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Contributions of Parent-Adolescent Negative Emotionality, Adolescent Conflict, and Adoption Status to Adolescent Externalizing Behaviors

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Abstract

Although most adopted children are well adjusted, decades of descriptive research have consistently found that adopted adolescents are at an increased risk for externalizing behaviors. Yet we have little understanding of the specific contributing factors that help explain this increased risk. Therefore, the present investigation tested a process model whereby parent-adolescent negative emotionality traits, adolescent conflict, and adoption status contribute to adolescent externalizing behaviors. The study included 616 families from the Sibling Interaction and Behavior Study (SIBS; McGue et al., 2007). The proposed model was tested using Structural Equation Modeling (SEM). Findings support two conflict-mediated family processes that contributed to externalizing behaviors: one initiated by parent-adolescent traits, and one by adoption status. Findings also underscore the salience of conflict in families and the significance of aggressive traits over the other lower order traits (alienation, stress reactivity) and higher order negative emotionality in our proposed process. Contrary to previous research, we found that adoption status did not directly add to our explanation of adolescent externalizing behaviors beyond our proposed process. Instead, adoption status was indirectly associated with externalizing problems through a conflict-mediated relationship.

Keywords

parent-adolescent; dyadic traits; negative emotionality; conflict; externalizing; adoption

Given that 1.5 million (approximately 2%) United States children are adopted (Nickman et al., 2005) and empirical evidence suggesting that adopted adolescents may be at increased risk for externalizing behaviors (Keyes, Sharma, Iacono, & McGue, 2008), there is a critical need to understand specific factors that contribute to this risk. Meta-analyses (Juffer & van IJzendoorn, 2005; Wierzbicki, 1993) examining decades of descriptive research have confirmed this increased risk, although note that most adopted adolescents are well adjusted. Recently, researchers have suggested moving beyond describing this risk to focusing on explaining processes that contribute to it (Palacios, 2009). In response, this study will test a process that seeks to explain how adoption status contributes to adolescent externalizing behaviors. Attention is paid to linking constructs with firmly established associations with externalizing behaviors to help explain this increased risk. Two such constructs are temperament and conflict.

One well-established construct associated with externalizing behaviors is temperament (Rothbart & Bates, 1998). The temperamental characteristic of negative emotionality has been associated with externalizing behaviors (Eisenberg et al., 2000, 2009; Rhee, Cosgrove, Schmitz, Haberstick, Corley, & Hewitt, 2007). For example, a study by Eisenberg et al. (2000) found that children high in negative emotionality exhibited more problem behaviors. Yet this research is limited because it primarily examines child main effects. Person-environment transactional theory (Caspi et al. 1987, 1988) suggests that children develop within the context of parent-child interactions. Therefore, parent-child negative emotionality traits may be more salient than child traits alone when considering the association between negative emotionality and externalizing behaviors. Because current literature classifies temperament as part of the broader concept of personality and focuses on specific dispositional traits (Eisenberg et al., 2008), we refer to specific traits (e.g. aggression) or use the term temperament hereafter. Higher and lower order personality traits (lower order traits are indicators of a higher order factor) are also referenced based on factor-analytically derived personality structures.

Similarities and differences in parent and child traits figure into the association between temperament and externalizing behaviors. Dyadic similarity is defined as parent-child trait levels that are the same (e.g. both have high aggression); whereas dyadic dissimilarity is defined as different combined trait levels (e.g. one has high aggression, the other has low). The latter may be particularly salient for adoptive families because behavior genetics research shows that temperament is at least partially heritable (Isen, Baker, Raine, & Bezdjian, 2009). Thus, adoptive parents and children are more likely to have dissimilar temperaments because they do not share genetic relations. Inconclusive findings on dyadic similarity/dissimilarity (e.g. both have been associated with higher levels of conflict, Lemery & Goldsmith, 2001; Munn & Dunn, 1989) support our contention that dyadic combinations may be salient. To our knowledge, no existing research has examined the effects of parent-adolescent dyadic trait combinations and adoption status on adolescent externalizing behaviors.

Conflict is a second construct associated with externalizing behaviors. Parent-child conflict is associated with child adjustment (Eisenberg et al. 2008), and behavior genetics research has established a genetic component to the association between parent-child conflict and externalizing outcomes (Burt, Krueger, McGue, & Iacono, 2003; Burt, McGue, Krueger, & Iacono, 2005). Yet this research focuses on explaining variance attributed to individual effects rather than examining adolescent externalizing behaviors within a family context.

Empirical research also shows an association between temperament and conflict (Eisenberg et al., 2008). For example, Barber (1994) found that adolescents with “difficult” temperaments (versus “easier”) were more likely to engage in conflictual parent-child interactions. Adolescent temperamental characteristics (e.g. control) also contribute to varying levels of conflict (Dekovi , 1999). Indeed, control or disinhibition traits may be linked to conflict avoidant behaviors, reducing conflict. Conversely, one could hypothesize that children with negative emotionality traits (e.g. aggressive tendencies) may be more likely to initiate conflict.

A handful of studies have examined parent-child conflict in adoptive families (Lansford, Ceballo, Abbey, & Stewart, 2001; Rosnati & Marta, 1997; Rueter, Keyes, Iacono, & McGue, 2009). For example, Lansford et al. (2001), found that adoptive mothers reported more parent-child disagreements than non-adoptive mothers. Rueter et al. (2009) found higher parent-adolescent conflict levels in adoptive families than in non-adoptive ones. Statistically significant differences in these family types were limited to observed adolescent behavior directed toward each parent (and not vice versa). Both studies were descriptive and

did not test processes that may help explain these differences and clarify the role of adoption status.

Taken together, it is reasonable to suggest that parent-adolescent negative emotionality traits, adolescent conflict, adoption status, and externalizing behaviors are associated. Yet the complex relationships among these variables have not been tested. The present study applied goodness of fit and person-environment transactional theoretical frameworks to provide a context in which to understand our proposed associations.

Theoretical Frameworks

Goodness of fit (Lerner, 1993; Thomas & Chess, 1977) and person-environment transactional (Caspi et al., 1987, 1988; Scarr & McCartney, 1983) theories may help explain the relationships among our proposed constructs in Figure 1. First, goodness of fit theory may explain how various parent-adolescent trait combinations are associated with adolescent behavioral outcomes. Traditional goodness of fit theory posits that a good “fit” between child characteristics and parental demands contributes to optimal child functioning. Yet child characteristics alone fail to explain this fit. Instead, we suggest that *both* parent and child characteristics (specifically, temperamental traits) contribute to environmental adaptation and optimal child outcomes – the extent of which is defined by the dyadic trait fit. For example, a child with high aggression is likely to need a parent with low aggression since different temperamental traits have different developmental needs (Rutter, 1989). This dyadic combination is likely to be a good, adaptive fit, and contribute to more positive outcomes.

Second, person-environment transactional theory may explain how conflictual interactions (specifically, observed adolescent to parent conflict) contribute to the process of children shaping their own developmental outcomes (Bell, 1968; Lewis, 1981). For example, combined low levels of parent-adolescent negative emotionality traits may interact such that the dyadic traits are adaptive and fit well – leading to lower conflict and externalizing levels. Yet if both have high levels, they are more likely to reinforce each other's negative behaviors vis-à-vis reactive or evocative transactions in a “downward spiral” (Burt et al., 2005). This maladaptive dyadic fit is likely to contribute to problematic behaviors.

Empirical support from family transactional (Patterson, 1982) and parent-child reciprocal effects research (Rueter & Conger, 1998) lend support for a person-environment transactional framework. Mounting evidence suggests that reciprocal parent-child interactions influence behavior over time (Conger & Ge, 1999; Kim, Conger, Lorenz, & Elder, 2001; Larsson, Viding, Rijdsdijk, & Plomin, 2008; Rueter & Conger, 1998). For example, Kim et al. (2001) found evidence of a maladaptive negative emotion reciprocal influence in parent-adolescent interactions. Similarly, Rueter and Conger (1998) found maladaptive reciprocal effects whereby negative, inconsistent parenting led to a decrease in positive adolescent behavior, and positive, nurturant parenting led to an increase in negative adolescent behavior.

We suggest a process whereby certain combinations of parent-adolescent negative emotionality traits (e.g. combinations reflecting low levels) are more likely to be adaptive and be associated with positive outcomes. Conversely, certain parent-adolescent negative emotionality trait combinations (e.g. combinations reflecting high levels) are more likely to be maladaptive and be associated with externalizing behaviors. We apply goodness of fit and person-environment transactional theories to consider the trait fit between *both* parent and child characteristics within the context of an adaptive transactional family environment.

Methodological Issues

The present study addresses two important methodological issues relevant to our hypothesized associations. First, challenges in identifying negative emotionality's structure (e.g., a global, higher order construct or one with discrete lower order parts) are intertwined with its inconsistent structural classification and measurement (Frick, 2004). Although we know traits exist, we do not know which ones are salient in family processes. Therefore, we tested our hypothesized process using *both* higher (negative emotionality) and lower order (aggression, stress reactivity, and alienation) constructs.

Second, with the exception of a handful of studies (Galambos & Turner, 1999; Rettew, Stanger, McKee, Doyle, & Hudziak, 2006; van Tuijl, Branje, Dubas, Vermulst, & Van Aken, 2005), research examining the association between temperament and externalizing behaviors primarily employs an individual unit of measurement. This approach fails to account for parent-child transactions that may contribute to adolescent externalizing. Research suggests that, along with child traits, parent traits may explain externalizing behaviors (Eisenberg et al. 1999). Therefore, we argue that *both* parent and adolescent traits must be considered.

This dyadic measurement approach is consistent with both our theoretical frameworks and reciprocal effects research; it also underscores the theoretical importance of a transactional environment. In lieu of using longitudinal data to demonstrate reciprocal effects, it makes good logical sense to measure dyadic traits at a given point in time since parent and child behaviors are closely related and influence each other. Rather than a dyadic trait variable that combines parent-only and adolescent-only levels of traits in exhaustive combinations, each dyadic trait level should reflect findings from reciprocal effects research.

The Present Study

Figure 1 depicts the study hypotheses. Empirical descriptive research has established a direct effect of adoption status on (a) externalizing behaviors (Juffer & van IJzendoorn, 2005; Keyes et al. 2008; Rueter & Koerner, 2008), and (b) conflict (Lansford et al., 2001; Rueter, Keyes et al., 2009). Building on this, we proposed an explanatory family process whereby parent-adolescent traits, adolescent conflict, adoption status, and adolescent externalizing were associated in complex patterns. We also tested a direct effect of adoption status on parent-adolescent traits. Because previous research has identified age (McGue, Elkins, Walden, & Iacono, 2005) and gender differences (Conger & Ge, 1999; Rothbart & Bates, 1998) with respect to variance in the latent constructs, age and gender were controlled in each trait model.

Method

Participants

Data for this study were from the Sibling Interaction and Behavior Study (SIBS; McGue et al., 2007), a longitudinal study examining sibling and family influences on adolescent behavior. Participating families ($N = 617$) had at least one parent and two adolescent siblings with a maximum five-year age difference. The present study used data from the mothers (M age = 45.56, $SD = 4.23$), fathers (M age = 48.23, $SD = 4.42$), and the elder sibling (M age = 16.14, $SD = 1.5$). In 384 families, the elder sibling was adopted (International adoptions: $n = 252$, 66% Asian). In 232 families, the elder sibling was the biological offspring of the parents. All parents were predominantly middle class and Caucasian. One elder adoptee was removed from the sample due to a biological relation to the sibling, resulting in a final sample of 616 families.

Eligible families were required to have participating adopted children placed before two years of age ($M = 4.7$ months, $SD = 3.4$ months), no special needs children, and live within driving distance of the university. Families with adopted children were recruited from three adoption agencies. Families with biological children were recruited through state birth certificates. The study sample is generally representative of two-parent families with two or more children in the university's metropolitan region (McGue et al., 2007).

Procedures

Using procedures approved by the university IRB, all participating families completed informed consent, a battery of assessments, and two five-minute videotaped family interaction tasks during a half-day visit to the Minnesota Center for Twin and Family Research (MCTFR). Family members also completed mailed, pre-visit personality questionnaires prior to the in-person interview. Each family member separately completed self-report questionnaires in MCTFR interview offices after the recorded family interactions. For the videotaped family interactions, all family members were seated around a table in a room decorated to look like a living/dining room. Discussions were recorded by an inconspicuously placed video camera. Tasks were explained to the family by a trained interviewer, who left the room during videotaping. The first task consisted of a family attempt to reach consensus about a Rorschach inkblot; for the second task, the family attempted to resolve a moral dilemma.

Measures

Parent-adolescent dyadic trait fit was defined as parent-adolescent traits hypothesized to be adaptive and beneficial to adolescent functioning. Traits assessed included Negative Emotionality (a higher order scale) and its three lower order dimensions (Aggression, Alienation, and Stress Reactivity). Mothers, fathers, and adolescents each separately completed a pre-mailed Multidimensional Personality Questionnaire (MPQ; Tellegen & Waller, 2008) or a Personality Booklet – Youth Abbreviated (PBYA; Tellegen & Waller, 2008) questionnaire prior to their MCTFR visit. The MPQ is a factor-analytically developed measure of higher and lower order personality traits. The PBYA is a shortened version of the MPQ designed for adolescents under 16 years of age. All questionnaire items used a 4-point scale ($1 = \text{definitely false}$ to $4 = \text{definitely true}$) and were reverse coded as necessary so that high scores reflected high trait levels.

The higher order scale, *Negative Emotionality*, was created by summing three 18-item lower order MPQ or PBYA scales (Tellegen & Waller, 2008). The *Aggression* scale measures proclivities toward physical/cognitive aggression and includes items such as “When someone hurts me, I try to retaliate (get even),” and “When I get angry, I am often ready to hit someone.” *Alienation* measures feelings of estrangement/victimization and includes items like “People often try to take advantage of me” and “Some people oppose me for no good reason.” *Stress Reactivity* measures mood regulation/lability and includes items like “I often find myself worrying about something” and “When I want to, I can usually put fears and worries out of my mind.” Internal consistency of the Aggression ($\alpha = .77$ to $.88$), Alienation ($\alpha = .81$ to $.87$), and Stress Reactivity ($\alpha = .87$ to $.90$) scales has been tested across four college and community samples. (Tellegen & Waller, 2008). Internal consistency was also examined using the study sample: Aggression (mothers, $\alpha = .56$; fathers $\alpha = .76$, adolescents, $\alpha = .80$), Alienation (mothers, $\alpha = .80$; fathers $\alpha = .88$, adolescents, $\alpha = .80$), Stress Reactivity (mothers, $\alpha = .78$; fathers $\alpha = .84$, adolescents, $\alpha = .77$) and, Negative Emotionality (mothers, $\alpha = .86$; fathers, $\alpha = .92$, adolescents, $\alpha = .88$).

Using parent and elder sibling reports of Negative Emotionality, Aggression, Alienation, and Stress Reactivity, dyadic Mother-Adolescent and Father-Adolescent Trait variables

were created in three steps. In this process, the unit of measurement changed from individual to dyadic. First, for each scale, we identified individuals with low, medium, and high traits. Because MPQ and PBYA scales do not have standardized cut-offs for low or high scores, we used standard deviations to demarcate individual-level (parent-only and adolescent-only) low, medium, and high traits. Individuals whose trait score was more than one standard deviation below the scale's mean were assigned a *low* trait level. Those with a trait score within one standard deviation of the scale's mean were assigned a *medium* level. Individuals with trait scores one standard deviation above the scale's mean were assigned a *high* level.

Second, individual-level traits coded as low, medium, and high were combined in all possible combinations (e.g. parent high-adolescent high, parent medium-adolescent high, etc., see Table 1). This resulted in dyadic-level Negative Emotionality, Aggression, Alienation, and Stress Reactivity trait variables for each mother-adolescent and father-adolescent pair.

Finally, we coded the dyadic combinations shown in Table 1 to ensure that the final dyadic trait variable was consistent with empirical findings on the effects of reciprocal parent-adolescent interactions previously discussed in the introduction. Reciprocal research has shown that higher levels of a negative trait may reinforce another family member's negative behavior (e.g. Rueter & Conger, 1998). Therefore, the combined dyadic trait levels were coded from *1 = least adaptive dyadic fit* to *5 = most adaptive dyadic fit* such that dyads that included two "high" ratings or one high and one medium rating received a "one." Dyads received a "two" if they included a high rating and a low rating. Dyads with two medium ratings were coded "three." Those with one medium and one low rating were coded "four," and dyads received a code of "five" if they included two low ratings. The resulting mother-adolescent and father-adolescent trait variables were used as indicators of the parent-adolescent dyadic trait fit latent factor for each trait model. All recoded distributions produced skew and kurtosis statistics $\pm$ one, indicating normality (Kline, 2005; Aggression: skew, $-.42$ to $-.52$, kurtosis, $-.60$ to $-.87$; Alienation: skew, $-.40$ to $-.43$, kurtosis, $-.65$ to $-.85$; Stress Reactivity: skew, $-.32$, kurtosis, $-.85$ to $-.88$; Negative Emotionality: skew, $-.31$ to $-.38$, kurtosis, $-.87$ to $-.90$).

Adolescent conflict, defined as hostile, angry, and coercive adolescent behavior directed toward each parent, was assessed as a latent concept using observer ratings from the Sibling Interaction and Behavior Rating Scales, adapted from the Iowa Family Interaction Rating Scales (IFIRS; Melby et al., 2001). In addition to 100 hours of training, observers were required to pass observation and written examinations before independently coding, and attend biweekly coder meetings to prevent "rater drift." To assess inter-rater reliability, random secondary observers rated 25% of all interactions and secondary ratings were compared to the primary ratings using interclass correlations (ICC; Shrout & Fleiss, 1979).

Observers globally rated (*1 = not at all characteristic* to *9 = mainly characteristic*) adolescent *hostility* (hostile, angry, and critical behavior) toward the mother (ICC = .73) and father (ICC = .71) and adolescent *angry coercion* (attempts to control and/or change behavior or opinions marked by anger and contempt) toward the mother (ICC = .65) and the father (ICC = .67). These variables served as indicators of the adolescent conflict latent construct for each trait model (Aggression: *hostility*: to mother, $\lambda = .83$, to father, $\lambda = .77$; *angry coercion*: to mother, $\lambda = .73$, to father, $\lambda = .74$; Alienation: *hostility*: $\lambda = .81$; *angry coercion*: $\lambda = .71$; *hostility*: $\lambda = .78$; *angry coercion*: $\lambda = .76$; Stress Reactivity: *hostility*: $\lambda = .82$; *angry coercion*: $\lambda = .72$; *hostility*: $\lambda = .82$; *angry coercion*: $\lambda = .75$; Negative Emotionality: *hostility*: $\lambda = .81$; *angry coercion*: $\lambda = .71$; *hostility*: $\lambda = .79$; *angry coercion*: $\lambda = .76$).

Adolescent externalizing behavior was defined as antisocial, aggressive or delinquent behavior in multiple contexts including home, school, and community and assessed as a latent construct with three indicators. Adolescents used the Delinquent Behavior Inventory (DBI; Gibson, 1967), to report how often they engaged in 36 behaviors, including “using any kind of weapon in a fight,” “smashing, slashing, or damaging things,” “cutting classes at school,” “stealing things,” ($1 = \text{never}$, $2 = \text{once}$, and $3 = \text{more than once}$). Responses were summed to create the first adolescent externalizing indicator ($\alpha = .84$; Aggression: $\lambda = .68$; Alienation: $\lambda = .64$; Stress Reactivity: $\lambda = .64$; Negative Emotionality: $\lambda = .65$).

Symptom counts from the Diagnostic Interview for Children and Adolescents – Revised (DICA-R; Welner et al., 1987) formed the second adolescent externalizing indicator (Aggression: $\lambda = .67$; Alienation: $\lambda = .70$; Stress Reactivity: $\lambda = .71$; Negative Emotionality: $\lambda = .69$). Trained interviewers separately administered the DICA-R to both adolescents and mothers. Using a “best estimate” method, a symptom was considered present if one or the other reported it; if both reported it, the symptom was only counted once. All adolescent or mother-reported (ADHD, CD, and ODD) symptoms were summed. As per Iacono et al. (1999), this method yielded acceptable kappa reliabilities: ADHD (.77), ODD (.71), and CD (.81).

The third indicator of adolescent externalizing consisted of a 47-item adolescent externalizing in-class behavior checklist adapted from Conners' Teacher Rating Scale (Conners, 1969) and the Rutter Child Scale B (Rutter, 1967). Three teachers were nominated by each adolescent, contacted, and asked to complete the survey. The teacher response rate of 78% was not correlated with adolescent gender or adoption status. Items were rated on a 4-point scale ($1 = \text{not at all characteristic}$ to $4 = \text{very much characteristic}$) and included “is defiant,” “has difficulty concentrating on schoolwork,” “is often truant,” “initiates physical fights,” and “obeys the rules” (reverse coded). Each teacher's responses were summed (Range: 49 to 158.7, $\alpha = .97$, Spearman-Brown inter-teacher reliability = .82). The mean of each adolescent's teacher reports was used as the third indicator of the latent factor (Aggression: $\lambda = .65$; Alienation: $\lambda = .67$; Stress Reactivity: $\lambda = .67$; Negative Emotionality: $\lambda = .67$).

Analysis Plan

We proposed that parent-adolescent dyadic trait fit contributed to adolescent conflict and adolescent externalizing behavior beyond variance due to age and gender. We also proposed that this hypothesized process holds even after controlling for adoption status. Due to the complex associations proposed among multiple dependent variables and latent concepts, we used structural equation modeling (SEM) to test study hypotheses (see Figure 1.) Data were screened for normality, outliers, and multicollinearity prior to conducting analyses (Kline, 2005).

Testing our hypotheses consisted of three steps for each trait model (Aggression, Alienation, and Stress Reactivity, Negative Emotionality). In step one (not depicted in Figure 1), we tested a base model in which parent-adolescent dyadic trait fit, adolescent conflict, and adolescent externalizing were each regressed on our control variables, age and gender. This allowed us to determine the amount of variance in each latent construct due to age and gender. In step two, we tested the “a” paths (depicted in Figure 1) to determine the amount of variance explained by each construct beyond that explained by age and gender. In step three, we added adoption status (adopted = 1, non-adopted = 2) and tested the “b” paths depicted in Figure 1 to determine (a) the amount of variance explained by adoption status over previously added variables, and (b) if our hypothesized process held after accounting for adoption status. In all three steps, residuals for the Adolescent conflict latent variable indicators were correlated.

Models with a good fit included a statistically significant χ^2 (Bollen, 1989), comparative fit index (CFI) and Tucker-Lewis index (TLI) above .90, standardized root mean square residual (SRMR) less than .08, root mean square error of approximation (RMSEA) less than .06 (Hu & Bentler, 1999). Analyses were conducted using Mplus 5.2 (Muthén & Muthén, 1998–2009).

Missing Value Analysis

Sixty percent of the 616 study families had complete data on all study variables. Missing data was due to (a) missing teacher reports of externalizing behavior (31%) and, (b) fathers who either did not complete the MPQ (Tellegen & Waller, 2008; 12%) or did not participate in the observation tasks (23%). All other study variables had no more than 3% missing data.

Mplus estimates missing data by adjusting model parameter estimates using full-information maximum-likelihood estimation (FIML; Muthén & Shedden, 1999; Schafer & Graham, 2002). Reliable estimation requires that the proportion of available data for each study variable and between each pair of variables be at least .10. These proportions ranged from .53 to 1.00, with the vast majority above .85. Therefore, we used FIML to estimate missing data.

Results

Preliminary Analyses

Table 2 presents descriptive statistics for all study variables. We also tested for possible differences in the proportion of adoptive and non-adoptive families at each dyadic trait level for each mother-adolescent and father-adolescent dyad across all trait models using Fisher's exact tests. No statistically significant differences were found. In agreement with earlier descriptive research (Juffer & van IJzendoorn, 2005; Wierzbicki, 1993), regressing adolescent externalizing on adoption status revealed a statistically significant association ($\beta = -.19$, $t = -4.31$, $p < .01$).

Hypothesis Testing

All hypothesized associations depicted in Figure 1 were tested for each lower and higher order trait model in three steps and are presented accordingly. Overall, the patterns of model fit statistics, explained variance, statistically significant associations supported our general hypothesis that parent-adolescent dyadic trait fit contributes to adolescent conflict and explains more variance in adolescent externalizing behavior than adoption status alone. As shown in Table 1, all trait models had good model fit. For example, although the (step two) Aggression model produced a statistically significant chi square value ($\chi^2 = 54.49$, $df = 32$, $p < .01$), all other fit measures suggest an excellent fit (CFI = .99, TLI = .98, RMSEA = .03, SRMR = .03).

Step One Findings

At step one, we tested age and gender contributions to the R^2 for each latent construct for all trait models. Age produced similar associations with adolescent externalizing across all models. Gender's association with adolescent externalizing was also similar across all models. For example, in the Aggression model, age ($\beta = .25$, $t = 5.48$, $p < .01$) and gender ($\beta = -.43$, $t = -10.27$, $p < .01$) explained nearly a quarter of the variance in adolescent externalizing ($R^2 = .22$, $t = 5.72$, $p < .01$). In all models, age and gender were unrelated to adolescent conflict and, in all but one model they were unrelated to parent-adolescent dyadic trait fit. The exception was the Aggression model. In this model gender (but not age) was associated with parent-adolescent dyadic trait fit (gender: $\beta = .29$, $t = 6.29$, $p < .01$; $R^2 = .08$,

$t = 3.15, p < .01$). Because step one analyses across all models produced results similar to those reported here, step one findings are not reported in Table 3.

Step Two Findings

Step two findings are presented in Table 3. At this step, we tested all “a” paths depicted in Figure 1. As reported in Table 3, all trait models showed statistically significant increases in R^2 for adolescent externalizing. For example, Table 3 reports an explained variance of $R^2 = .50, t = 9.79, p < .01$ for adolescent externalizing in the step two Aggression model. Compared to the explained variance produced by the step one Aggression model ($R^2 = .22, t = 5.72, p < .01$), this is an increase in explained variance of 28 percent ($\Delta R^2 = .28$). This increase in explained variance was due to strong associations between adolescent externalizing and parent-adolescent dyadic trait fit ($\beta = -.45, t = -8.68, p < .01$) and adolescent conflict ($\beta = .24, t = 4.75, p < .01$). Table 3 also shows that only the step two Aggression model produced a statistically significant increase in explained variance for adolescent conflict ($\beta = -.23, t = -4.18, p < .01; \Delta R^2 = .05$). Not reported in Table 3 is the indirect effect of parent-adolescent dyadic trait fit on adolescent externalizing. This effect was only statistically significant in the Aggression model ($\beta = -.06, t = -3.37, p < .01$).

Step Three Findings

To examine the possibility that adoption status continues to explain variance in adolescent externalizing behavior beyond our proposed process, we added all “b” paths depicted in Figure 1. As shown in Table 3, the addition of adoption status did not increase the explained variance for adolescent externalizing or parent-adolescent dyadic trait fit in any model, but we did find that the regression of adolescent conflict on adoption status produced a 2% increase in R^2 for adolescent conflict in all trait models. Not reported in Table 3 is the indirect effect of adoption status on adolescent externalizing, which was statistically significant in all trait models (Aggression: $\beta = -.03, t = -2.38, p < .05$; Alienation: $\beta = -.04, t = -2.75, p < .01$; Stress Reactivity: $\beta = -.04, t = -2.71, p < .01$; Negative Emotionality: $\beta = -.04, t = -2.65, p < .01$). Step 3 results for the Aggression model are presented in Figure 2.

Discussion

Adoption researchers have suggested moving beyond describing the risk of externalizing behaviors for adopted adolescents to focusing on explaining processes that contribute to it (Palacios, 2009). This study took the next, necessary step to advance research in this field by testing an explanatory process whereby parent-adolescent traits, adolescent conflict, and adoption status contribute to adolescent externalizing behavior. Our findings support parent-adolescent traits and adoption status initiated family processes that are mediated by conflict and contribute to externalizing problems. Importantly, adoption status did not significantly explain variance in adolescent externalizing behavior beyond our proposed process.

This study's findings demonstrate that being adopted alone is unlikely to explain an adolescent's externalizing behavior. Although earlier descriptive research (Juffer & van IJzendoorn, 2005; Keyes et al. 2008) reports a direct association between adoption status and externalizing behavior that was not replicated here, this study's findings demonstrate that the direct association is at least partially explained by a more complex, mediated process; this process is supported by other research showing that family characteristics account for substantial variance in adopted adolescent externalizing behaviors (Grotevant, Rueter, Von Korff, & Gonzales, in press; Grotevant et al., 2006; Rueter & Koerner, 2008; Rueter, Koh, Grotevant, & Wrobel, 2011).

Our investigation examined both lower and higher order negative emotionality traits. We only found support for the lower order parent-adolescent aggression trait in our proposed process. Specifically, only aggression was associated with adolescent conflict and externalizing behaviors. No support was found for a conflict-mediated relationship between parent-adolescent traits and externalizing behaviors for the other three traits (alienation, stress reactivity, and negative emotionality).

Our dyadic measure of parent-adolescent traits may help with the interpretation of these findings. As previously defined, low levels of parent-adolescent negative emotionality traits were hypothesized to be adaptive and beneficial to adolescent functioning. We included both parent and adolescent dyadic negative emotionality traits in our tested family process. Our findings suggest that certain parent-adolescent aggressive trait combinations may be maladaptive (reflecting a poor dyadic trait fit) and negatively influence adolescent externalizing outcomes. Dyadic trait combinations are particularly relevant to adoptive families since parents and children are more likely to have dissimilar temperaments and more varied combinations of dyadic traits. Our findings go beyond previous research by suggesting that parent and child traits together contribute to a family process that seeks to explain externalizing behaviors.

A weakness of our findings is that we cannot claim support for dyadic effects; nor did we test for reciprocal effects. Additionally, causation could not be determined. Future longitudinal research with appropriate time intervals should test reciprocal effects. Future research should also test for the salience of dyadic traits over individual ones by demonstrating that the former are stronger predictors of adolescent behavior than either parent or child traits alone.

It is possible that our mediated family process could occur in a different order. Although we proposed a conceptual longitudinal process whereby parent-adolescent traits, adoption status, adolescent conflict, and adolescent externalizing were associated in complex patterns, we used cross-sectional data. Therefore, the direction of the effects could be other than what we proposed. For example, adolescent conflict and externalizing may be mediated by parent-adolescent traits. Yet earlier temperament traits develop into later personality (Rothbart, Ahadi, & Evans, 2000) and have been found to be relatively stable (Johnson et al., 2005) over time. Therefore, we argue that temperament exists before conflict and externalizing behaviors. Also, the mean age at adoption for the adolescents in our sample was 4.7 months ($SD = 3.4$ months). Therefore, adoption status was determined prior to any manifestation of these behaviors. Evidence that both temperament and adoption status come before adolescent conflict and externalizing behaviors provide strong support that our model is the more plausible explanation.

The strengths of our study warrant attention. A significant strength of the study is that we had a relatively large sample of both adoptive and non-adoptive families. Most adoption research tends to use relatively small samples that only include adoptive families, precluding them from making comparisons. Another strength of our study is that we used multiple data sources. Parent-adolescent traits were measured using parent and adolescent self-reports; adolescent conflict was measured using observational data; adolescent externalizing behavior was measured using teacher and parent reports, and diagnostic interviews. Use of observational data to measure adolescent conflict reduced method bias in its associations with parent-adolescent traits and adolescent externalizing behavior. Some method variance was reduced with the use of multiple reporters in our adolescent externalizing behavior measure. This method variance reduction increased our overall confidence in the findings.

Limitations and Future Directions

Limitations to this study's generalizability should be noted. First, this investigation used an adolescent sample. Consequently, it is unknown if this process operates in families with younger or older children. Additional research is needed to test this process with these populations. Second, generalizability is limited to adolescents placed for adoption prior to two years of age. Our proposed process may work differently for children adopted at an older age. Finally, 66% of the adolescents in the sample were from international adoptions (predominantly Korean); results are not generalizable to adoptees from other countries. Future research should include adoptive families with more varied regional, ethnic, racial, and placement backgrounds.

Implications for Future Research, Policy, and Practice

Results from this study highlight the importance of understanding how family processes (specifically, the role of adolescent conflict) contribute to adolescent externalizing behaviors. Contrary to previous research, we found that adoption status did not add to the explanation of adolescent externalizing behaviors beyond our proposed process. Conflict-mediated relationships between (a) parent-adolescent aggressive traits and externalizing behaviors, and (b) adoption status and externalizing behaviors suggest that conflict may serve a specific function in families. Although researchers agree that high levels of parent-child conflict (defined as frequent, high intensity conflict) are not beneficial to adolescent externalizing outcomes (Dekovi, 1999; Smetana, 1989), the quality of conflictual interactions potentially influences outcomes more than frequency or intensity alone (Eisenberg et al., 2008). In the context of positive parent-adolescent relationships, growth may occur through conflict-mediated processes. For example, recent research suggests that conflict may play a role in identity development (Lichtwarck-Aschoff, van Geert, Bosma, & Kunnen, 2008). Given the potential for growth from conflict, clinicians should consider the quality of parent-child relationships in determining intervention points for handling parent-child conflict. A better understanding of family processes that contribute to adolescent externalizing outcomes will help with the development of evidence-based clinical interventions aimed at reducing problem behavior and promoting healthy adolescent adjustment.

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Figure 1.

Proposed Conceptual Process Model.

Note. Path conceptualized but not pictured: adoption status to adolescent externalizing behaviors; a = paths entered at Step 2; b = paths entered at Step 3.

Figure 2.

Final Step 3 Aggression Model Results.

Note. N = 616. Associations specified but not pictured: age and (a) parent-adolescent dyadic trait ($\beta = .28, t = 6.27, p < .01$), (b) adolescent conflict ($\beta = .11, t = 2.18, p < .05$) and, (c) adolescent externalizing behaviors ($\beta = .22, t = 5.10, p < .01$); gender and (a) parent-adolescent dyadic trait ($\beta = .28, t = 6.27, p < .01$), (b) adolescent conflict ($\beta = .11, t = 2.18, p < .05$) and, (c) adolescent externalizing behaviors ($\beta = .22, t = 5.10, p < .01$); adoption status to adolescent externalizing behaviors ($\beta = -.09, t = -2.09, p < .05$); ACEM = adolescent to mother *angry coercion*; ACEF = adolescent to father *angry coercion*; HSEM = adolescent to mother *hostility*; HSEF = Adolescent to father *hostility*; to determine direction of effects, adoption status (1 = adopted, 2 = non-adopted); gender (1 = male, 2 = female). * $p < .05$; ** $p < .01$.

Table 1

Empirically Supported Combined Levels of Parent-Adolescent Dyadic Traits

Individual Trait Ratings		Dyadic Trait Variable
Parent	Adolescent	Parent-adolescent
High	High	1
High	Medium	1
Medium	High	1
High	Low	2
Low	High	2
Medium	Medium	3
Medium	Low	4
Low	Medium	4
Low	Low	5

Table 2

Intercorrelations, Means, and Standard Deviations for all Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	M	SD
Mother-adolescent trait																			
1. Aggression	–	.37	.36	.56	.54	.21	.14	.30	.08	.08	.07	.09	–.30	–.32	–.32	–.02	.19	2.79	1.10
2. Alienation	.34	–	.45	.68	.25	.60	.27	.44	–.06	–.05	–.04	–.06	–.25	–.32	–.32	–.06	.06	2.74	1.16
3. Stress Reactivity	.24	.35	–	.61	.21	.31	.47	.38	–.05	–.05	–.01	–.04	–.14	–.14	–.17	–.03	.00	2.78	1.12
4. Negative Emotionality	.57	.65	.61	–	.38	.43	.33	.54	.01	.03	.07	.09	–.32	–.34	–.36	–.05	.11	2.84	1.08
Father-adolescent trait																			
5. Aggression	.62	.13	.14	.29	–	.28	.26	.52	.01	.04	.08	.06	–.24	–.27	–.35	.02	.25	2.88	1.11
6. Alienation	.29	.64	.31	.47	.29	–	.44	.66	–.15	–.15	–.02	–.08	–.19	–.26	–.20	–.09	.01	2.84	1.04
7. Stress Reactivity	.19	.23	.61	.40	.21	.37	–	.64	–.09	–.14	.02	–.03	–.11	–.07	–.14	–.07	–.09	2.76	1.18
8. Negative Emotionality	.40	.38	.43	.61	.52	.60	.59	–	–.07	–.10	.04	.03	–.23	–.21	–.25	–.09	.02	2.77	1.21
Adolescent conflict																			
Adolescent to mother																			
9. Angry coercion	–.24	–.07	–.01	–.13	–.25	–.01	–.02	–.08	–	.82	.50	.46	.05	.10	.16	.16	–.01	1.54	.97
10. Hostility	–.28	–.05	–.02	–.13	–.27	–.03	–.01	–.08	.86	–	.52	.66	.05	.05	.13	.11	.02	1.91	1.31
Adolescent to father																			
11. Angry coercion	–.21	–.02	–.04	–.06	–.24	–.01	–.03	–.08	.55	.56	–	.83	.02	.10	.15	.19	.03	1.38	.85
12. Hostility	–.19	–.02	.02	–.02	–.24	–.01	–.01	–.05	.52	.62	.85	–	.02	.04	.07	.10	.10	1.69	1.14
Adolescent externalizing																			
13. Symptoms	–.26	–.16	–.08	–.17	–.24	–.14	–.07	–.17	.20	.27	.21	.25	–	.44	.55	.24	–.18	3.69	4.74
14. Teachers	–.29	–.20	–.16	–.22	–.27	–.15	–.08	–.20	.16	.20	.14	.17	.54	–	.54	.21	–.24	61.92	13.76
15. Self-report	–.33	–.12	–.05	–.20	–.35	–.13	–.05	–.15	.32	.37	.26	.28	.42	.29	–	.26	–.27	43.41	9.13
Control variables																			
16. Age	–.02	–.09	–.07	–.05	–.04	–.06	–.06	–.03	.03	.02	.12	.11	.04	.03	.15	–	.09	16.38	1.48
17. Gender	.19	.05	–.10	.03	.23	.10	–.10	.04	–.09	–.11	–.11	–.14	–.27	–.32	–.28	.17	–	1.53	.50
M	2.68	2.64	2.63	2.62	2.75	2.64	2.66	2.67	1.77	2.24	1.61	2.04	5.88	66.25	43.18	16.00	1.50		
SD	1.12	1.13	1.13	1.15	1.07	1.12	1.12	1.12	1.29	1.57	.97	1.40	6.13	17.96	7.42	1.49	.50		

Note. Intercorrelations for non-adopted adolescent participants (n = 232) are presented above the diagonal, and intercorrelations for adopted adolescent participants (n = 384) are presented below the diagonal. Means and standard deviations for non-adopted adolescents are presented in the vertical columns, and means and standard deviations for the adopted adolescents are presented in the horizontal rows.

Table 3

Model Fit Statistics, R^2 and Standardized Coefficients for All Trait Models

Model Fit Statistics										Explained Variance			Coefficient	
										Adolescent conflict		Externalizing		
Model	χ^2	CFI	TLI	RMSEA	SRMR	R^2	ΔR^2	R^2	ΔR^2	R^2	ΔR^2	β		
Aggression														
Step 2	54.49**	.99	.98	.03	.03	.07**	.05**	.50**	.28**			-.23**		
Adolescent conflict on Aggression														
Externalizing on Aggression														
Externalizing on adolescent conflict														
Step 3	76.82**	.98	.97	.04	.03	.09**	.02**	.50**	--			-.45**		
Adoption status on Aggression														
Adoption status on adolescent conflict														
Adoption status on externalizing														
Alienation														
Step 2	48.57*	.99	.99	.03	.03	.02	--	.40**	.19**			-.13**		
Adolescent conflict on Alienation														
Externalizing on Alienation														
Externalizing on adolescent conflict														
Step 3	71.05**	.99	.98	.04	.03	.04*	.02*	.40**	--			.31**		
Adoption status on Alienation														
Adoption status on adolescent conflict														
Adoption status on externalizing														
Stress Reactivity														
Step 2	48.85*	.99	.99	.03	.03	.02	--	.36**	.15**			-.06		
Adolescent conflict on Stress Reactivity														
Externalizing on Stress Reactivity														
Externalizing on adolescent conflict														

Model Fit Statistics										Explained Variance		Coefficient		
										Adolescent conflict		Externalizing		
Model	χ^2	CFI	TLI	RMSEA	SRMR	R^2	ΔR^2	R^2	ΔR^2	R^2	ΔR^2	β		
Step 3	69.22**	.99	.98	.04	.03	.04	.02*	.36	--			.09		
Adoption status on Stress Reactivity														
Adoption status on adolescent conflict												-.15**		
Adoption status on Externalizing												-.11*		
Negative Emotionality														
Step 2	50.03*	.99	.99	.03	.03	.02	--	.45**	.23**					
Adolescent conflict on Negative Emotionality												-.09		
Externalizing on Negative Emotionality												-.36**		
Externalizing on adolescent conflict												.30**		
Step 3	72.46**	.99	.98	.04	.03	.04*	.02*	.45**	--					
Adoption status on Negative Emotionality												.11*		
Adoption status on adolescent conflict												-.14**		
Adoption status on externalizing												-.08		

Note. N = 616. CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual. All step 2 ($df = 32$) and 3 ($df = 32$) models had same df 's per step. Standardized coefficients for direct (not indirect) relationships only are reported.

* $p < .05$

** $p < .01$.