09z	.03z
9. Hostility-developmental trend: YR	.05	.11	.01	.19	.11	.07	-.36	-.17	-.13	-.07	.15	.02z	1.00	-.05z	.28	.27	.15	.11	.17
10. Hostility-developmental trend: PR	-.09	.02	-.09	.07	.03z	-.01z	-.16	-.20	.01z	.05z	.02z	-.10	.28	1.00	-.38	-.75	-.04z	-.07	-.06z
11. Hostility-level: YR	1.97	.78	2.12	.78	.31	.01	-.32	-.13	-.41	-.22	.61	.22	.00z	-.08	1.00	.53	.19	.27	.28
12. Hostility-level: PR	2.72	.67	2.84	.68	.20	.12	-.24	-.21	-.27	-.40	.36	.34	.09	-.22	.55	1.00	.09z	.15	.14
13. Delinquency- YR	.81	1.93			.14	.01z	-.14	-.07z	-.16	-.10	.16	.08	.25	.08	.21	.10	1.00	.42	.42
14. Tobacco use- YR	.36	.69			.16	-.07t	-.15	-.02z	-.14	-.02z	.17	.14	.05z	.04z	.25	.18	.43	1.00	.72
15. Polysubstance use initiation-YR	1.10	1.47			.14	-.09t	-.17	-.08t	-.18	-.09	.16	.11	.10	.05z	.25	.16	.42	.72	1.00

Note. Means are presented for Wave 5 for outcome variables. N = 618. YR= youth-reported. PR= parent reported. Correlations for fathers are above the diagonal and correlations for mothers are below the diagonal. For all correlations $p < .05$ unless otherwise noted as z = non-significant, t = $p < .10$

Table 3
Fathers' Lability in Warmth and Hostility as Predictors of Youth Risky Behavior in Poisson Regression Models

Youth Reports about Fathers' Parenting				Father Self-Reports about Parenting								
Delinquency	Tobacco Use	Polysubstance Initiation		Delinquency	Tobacco Use	Polysubstance Initiation						
		Est	SE			Est	SE					
Father Warmth												
Warmth lability (α_1)	.27	.26	.78*	.37	.56**	.19	.21	.32	.51	.49	.32	.28
Warmth lability* warmth lability (α_2)	-.98**	.35	-.45	.42	-.38	.24	.06	.71	-.18	.87	-.64	.68
Warmth developmental change (α_3)	-1.71***	.07	.07	.49	-.28	.28	.95	.92	1.17	1.42	.85	.83
Warmth level (α_4)	.07	.07	-.05	.11	-.08	.05	-.08	.08	.06	.49	-.00	.07
Grade 6 Levels of outcome (α_5)	.41***	.04	1.00***	.18	.82	.06	.39***	.03	.97***	.19	.79***	.06
Gender (α_6)	.45**	.15	-.11	.22	-.09	.12	.67***	.14	-.10	.22	-.04	.12
Condition (α_7)	-.03	.14	-.19	.21	-.42**	.11	-.10	.13	-.24	.16	-.47**	.11
Parent Education (α_8)	.06	.04	-.14**	.05	-.07**	.03	.03	.04	-.14	.05	-.07*	.03
Parent dual-bio marital status (α_9)	-.28†	.15	-.84***	.22	-.32*	.13	-.41**	.15	-.88***	.22	-.36**	.13
Father Hostility												
Hostility lability (α_1)	.37	.34	1.02*	.51	.70**	.27	-.02	.41	.10	.65	-.41	.36
Hostility lability* hostility lability (α_2)	-.90*	.42	-.89	.56	-.85*	.34	1.13	.65	.38	.93	.65	.56
Hostility developmental change (α_3)	1.71***	.62	.68	.91	.47	.52	9.76*	4.24	5.44	5.73	2.51	3.42
Hostility level (α_4)	.12	.09	.17	.14	.17*	.07	.41**	.16	.44*	.21	.33*	.13
Grade 6 Levels of outcome (α_5)	.34***	.04	.93***	.19	.72***	.07	.40***	.04	.97***	.19	.81***	.07
Gender (α_6)	.53***	.14	-.12	.22	-.12	.12	.65***	.14	-.15	.21	-.11	.12
Condition (α_7)	.02	.14	-.17	.21	-.39**	.11**	-.06	.14	-.26	.21	-.48**	.11
Parent Education (α_8)	.05	.04	-.15***	.05	-.07*	.03	.05	.04	-.14**	.05	-.06*	.03
Parent dual-bio marital status (α_9)	-.29	.15	-.78***	.21	-.28*	.13	-.38*	.15	-.89***	.21	-.35**	.12

*
 $p < .05$ **
 $p < .01$ ***
 $p < .001$

Separate models were run for father warmth and hostility. All estimates are unstandardized. All variables were centered for our analysis.

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$$90^\circ = d_z$$
$$10^\circ = d_j$$

Table 4
Mothers' Lability in Warmth and Hostility as Predictors of Youth Risky Behavior in Poisson Regression Models

	Youth Reports about Mothers' Parenting				Mother Self-Reports about Parenting							
	Delinquency		Tobacco Use		Polysubstance Initiation		Delinquency		Tobacco Use		Polysubstance Initiation	
	Est	SE	Est	SE	Est	SE	Est	SE	Est	SE	Est	SE
Mother Warmth												
Warmth lability (α_1)	1.05***	.21	.51 ^z	.27	.33*	.16	-.28	.31	-.64	.42	-.71**	.25
Warmth lability* warmth lability (α_2)	-1.02***	.27	-.24	.24	-.28	.17	-2.44**	.94	.06	1.18	-1.21	.78
Warmth developmental change (α_3)	-.60*	.29	-.32	.46	-.34	.27	-2.51*	1.17	.34	1.73	-1.22	.99
Warmth level (α_4)	.01	.07	-.01	.12	-.08	.07	.16	.11	-.07	.17	-.09	.09
Grade 6 Levels of outcome (α_5)	.37***	.03	.93***	.16	.68***	.06	.38***	.03	.89***	.16	.69***	.06
Gender (α_6)	.35**	.11	-.29***	.18	-.12	.10	.37**	.11	-.26	.18	-.09	.10
Condition (α_7)	-.14	.12	-.02	.18	-.23*	.10	-.08	.11	-.01	.18	-.19†	.09
Parent Education (α_8)	.03	.02	-.14**	.04	-.06*	.03	.01	.03	-.15***	.04	-.07**	.03
Parent dual-bio marital status (α_9)	-.45***	.11	-.74***	.18	-.46***	.10	-.54***	.12	-.78**	.18	-.54***	.10
Mother Hostility												
Hostility lability (α_1)	.02	.29	.40	.43	.17	.24	.71*	.37	-.13	.55	.03	.32
Hostility lability* hostility lability (α_2)	-.59*	.30	-.76	.50	-.58*	.28	-.12	.59	1.51	.80	.92	.48
Hostility developmental change (α_3)	3.31***	.34	.84†	.45	.62**	.27	2.73***	.76	1.16	1.00	.82	.60
Hostility level (α_4)	.21*	.09	.39**	.14	.28***	.08	.17*	.08	.30***	.12	.19**	.07
Grade 6 Levels of outcome (α_5)	.34***	.03	.90***	.16	.63***	.06	.39***	.03	.97***	.16	.70***	.06
Gender (α_6)	.38***	.12	-.22	.18	-.09	.10	.34**	.12	-.28	.18	.09	.10
Condition (α_7)	.01	.11	-.01	.18	-.21*	.10	-.11	.11	-.04	.18	-.23*	.09
Parent Education (α_8)	.02	.03	-.13**	.04	-.05*	.03	.03	.03	-.15***	.05	-.06*	.03
Parent dual-bio marital status (α_9)	-.39**	.12	-.75***	.18	-.50***	.03	-.47***	.12	-.73***	.17	-.49***	.10

*
 $p < .05$ **
 $p < .01$ ***
 $p < .001$

Separate models were run for mother warmth and hostility. All estimates are unstandardized. All variables were centered for our analysis.

$$.10 < d_f$$
$$.90 = d_z$$

Table 5
Youth Gender Moderates the Linkages Between Liability in Parental Warmth and Hostility and Youth Delinquency

	Father Models				Mother Models			
	Youth-R report	Father-Report	SE	Est	Youth-Report	Mother-Report	SE	Est
Parental Warmth								
Warmth liability (α_1)	.54	.29	-.03	.34	1.03***	.21	-.35	.32
Warmth liability * warmth liability (α_2)	-1.27**	.39	.22	.76	-1.17***	.30	-2.55*	1.00
Warmth developmental change (α_3)	-1.88***	.37	1.29	.93	-.56	.29	-2.45*	1.17
Warmth level (α_4)	.07	.06	-.10	.08	-.00	.08	.16	.11
Grade 6 Levels of outcome (α_5)	.40**	.09	.39***	.03	.36***	.03	.38	.03
Gender (α_6)	.28	.18	.74	.16	.25	.13	.44**	.1
Condition (α_7)	-.07	.14	-.09	.14	-.14	.12	-.08**	.11
Parent Education (α_8)	.06	.04	.04	.04	.02	.03	.02	.03
Parent dual-bio marital status (α_9)	-.23	.15	-.41**	.15	-.47***	.12	-.55***	.12
Gender * AQ liability (α_{10})	-1.66***	.50	1.49*	.66	.09	.39	.85	.59
Gender * AQ liability * AQ liability (α_{11})	1.86*	.76	-.50	1.53	.71	.60	-.86	1.95
Parental Hostility								
Hostility liability (α_1)	.74*	.36	.15	.45	-.04	.29	.82*	.37
Hostility liability * hostility liability (α_2)	-1.28**	.46	-.71	1.12	-.41	.32	-.02	.58
Hostility developmental change (α_3)	1.72**	.61	10.85**	4.17	3.40***	.34	2.55**	.75
Hostility level (α_4)	.15	.09	.43**	.15	.27**	.09	.17*	.08
Grade 6 Levels of outcome (α_5)	.34***	.04	.40***	.04	.35***	.04	.41	.03
Gender (α_6)	.29	.17	.77**	.16	.18	.14	.32*	.13
Condition (α_7)	.01	.14	-.01	.14	.05	.12	-.11	.12
Parent Education (α_8)	.06	.04	.05	.04	.02	.03	.04	.03
Parent dual-bio marital status (α_9)	-.28	.15	-.38*	.15	-.38**	.12	-.48***	.12
Gender * AQ liability (α_{10})	-2.00***	.57	-.34	.87	-1.09*	.48	-2.02***	.71

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	Father Models				Mother Models			
	Youth-Report		Father-Report		Youth-Report		Mother-Report	
	Est	SE	Est	SE	Est	SE	Est	SE
Gender * AQ lability * AQ lability (α_{11})	3.12 ^{***}	.91	-3.64	2.28	2.11 ^{**}	.65	1.13	1.19

Gender * AQ lability * AQ lability (α_{11})

* $p < .05$

** $p < .01$

*** $p < .001$

Separate models were run for parental warmth and hostility. All estimates are unstandardized. All variables were centered for our analysis.