

Individual Differences in Adolescents' Emotional Reactivity across Relationship Contexts

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Abstract Understanding individual differences in adolescents' ability to regulate emotions within interpersonal relationships is paramount for healthy development. Thus, the effect of individual vulnerabilities (depressive affect, social anxiety, self-blame, and coping efficacy problems) on the transmission of emotional reactivity in response to conflict from family to peers (friends and romantic partners) was prospectively examined across six waves of data in a community-based sample of 416 adolescents (M_{age} Wave 1 = 11.90, 51% girls). Multiple-group models estimated in structural equation modeling suggested that youth who were higher in social anxiety or coping efficacy problems were more likely to transmit emotional reactivity developed in the family-of-origin to emotional reactivity in response to conflict in close friendships. Additionally, those youth higher in self-blame and depressive affect were more likely to transmit emotional reactivity from friendships to romantic relationships.

Keywords Adolescence · Emotional reactivity · Family · Individual vulnerabilities · Peer relationships

Introduction

An important component of adolescents' development is the ability to regulate emotions in interpersonal relationships, particularly when one is experiencing conflict in those relationships. One indicator of adolescents' ability to regulate emotions in response to conflict is emotional reactivity. Emotional reactivity is defined as arousal and dysregulation of adolescents' emotions and an inability to calm oneself when upset or aroused by an interpersonal stressor (Buehler and Welsh 2009). Extant research demonstrates that the ability to manage emotion is needed to sustain healthy relationships with peers during childhood (Blair et al. 2014). During adolescence, as friendships and romantic relationships become more salient and complex (Furman and Rose 2015), emotional reactivity may be an even greater liability for relationships. Additionally, emotional reactivity has long-term effects on behavioral and physical health (e.g., internalizing problems, Buehler et al. 2007; e.g., physiological stress reactivity, Davies et al. 2009; e.g., dating violence, Kinsfogel and Grych 2004), and thus it is important to understand the development of emotional reactivity during adolescence.

Recent research has suggested that adolescents' responses to relationship conflict may be learned in families and later transmitted to important contexts outside families, such as friendships and romantic relationships (Fosco et al. 2015). The literature, however, is limited in the understanding of individual differences that place some youth at risk for the transmission of negative emotions from family-of-origin to peer relationships outside of the family (Saxbe et al. 2012). Greater understanding of individual vulnerabilities in how children respond to conflict across different relationships is an important goal for researchers as such response affects long-term development (Grych and

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Cardoza-Fernandes 2001). Thus, given extant research suggesting individual vulnerabilities such as self-blame (Simon and Furman 2010), coping resources, depressive affect, and social skills deficits may increase the transmission of emotional reactivity from one context to the next (Larson and Almeida 1999), the current study examined these factors as moderators of the transmission of emotional reactivity from family-of-origin experiences to friendships and romantic relationships.

Transmission of Emotional Reactivity

Emotional security theory (EST; Cummings and Davies 2010) addresses the question of long-term effects of interparental conflict with the supposition that children and adolescents are motivated by a need to maintain their emotional security. This process is driven by the youth's cognitive appraisals of the conflict, which then leads to emotional responses. When youth appraise their parents' conflicts as destructive, they are particularly likely to respond with greater emotional reactivity, which challenges their sense of emotional security. Similarly, Grych and Fincham's cognitive contextual approach (1990) suggests that the ways individuals evaluate events shapes their emotional response to the event, which can in turn shape further cognitive evaluation of the event. According to this theory, it is the combination of cognitive evaluations and emotional responses that shapes youth's behavior in response to those events. Thus, it may be that adolescents who interpret interparental conflict as destructive are likely to interpret conflict with friends and romantic partners as similarly destructive and respond with similar emotional reactivity, thus transmitting this potentially harmful cognitive/emotional process across relationships (Cook et al. 2013).

Extant research suggests that the family context affects the development of relationship competencies in friendships (Kretschmer et al. 2015), and in turn, how adolescents think and behave in friendships are associated with romantic relationships (Collins et al. 2009). Most recently, researchers tested a model that examined the transmission of emotional reactivity across different relationship contexts and found that emotional reactivity developed in the family-of-origin in response to interparental conflict was associated with adolescents' emotional reactivity when faced with conflict in their friendships and romantic relationships (Cook et al. 2013). Additionally these authors found that emotional reactivity in close friendships partially explained the transmission of emotional reactivity from family to romantic relationships, suggesting that friendships are a key context where adolescents further refine relationship skills. Although this most recent research is helpful to understand how emotions may be transmitted across important

relationship contexts, it does not provide information regarding which youth might be at the greatest risk for the transmission of emotional reactivity.

Individual Differences in the Transmission of Emotional Reactivity

The current study examined individual vulnerabilities that affect the transmission of emotional reactivity from family to friendships to romantic relationships. Cognitive and emotional appraisals of interparental conflict, theoretically proposed to be critical to youth outcomes such as emotional reactivity (Cummings and Davies 2010; Grych and Fincham 1990), are likely shaped by individual differences in cognitive, psychological, and social characteristics. Past research has generally conceptualized individual differences as predictors or mediators of the transmission of emotional reactivity across relationship contexts (Grych and Fincham 1993). Stress and coping theory (Lazarus and Folkman 1984), however, suggests that the psychological resources that one has to cope with stress may impact adolescents' reactions to interpersonal stress (i.e., conflict) and the transmission of that stress. Compas and colleagues (2001) have applied these ideas to adolescence in their discussion of competence, which reflects the resources that adolescents need to cope with stressors in their environment. In the current study, we focus on limited resources or limited competence as a vulnerability that reflects a person's lack of psychological resources needed to deal with the demands in the environment. Although a plethora of past research has examined how vulnerabilities might explain individual differences in emotional reactivity to stressors in the environment such as interpersonal relationships (e.g., Compas et al. 2001), past research has generally not demonstrated that individuals with fewer personal resources are more vulnerable to emotional reactivity *transmission*.

Theoretically, many personal and social capacities may act as personal resources when managing stressful interpersonal events. Depletion of such resources impairs an individuals' ability to cope with stress across contexts and may contribute to the transmission of emotionally reactive states across those contexts. Stress and coping theory identifies two factors that affect individuals' personal resources to respond to stressful interpersonal events—cognitive appraisals and coping. Depressive affect and social anxiety can be thought of as properties of a person that generally impair individuals' cognitive appraisals of interpersonal stress and ability to cope with that stress across different contexts. Indeed, past research on depression has focused a great deal of attention on individuals with depression being likely to use ineffective cognitive strategies to deal with emotions, with research during the period of adolescence suggesting that adolescents who

scored higher on depression were more likely to use maladaptive strategies to regulate emotions in response to stress such as ruminations and catastrophizing (Garnefski and Kraaij 2006). Additionally, research suggests that individuals who report more depressive affect may have better long-term memory for negative material and differ in their degree to which they can repair and recover from negative emotions to stress and tend to generalize these emotions across contexts (Beck 2002; Joormann and Gotlib 2010). Less research has focused on social anxiety but models of social anxiety propose that emotional reactivity and dysregulation are important features of this disorder (Hermann et al. 2004), and that individuals who score higher on social anxiety may be more prone to ruminations regarding social relationships (Turk et al. 2005) and have more problems coping with and regulating emotions (Eisenberg et al. 2000). Taken together, this research suggests that both depression and social anxiety involve impaired cognitions and limited coping resources, which stress and coping theory suggest may impact the transmission of emotional reactivity across contexts.

In the current study, self-blame and coping efficacy problems are process-oriented factors that reflect adolescents' response to interpersonal conflict witnessed in their parents' marital relationship. Process-oriented factors are thought to be cognitive and coping responses that are specific to a certain stressful encounter. In the current study, we assess self-blame and coping efficacy as responses to a specific type of stressful encounter, that of interparental conflict. Specifically, self-blame involves a maladaptive cognitive attribution that adolescents are to blame for their parents' conflict and coping efficacy problems represent the belief that you lack the coping resources to manage the conflict. Countless research studies have examined the basic premise set forth by cognitive-contextual theory that children's appraisals of marital conflict (e.g., self-blame and coping efficacy) affect the impact of that conflict on development (e.g., Buehler et al. 2007). These appraisals may impact adolescents' response to conflict, which theoretically could generalize to other contexts when faced with conflict. Specifically, children who witness conflict within the family may be more reactive to later instances of conflict and this may be particularly true for adolescents who interpret that conflict in maladaptive ways (Grych and Cardoza-Fernandes 2001). These appraisals have often been conceptualized as mediators but a handful of studies have examined self-blame as a moderator of the effect of interparental conflict on adolescents' adjustment (Simon and Furman 2010). Furthermore, the premise that individuals' reactions to and transmission of emotions associated with conflict are affected by the meaning individuals' attribute to conflict (self-blame) and their perceived resources to handle that conflict (e.g., coping) is consistent with stress and

coping theory and the conceptualization of self-blame and coping problems as moderators.

Although the above studies suggest reason to believe that individual-difference variables will moderate the transmission of emotional reactivity across contexts, research has yet to examine whether vulnerabilities such as depressive affect, social anxiety, coping efficacy problems, and self-blame may shape the transmission of emotional reactivity from within the family-of-origin to friendships and romantic relationships. Simon and Furman's (2010) study during late adolescence is an exception with their findings indicating that the transmission of destructive conflict styles from family to romantic relationships was only present for adolescents high in self-blame. Additionally, studies from the attachment perspective have found that attachment styles between youth and their parents have moderated the transmission of family conflict and emotional processes to youth's later conflict styles in other relationships, (Hare et al. 2009), as well as the transmission of aggression from family to romantic relationships (Grych and Kinsfogel 2010). It is important to note, however, that studies focusing on attachment differ from the focus in the current study in two notable ways. First, those studies have not examined the transmission of emotions in response to interparental conflict to friendships and to romantic relationships. Secondly, although attachment shares some conceptual overlap with constructs in the current study, it is a distinct construct that may have different effects on transmission than our hypothesized variables. Thus, to our knowledge, no studies have examined the moderating effects of individual youth characteristics on the transmission of emotional processes from within the family to friendships and romantic relationships. Given that there is plentiful justification for anticipating that individual vulnerabilities may be critical to our understanding of emotional reactivity transmission, this study aims to bridge this gap.

Current Study

Research to date has generally neglected to examine how individual vulnerabilities during adolescence impact the transmission of emotions from family to friendships and romantic relationships. This is surprising given the importance of adolescent friendships and romantic relationships and the growing body of research focused on understanding the transmission of cognitions, emotions, and behaviors from family to romantic relationships. Given theory and past research that limited psychological and cognitive resources might impact individuals' reactions to and transmission of interpersonal stress, we chose to examine four specific vulnerabilities that may be particularly important to interpretation and transmission. Specifically, given the

research that suggests that depression and social anxiety involve impaired cognitions and limited coping resources, as well as the knowledge that during adolescence depressive affect increases (US Department of HHS 2013) and social anxieties increase and take on more salience (Erath et al. 2007), we chose to examine these specific individual vulnerabilities as moderators of the transmission of emotions. Furthermore, one of the most influential theories that has been used to understand how interparental conflict affects later relationships is the cognitive-contextual theory (Grych and Fincham 1990), and thus we chose to examine two variables, self-blame and coping efficacy problems, that this theory suggests may affect the transmission of behaviors, cognitions, and emotions from the family. In the current study, we hypothesize that individual vulnerabilities impact adolescents' transmission of emotional reactivity developed in response to interparental conflict within the family to close friendships and romantic relationships such that adolescents who report being higher in any of four vulnerabilities—depressive affect, social anxiety, coping problems, and self-blame—are more likely to transmit emotional reactivity from family-of-origin to close friendships to romantic relationships than are adolescents with lower potential vulnerabilities.

Given that self-blame and coping were assessed in response to interparental conflict, we further expected that self-blame and coping efficacy problems would have a stronger impact on the transmission of emotional reactivity from family-of-origin to peer relationships and less of an impact on the transmission of reactivity from friendships to romantic relationships. Furthermore, given that depressive affect and social anxiety were not assessed in regards to a specific interpersonal interaction but were considered to be more properties of the individual, we expected these vulnerabilities to impact transmission equally across the relationships.

Methods

Sample

This study utilized data from a longitudinal project that examined family processes during the transition from childhood into adolescence. Sixth grade students in 13 middle schools from a southeastern county were recruited during the first wave of data collection to complete during school a questionnaire on family life. A subsample of 1131 eligible families (two-parent households, no step-children) was identified as potential participants for a home interview and multiple assessments over time, and 416 of these families agreed to participate (37% response rate; similar to previous studies e.g., National Survey of Families and

Households—34%). Those 416 families comprise the participants who were followed over the course of 6 years and provide data for the current article.

At the beginning of the study (W1), adolescents were in 6th grade and roughly 12 years of age ($M = 11.90$, $SD = 0.42$). Participants were primarily European American (91%) and 51% were girls. The median level of education for parents was an associate's degree and was similar to European American adults in the county (county mean category was some college, no degree; U.S. Census, 2000, Table P148A of SF4). The median level of household income for participating families was slightly less than \$70,000, which is somewhat higher than the median 1999 income for married European Americans in the county (\$59,548, U.S. Census, 2000, Table PCT40 of SF3; \$64,689 inflation-adjusted dollars through 2001). Adolescents and families were followed for three subsequent years (W2, W3, W4) and data was collected in families' homes. This data collection involved self-report assessments from youth, mom, and dad, and observations during family interaction tasks taken by trained research assistants.

During middle adolescence, youth who participated in W1 of the project were invited to participate in a telephone interview focused on adolescents' relationships with friends and romantic partners if they had begun dating. These W5 telephone interviews took place about 1 year following the families' W4 home assessment. Adolescents were again interviewed over the telephone about their relationships with friends and romantic partners one year later (W6). Three-hundred and eight youth participated in the W5 telephone interviews (74% retention rate of W1 families) and 261 participated at W6 (63% retention rate). Most adolescents were in 11th grade at W6 ($M = 17.08$, $SD = 0.64$). On average, participants reported that they had been friends with their closest friend for almost 6 years ($SD = 3.74$ years). On average, youth reported that they had been dating their romantic partner for 9 ½ months ($SD = 9.49$ months) but only 133 youth reported that they were currently in a romantic relationship. A series of univariate analyses of variance (ANOVA) were conducted to examine differences between youth who participated in W5 and W6 and those who participated in W1. Participating youth did not differ significantly from nonparticipating youth who were part of the study at W1 on the variables examined in the current study.

Procedures

During the first four years of data collection, questionnaires were mailed home to youth, mothers, and fathers. Another brief questionnaire containing particularly sensitive information was completed during a home visit (e.g., marital aggression). The home visit also involved several

videotaped family interaction tasks based on those developed for the Iowa Youth and Family Project; two were used in the current study. One semi-structured interaction session was a problem-solving task that included mothers, fathers, and adolescents and focused on issues of contention identified by family members on the Issues Checklist (Conger et al. 1992). The second task included the mother and father and focused on the marital relationship and coparenting. Data were coded using the Iowa Family Interaction Rating Scales (IFIRS; Melby and Conger 2001). To assess reliability, 20% of tasks were coded by an independent rater (i.e., 83 families). In-home data collection with families was conducted again a year later (W2), two years later (W3), and three years later (W4). Families were compensated for their participation. During W5 and W6, telephone interviews (20 min) were completed with youth. Parents were not involved in W5 or W6. For purposes of the friendship portion of the interview protocol, adolescents were asked to select a same-sex closest friend to think about when responding to statements. If adolescents were currently in a romantic relationship, they also were asked to respond to a series of similar statements regarding their current romantic partner. Youth were paid for participation.

Measurement

Interparental conflict

Interparental conflict was a latent construct representing interparental conflict across the first four waves of the study. We chose to create a latent construct that represented the first four waves of adolescence to get a more stable estimate of interparental conflict that was occurring in the home during the earlier part of adolescence. This latent construct included manifest indicators of both mothers' and fathers' self-reports of hostility and observed hostility from W1–W4 of the study. Mothers' and fathers' separately completed an 18-item questionnaire measure of overt interparental conflict (i.e., verbal and aggressive tactics) toward their spouse (Buehler et al. 1998; Kerig 1996). Sample items included "I tell my spouse to shut up," and "I slap my spouse." The response format ranged from 1 (*never*) to 5 (*always*). Items were averaged across all the waves and within respondent in SPSS and higher scores indicated more hostility in the relationship. Cronbach's alpha for mothers' hostility across all four waves was 0.94 and fathers' report was 0.95 across averaged waves. Two observational rating scales also were used as manifest indicators of interparental conflict from the IFIRS: hostility (HS) and antisocial behavior (AN). Observers rated mom's behavior toward dad and dad's behavior toward mom during the two interaction tasks. Observers' ratings across all four waves were averaged to create a manifest variable used in the analyses.

Cronbach's alpha for that variable was high ($\alpha = 0.93$). More details on this measure have been presented in a previous article (Cook et al. 2013).

Adolescents' emotional reactivity in response to interparental conflict

To assess emotional reactivity in response to interparental conflict youth reports on nine items from the *Emotional Reactivity Subscale* of the Security in the Interparental Subsystem scale were assessed at W1–W4 (SIS; Davies et al. 2002). Items have a 4-point response format and higher scores indicated greater emotional reactivity (e.g., W1 $\alpha = 0.86$; W2 $\alpha = 0.87$; W3 $\alpha = 0.89$; W4 $\alpha = 0.86$). Sample items included "when my parents argue I feel upset," and "when my parents argue I can't calm myself down." A latent construct was formed with W2–W4 of emotional reactivity to interparental conflict.

Emotional reactivity in friendships and romantic relationships

Nine items from the *Emotional Reactivity Subscale* from the Insecurity in the Interparental Subsystem Scale (SIS; Davies et al. 2002; YR; W5) were adapted to assess adolescents' emotional responses to conflict in friendships. Adolescents were asked to evaluate how true certain statements were when they had an argument with their best/closest friend. To assess adolescents' emotional responses to conflict in romantic relationships, the same nine items from the *Emotional Reactivity Subscale* (SIS; Davies et al. 2002; YR; W6) were used but adolescents were asked to evaluate how true certain statements were in reference to an argument with their current romantic partner. Statements included "I feel sad," and "I can't stop thinking about the problem." Response options ranged from 1 (*not at all true of me*) to 4 (*very true of me*) with higher scores indicating more difficulty regulating emotional and behavioral responses when faced with conflict with friends or romantic partners. Cronbach's alpha for friendship reactivity was 0.85 and for romantic relationship reactivity was 0.82.

Moderating vulnerabilities

Several variables were examined to assess stable indicators of psychological resources available to manage emotional responses to conflict: (a) adolescents' depressive affect, (b) social anxiety, (c) coping efficacy problems re parent's conflict, and (d) self-blame re parent's conflict. To obtain a more stable estimate of psychological resources, adolescents' self-report on each scale were averaged across four years (W1–W4).

Depressive affect Adolescents were asked to self-report on the severity of their symptoms related to depression and/or dysthymic disorder using the Children's Depression Inventory-Shortened version (Kovacs 1992). Sample items include "feel like crying" and "things bother me." This measure has 10-items and asks adolescents to report on symptoms that are associated with depression such as sadness and feelings of worthlessness on a 3-point scale. Scores were averaged across W1–W4 ($r_s = 0.30\text{--}0.49$) and reliability was adequate across waves ($\alpha = 0.80\text{--}0.84$).

Social anxiety A portion of the Social Anxiety Scale for Children (La Greca and Stone 1993) was used to measure adolescent's subjective experience of social anxiety using 7 items such as "I'm afraid that other kids will not like me" and "I get nervous when I talk to new kids." Participants responded on a 1 (*not at all*) to 5 (*all the time*) scale with higher scores indicating increased social anxiety ($\alpha = 0.82\text{--}0.88$). Scores were averaged across W1–W4 ($r_s = 0.44\text{--}0.68$).

Coping efficacy problems Coping efficacy problems was measured with six items from the coping efficacy subscale from the Children's Perception of Interparental Conflict Scale (CPIC; Grych et al. 1992). Adolescents responded to items such as "When my parents argue there's nothing I can do to stop them," on a 3-point scale that included responses for 1 (*False*), 2 (*Sort of True*) and 3 (*True*). Scores were averaged across W1–W4 ($r_s = 0.35\text{--}0.64$) and reliability was adequate across waves ($\alpha = 0.69\text{--}0.74$), with higher scores indicating coping efficacy problems.

Self-blame To measure self-blame youth reported on the 5-item self-blame subscale of the Children's Perception of Interparental Conflict questionnaire (Grych et al. 1992). Adolescents responded on a 3-point scale that included 1 (*False*), 2 (*Sort of True*) and 3 (*True*) to such items as "I'm not to blame when my parents have arguments (Reverse coded)" and "It's usually my fault when my parents argue." Scores were averaged across W1–W4 ($r_s = 0.25\text{--}0.56$) and reliability was adequate across waves ($\alpha = 0.79\text{--}0.85$), with higher scores indicating higher self-blame.

Friendship and romantic relationship conflict

Adolescents were asked to respond to six items on *The Conflict and Antagonism Subscales* from the Network of Relationships Inventory (NRI; Furman and Buhrmester 1985) to measure frequency of conflict in adolescents' same-sex closest friendship. Participants responded on a scale from 1 (*little or none*) to 5 (*the most*) to questions such as "How much do you and your friend disagree or quarrel." The same six-items were used to assess frequency of

conflict in adolescents' romantic relationships but instead had boyfriend/girlfriend as the referent. Higher scores indicated more frequent conflict between friends ($\alpha = 0.78$) and between romantic partners ($\alpha = 0.82$). These two variables were included as control variables.

Other control variables

Wave 1 emotional reactivity to interparental conflict was used as a control variable to aid in controlling for youth's trait-like negative emotions. Adolescents' gender (girls = 0 and boys = 1) was also used as a control variable in all models given past research with this sample suggesting gender differences in key study variables (Cook et al. 2013). Finally, in all moderating models we controlled for a standardized composite variable of the other moderators (e.g., when estimating the depressive affect moderating model we controlled for a composite variable of social anxiety, self-blame, and coping efficacy problems) so that the distinct influence of a particular moderator on the transmission of emotional reactivity is estimated.

Analytic Strategy

The AMOS 24.0 structural equation modeling program (SEM) was used for data analysis. For purposes of data analyses we omitted 50 youth who had not started dating by W6 resulting in a final sample of 366. These youth were omitted due to concerns that findings may not apply to youth who had not yet begun dating. The full information maximum likelihood estimation procedure (FIML) was used to address missing values due to attrition because FIML produces less biased estimates than does listwise case deletion or mean substitution (Acocck 2005).

In a previous publication, we assessed the transmission of emotional reactivity across contexts and thus these analytic procedures will not be discussed further here (Cook et al. 2013). The main purpose of this study was to test the moderating effects of psychological vulnerabilities on emotional reactions to conflict and transmission of emotional reactivity across relationship contexts. To test for moderating effects, four multiple-group SEM models were estimated (one for each moderator variable). In each case, we used a dichotomous moderator and estimated a multiple-group model, as opposed to estimating a continuous interaction, because it is very difficult to detect moderated mediated effects with continuous variables in field research and we wanted to maximize power to detect potential group differences (McClelland and Judd 1993; O'Connor 2006). Furthermore, we were interested in assessing if psychological vulnerabilities moderated the transmission of emotions, which is best estimated with a multiple-group model approach as opposed to estimating separate interaction

effects. To create the dichotomous moderators a top 33% split procedure was used to form two groups such that those falling in the top 33% of the sample on a given vulnerability were classified as high in that psychological vulnerability and the rest of the sample (bottom 67%) were classified in a group who scored lower on a given psychological vulnerability (Henseler and Fassott 2010). To test for differences across groups, two models were compared, one in which all parameters were constrained to be equal and the other in which the structural loadings were allowed to vary across the two groups (e.g., top 3rd on depressive affect and bottom 2/3rds on depressive affect). The change in the chi-square was examined for statistical significance at the $p < 0.05$ level. A significant change in chi-square between the models suggests that group differences in the freed structural pathways exist, and critical ratios above 1.96 were examined to locate specific, significant group differences (Byrne 2001).

Results

Preliminary Results

Correlations, means, and standard deviations of study constructs are presented in Table 1. Relationships were generally in the expected direction and indicated small to moderate correlations between key study variables. Basic correlations suggested that gender was associated with close friend emotional reactivity ($r = -0.27$, $p < 0.05$) and romantic relationship reactivity ($r = -0.24$, $p < 0.05$) such that girls were more likely to evidence reactivity in relationships and thus the effect of gender was controlled in all subsequent models. We also controlled for the effect on close friend conflict on close friend ER ($r = 0.28$, $p < 0.05$) and romantic relationship conflict on romantic relationship ER ($r = 0.31$, $p < 0.05$) across all structural equation models.

Emotional Reactivity across Interpersonal Contexts

Consistent with reports in a previous study that used a similar measure of emotional reactivity (Cook et al. 2013), results from the mediating model indicated that emotional reactivity developed in response to interparental conflict ($\beta = 0.26$, $p < 0.01$) was significantly associated with romantic relationship ER in late adolescence ($\beta = 0.21$, $p < 0.05$), and that this relationship was partially mediated by adolescents' close friendship ER (Fig. 1; Sobel's $z = 2.47$, $p < 0.01$) suggesting that emotional reactivity developed in response to interparental conflict is associated with emotional reactivity in adolescents' close relationships. The model fit was adequate, $\chi^2 = 99.18$ (51), $p < .01$, $CFI =$

0.93, $RMSEA = 0.05$. These results are nearly identical to the previous published article utilizing this sample, with the exceptions that the current analyses did not control for trait-like negative emotions given our interest in testing the moderating effects of psychological vulnerabilities. The current analyses also controlled for gender given previous findings with this sample. Furthermore, the measurement model differed slightly from the previous article such that interparental conflict was comprised of wave 1 to wave 4 average indicators of conflict rather than just wave 1 data.

Individual Differences in Emotional Reactivity across Interpersonal Contexts

Before examining structural pathways across groups, we tested for metric measurement invariance for each of the moderating models. To test for metric invariance two models were compared, one with all parameters constrained to be equal and the other in which the factor loadings were allowed to vary across the two groups. In each of the four measurement models, a fit of the constrained model and the model where factor loadings were allowed to vary across individuals differed significantly, with the latter model being a better fit as indicated by significant change in chi squares across the models. The decision was made to allow the factor loadings that varied across the groups (critical ratio above 1.96) to be freed before estimating structural differences.

For each substantive moderating analysis, two models were compared, one in which all parameters were constrained to be equal and the other in which the structural loadings were allowed to vary across the two groups. Change in chi-square was examined for statistical significance at the $p < 0.05$ level. A significant change in chi-square between the models suggests individual differences in the freed structural pathways exist, and critical ratios were examined to locate specific group differences (Byrne 2001).

Comparison of the chi-squares across the freed and constrained models suggested that there was a significant difference in chi-square for each of the four moderating analyses. As such, psychological vulnerabilities moderated the transmission of emotional reactivity across relationship contexts (Figs. 2–5). Critical ratios were examined in each of the models to see where these differences reached a level of statistical significance. Findings indicated that youth who were higher in coping efficacy problems ($\beta = 0.36$, $p < 0.001$), or higher in social anxiety ($\beta = 0.39$, $p < 0.001$) were more likely to transmit emotional reactivity from the family-of-origin to close friendships than youth lower in coping efficacy problems ($\beta = 0.13$, $p = 0.11$, *ns*) or lower in social anxiety ($\beta = 0.14$, $p = 0.07$, *ns*), respectively.

Table 1 Descriptive statistics and intercorrelations between study variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. W1-W4 IC—MR Mom to Dad	—															
2. W1-W4 IC—FR Dad to Mom	0.54	—														
3. W1-W4 IC—Observed	0.31	0.29	—													
4. W1 ER to IC	0.24	0.22	0.11	—												
5. W2 ER to IC	0.25	0.20	0.10	0.55	—											
6. W3 ER to IC	0.30	0.24	0.30	0.46	0.58	—										
7. W4 ER to IC	0.22	0.18	0.22	0.40	0.52	0.57	—									
8. W5 Friend ER	0.06	-0.03	-0.03	0.10	0.21	0.30	0.31	—								
9. W6 Romantic ER	0.12	0.14	0.03	0.17	0.23	0.24	0.29	0.43	—							
10. W5 Friend conflict	0.12	0.01	0.12	0.13	0.09	0.23	0.18	0.28	0.16	—						
11. W6 Romantic conflict	0.02	0.02	-0.06	-0.06	0.04	-0.01	-0.06	0.21	0.31	0.22	—					
12. Gender	-0.08	.03	-0.01	0.07	0.01	-0.07	-0.08	-0.27	-0.24	-0.05	-0.07	—				
13. YR Coping problems	0.32	0.37	0.26	0.42	0.43	0.46	0.38	0.04	0.13	0.15	0.01	-0.01	—			
14. YR Self blame	0.20	0.15	0.13	0.16	0.26	0.37	0.34	0.22	0.21	0.19	0.14	-0.04	-0.36	—		
15. YR Depressive affect	0.15	0.15	-0.11	0.24	0.31	0.34	0.40	0.30	0.32	0.20	-0.03	-0.01	0.41	0.49	—	
16. YR Social avoidance	0.10	0.09	-0.01	0.22	0.28	0.19	0.25	0.17	0.21	0.06	-0.12	-0.06	0.33	0.12	.38	—
<i>M</i>	1.79	1.72	2.76	1.61	1.51	1.40	1.32	1.56	1.77	1.54	1.50	N/A	2.47	1.16	1.76	2.28
<i>SD</i>	0.39	0.39	1.02	0.55	0.53	0.50	0.47	0.41	0.43	0.50	0.47	N/A	0.34	0.26	2.09	0.77

W1 wave 1, W2 wave 2, W3 wave 3, W4 Wave 4, ER emotional reactivity, IC interparental conflict, MR mom report, FR father report
 Bold coefficients significant $p < .05$

Fig. 1 Emotional reactivity across relationship contexts. Model controls for gender and youth report of emotional reactivity at Wave 1. *W* wave, *OB* observer rating, *IC* interparental conflict, *MR* mother report, *FR* father report, *YR* youth report, *ER* emotional reactivity. $\chi^2 = 99.18$ (51), $p < 0.01$, $CFI = 0.93$, $RMSEA = 0.05$

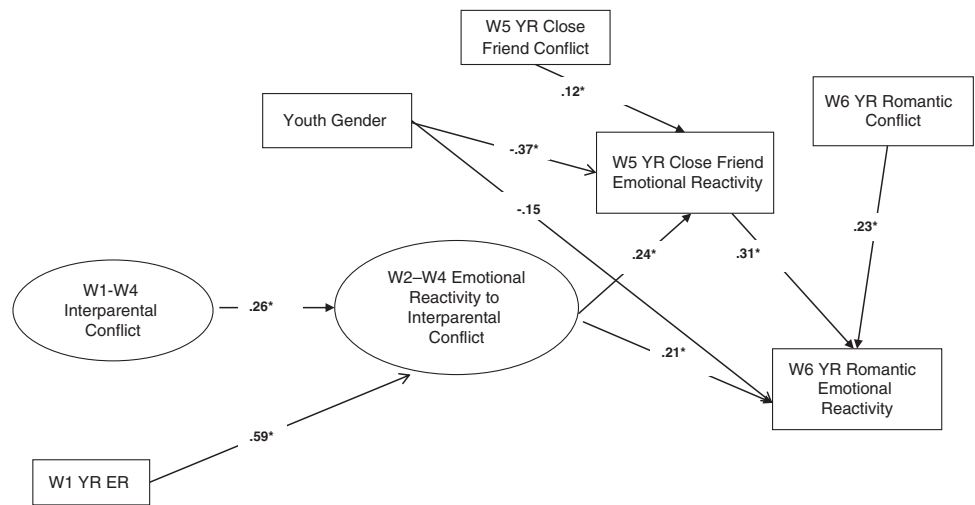
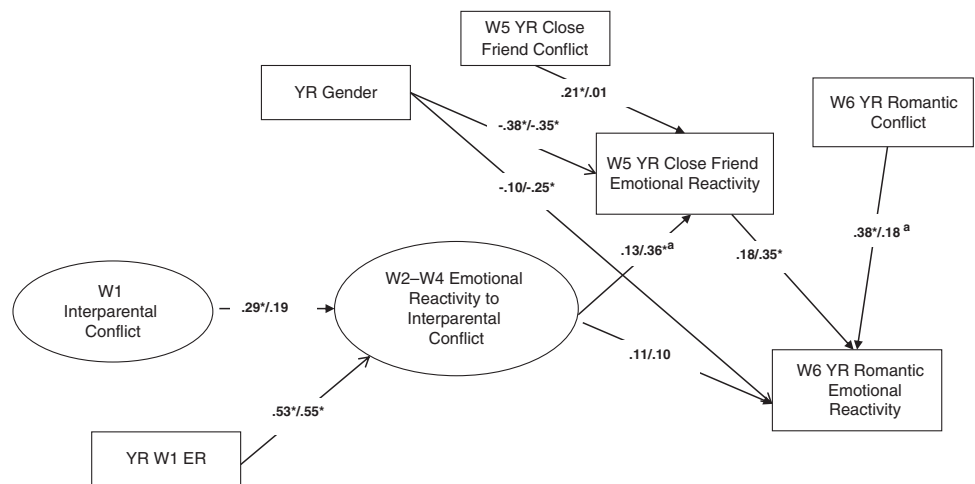


Fig. 2 Coping efficacy problems as a moderator of emotional reactivity across relationship contexts. Those lower in coping problems are to the left and youth higher in coping problems are to the right of the diagonal. This model used a top 33% split. Standardized betas are presented and * indicates that a specific pathway is significant at $p < 0.05$ level. ^a Indicates that a specific pathway differs across groups. Model controls for youth report of emotional reactivity at Wave 1, gender, and composite variable of other moderators. $\Delta\chi^2 = 45.75$, $df = 11$, $p < 0.001$



The pathway from close friendship ER to romantic relationship ER also differed across individuals such that for youth that were higher in self-blame ($\beta = 0.45$, $p < 0.001$) or depressive affect ($\beta = 0.46$, $p < 0.001$) the pathway was stronger than for youth lower in self-blame ($\beta = 0.17$, $p < 0.05$) or depressive affect ($\beta = 0.17$, $p < 0.05$), respectively. Interestingly, none of the critical ratios were above 1.96 for the pathway from interparental conflict ER to romantic relationship ER suggesting that the transmission of emotional reactivity from family to romantic relationships did not significantly differ across youth vulnerabilities. We also tested for mediation using Sobel’s test and results indicated that close friendship ER explained the relationship between interparental conflict ER and romantic relationship ER for those higher in depressive affect, social anxiety, self-blame, and coping problems but not for those who were less psychologically vulnerable. This suggests that youth high in psychological vulnerabilities may be more susceptible for transmitting negative patterns of emotions into friendships,

which in turn accounts for how they will respond to conflict in romantic relationships (Table 2; Figs. 2–5).

Sensitivity Analyses

Given concerns around dichotomizing continuous moderators, several alternative models were estimated to examine if the moderation observed in the above models was robust across different cut-points in a multiple-group format and when moderators were included in the model as manifest interactions (e.g., interaction of emotional reactivity and coping problems added as latent variable). First, to examine if findings were consistent across different cut-points we examined multiple group models with the following different groups: (a) top 25% on a psychological vulnerability and a (b) mean split. Results were statistically similar except that for the estimated models with multiple groups based on a top 25% the critical ratio did not reach 1.96 for the coping efficacy problems model.

Fig. 3 Self-blame as a moderator of emotional reactivity across relationship contexts. Those lower in self-blame are to the left and youth higher in self-blame are to the right of the diagonal. This model used a top 33% split. Standardized betas are presented and * indicates that a specific pathway is significant at $p < 0.05$ level. ^a Indicates that a specific pathway differs across groups. Model controls for youth report of emotional reactivity at Wave 1, gender, and composite variable of other moderators. $\Delta\chi^2 = 37.09$, $df = 11$, $p < 0.001$

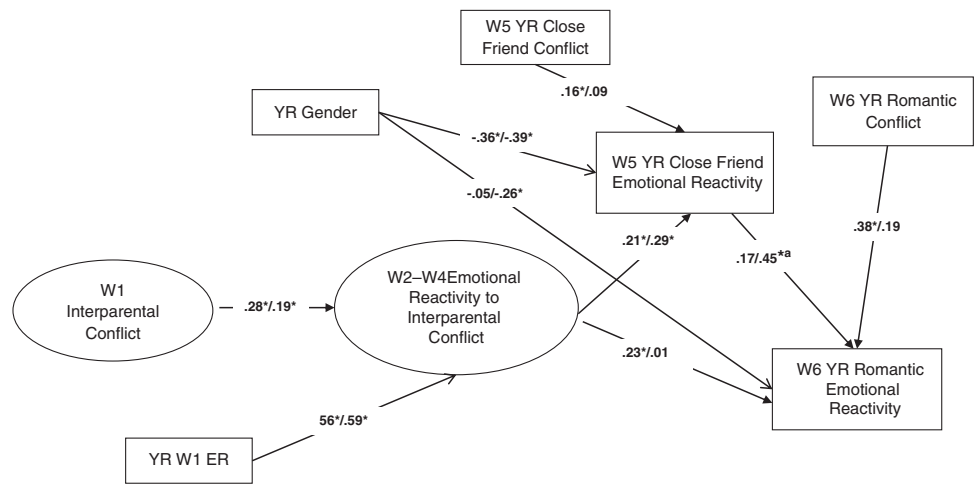
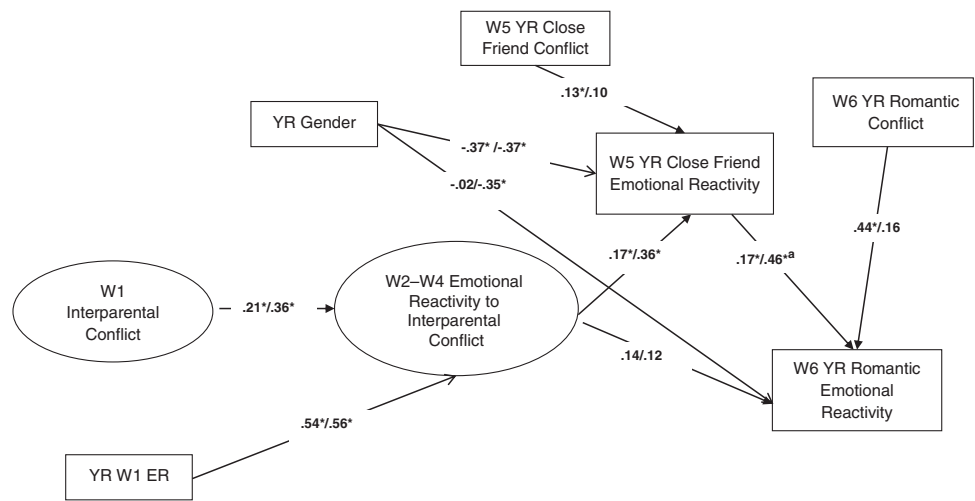


Fig. 4 Depressive affect as a moderator of emotional reactivity across relationship contexts. Those lower in depressive affect are to the left and youth higher in depressive affect are to the right of the diagonal. This model used a top 33% split. Standardized betas are presented and * indicates that a specific pathway is significant at $p < 0.05$ level. ^a Indicates that a specific pathway differs across groups. Model controls for youth report of emotional reactivity at Wave 1, gender, and composite variable of other moderators. $\Delta\chi^2 = 50.43$, $df = 12$, $p < 0.001$



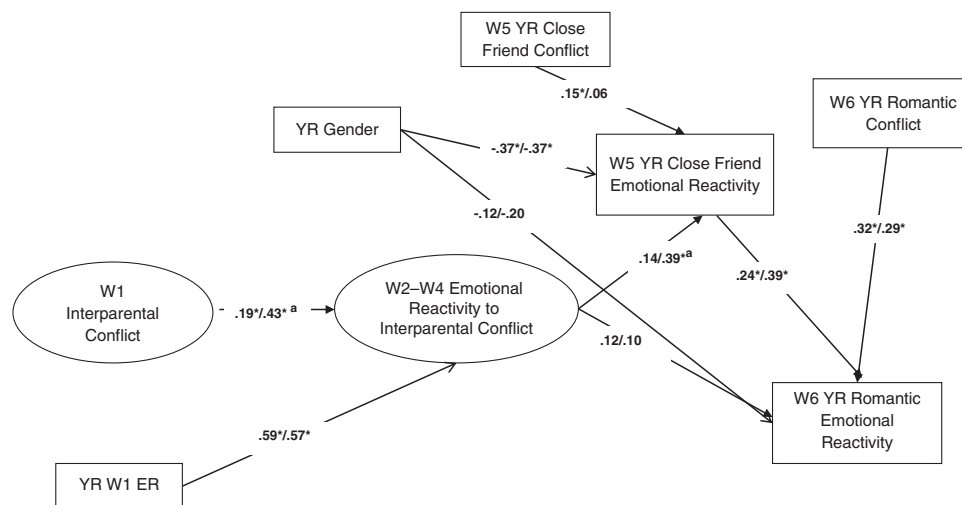
Second, we estimated four separate models where we included the moderators in the model as manifest indicators rather than using a multiple-group analysis. These results also suggested one difference from our main models in that coping efficacy problems did not significantly moderate the effect of best friend reactivity on dating partner reactivity ($p = 0.22$). Taken together, these results suggest that with the exception of the coping efficacy problems scale the findings are robust in regards to cut-points and reaffirm that psychological vulnerabilities affect the transmission of emotional reactivity.

Discussion

Developing the ability to regulate emotions in response to conflict is paramount to healthy adjustment both intrapersonally and interpersonally. Yet very little empirical

research has been conducted about which youth might be most vulnerable to developing and transmitting emotion regulatory problems in response to interpersonal conflicts during middle adolescence. The goal of this article was to examine if psychological vulnerabilities affected the extent to which youth transmitted emotional reactivity across three important relationship contexts. Findings indicated that youth reporting higher social anxiety or higher coping problems were more likely to transmit emotional reactivity from the family-of-origin to their close friendships than those youth who were lower in psychological vulnerabilities. Additionally, transmission of emotional reactivity from friendships to romantic relationships was more pronounced for youth higher in depressive affect or self-blame. Results suggest that individual differences in how we perceive and react to conflict may act as enduring relational vulnerabilities that affect emotional responses to conflict throughout adolescence.

Fig. 5 Social anxiety as a moderator of emotional reactivity across relationship contexts. Those lower in social anxiety are to the left and youth higher in social anxiety are to the right of the diagonal. This model used a top 33% split. Standardized betas are presented and * indicates that a specific pathway is significant at $p < 0.05$ level. ^a Indicates that a specific pathway differs across groups. Model controls for youth report of emotional reactivity at Wave 1, gender, and composite variable of other moderators. $\Delta\chi^2 = 32.70$, $df = 11$, $p < 0.01$



Emotional Reactivity Transmission from Family-of-Origin to Close Friendships

The results support previous research suggesting behaviors and emotions developed within the family influence how adolescents' respond to conflict in their close friendships (Simon and Furman 2010). Importantly, we extended this previous research and partially support our hypotheses by demonstrating that youth who report more problems with coping efficacy or report higher social anxiety are more likely to replicate negative patterns of handling their emotions, which were learned in the family within their close friendships. These results support theories such as stress and coping (Lazarus and Folkman 1984) and the cognitive contextual perspective (Grych and Fincham 1990), which suggest that how an individual appraises an event, which may be affected by something such as social anxiety (Turk et al. 2005), as well as the person's thoughts and actions to try to manage an event (coping efficacy) are both important to how reactive one generally is to a stressor. Furthermore, the results support research during adolescence that youth who use maladaptive coping strategies when faced with an interpersonal stressor, as might be the case for someone who has social anxiety, are more likely to be emotionally reactive (Hampel and Petermann 2006). Research with adolescents has not yet examined the transmission of these emotions but theoretical perspectives such as attachment theory and resource theory are consistent with our results that those with psychological vulnerabilities have depleted resources that make it more likely that they will transmit negative emotions across relationships (Larson and Almeida 1999). In the current study, we have extended this premise to a new area of research—adolescents' emotional reactivity in close personal relationships, an area of research that is paramount given the importance of developing

competencies and relationship templates during adolescence that will extend into adulthood (Gardner et al. 2007).

Contrary to expectations, we did not find that self-blame was a moderator of this transmission from family to friendships. This is surprising given that self-blame was a measure of adolescents' belief that they were to blame for their parents' marital conflict and past research has suggested that adolescents higher in self-blame are more impacted emotionally and behaviorally by their parent's marital conflict (El-Sheikh and Harger 2001). It is important to note that this past research generally has not examined the role that self-blame may have in impacting the transmission of emotional reactivity in response to interparental conflict to close friendships but has instead focused on direct behavioral and emotional outcomes in response to the conflict. Although research during adolescence has not focused on the question of how self-blame may affect transmission of emotions from family to friendships, stress and coping theories would suggest that perceptions of control (of which self-blame is an aspect) play a role in the impact of individual vulnerabilities on the transmission of emotional reactions to stress, with control expectancies having a greater negative impact on responses to stress when there is more novelty and more ambiguity (Folkman 1984). In the current study, interparental conflict was examined across a four year period and as such may have become predictable to adolescents reducing the possibility that adolescents' self-blame would exacerbate the transmission of emotions in response to this very specific type of stressor. More research is clearly needed to understand the role of individual vulnerabilities in transmission of emotions across different relationships.

Interestingly, results did not indicate that psychological vulnerabilities affected the direct transmission of emotions from family-of-origin to romantic relationships, when

Table 2 Moderating effects on the transmission of emotional reactivity using top 33% compared to rest of sample

Pathway	Moderators							
	Self-blame		Coping efficacy problems		Depressive affect		Social anxiety	
	Low (N = 207)	High (N = 109)	Low (N = 207)	High (N = 109)	Low (N = 209)	High (N = 107)	Low (N = 212)	High (N = 104)
ER Interparental conflict to ER best friend	0.21*	0.29*	0.13	0.36** ^a	0.17*	0.36*	0.14 ^a	0.39** ^a
ER Best friend to ER romantic	0.17*	0.45** ^a	0.18	0.35*	0.17*	0.46** ^a	0.24*	0.39*
ER Interparental conflict to ER romantic	0.23*	0.01	0.11	0.10	0.14	0.12	0.12	0.10
Marital conflict to ER interparental conflict	0.28*	0.19*	0.29*	0.19*	0.21*	0.36*	0.19*	0.43** ^a
Friend conflict to ER best friend	0.16*	0.09	0.21*	0.01	0.13*	0.10	0.15*	0.06
Romantic conflict to ER romantic	0.38*	0.19	0.38*	0.18** ^a	0.44*	0.16	0.32*	0.29*
Sobel's test for mediation through ER best friend	$z = 1.51$	$z = 2.24^*$	$z = 2.04^*$	$z = 1.22$	$z = 1.25$	$z = 2.64^*$	$z = 1.47$	$z = 2.29^*$

Note: Four different multiple group models were estimated and results from each of the models is presented above. All multiple group models indicated moderation and critical ratios were examined to locate specific, group differences

^a Indicates that the critical ratio was above 1.96 suggesting moderation of that specific structural pathway

* Indicates is significant at $p < 0.05$

controlling for the mediational pathway through reactivity with best friend. This is contrary to expectations and to previous research by Simon and Furman (2010) who found that self-blame and perceived threat moderated the transmission of interparental conflict to romantic partner conflict. This is also contrary to the large body of attachment research that suggests that attachment anxiety affects the transmission of emotions from family to romantic relationships (Grych and Kinsfogel 2010). However, it is critical to note that the attachment literature, as well as Simon and Furman's study did not examine the role of close friendships in that transmission. The inclusion of close friendship reactivity in the models reduced the amount of variance that was available to be predicted in romantic emotional reactivity, and thus provided greater specificity in the nature of the process by which emotions are transmitted and by which individual vulnerabilities may impact this transmission. Future studies should replicate our current results and examine mediational models to determine the process by which transmission occurs and how that differs based on individual vulnerabilities.

Emotional Reactivity Transmission from Close Friendships to Romantic Relationships

Self-blame and depressive affect impacted the transmission of emotional reactivity from friendships to romantic relationships, such that those youth high in self-blame or depressive affect showed stronger associations between emotional reactivity to conflict in friendships and romantic relationships than those youths lower in vulnerabilities. Both depression and self-blame may involve negative thoughts about self that are transmitted into how individuals view conflict in close relationships and their responses to that conflict across contexts. More specifically, individuals higher in depressive affect or self-blame may be more likely to attribute fault to themselves when confronted with conflict in close relationships and these attributions may extend across different relationships. Past research has suggested that individuals who are higher in depressive affect have a higher likelihood of overgeneralization, which may result in individuals being more likely to transmit negative patterns of emotions across contexts and thus it is not surprising that in this study we see that emotional reactivity developed in response to conflict within the family extends to friendships and romantic relationships among youth that are more depressed. This finding is consistent with research conducted during childhood that has suggested that children high in negative emotionality, as might be observed in depression, will require stronger skills to regulate their emotions if they are going to avoid replicating emotions learned within the family to responses to conflict in peer relationships (Morris et al. 2007). Our findings are also

consistent with research suggesting that depressive affect is a particularly salient factor affecting emotional reactivity and response to stress in romantic relationships (Hankin et al. 2007; Vujeva and Furman 2011) and to peer relationships during adolescence (La Greca and Harrison 2005). Furthermore, our findings support the general premise during adolescence that peer relationships take on extreme prominence and success in those relationships is strongly intertwined with depressive affect (Rudolph 2002).

It is particularly noteworthy that self-blame, a variable measured in response to adolescents' tendency to blame themselves for interparental conflict, may become internalized and develop into a relational template that will affect the strategies that youth use to manage conflict in their close peer relationships (Linder and Collins 2005). This finding is consistent with Davies' and Cummings (1994) emotional security hypotheses, which suggests that adolescents' representations of relationships will become ingrained as relationship styles that will later impact how adolescents' view their emotional security across relationships. Furthermore, Furman and colleagues' (2002), Connolly et al. (2000) work has suggested that these relational views will be transmitted across relationships outside of the family, notably from friendships to romantic relationships. However, this is the first study that has examined this transmission of emotional reactivity across close peer relationships and self-blame as a moderator of that transmission and thus more research is needed.

Limitations

Although this study examines an important but understudied topic, it is not without limitations. The current study was not able to control for previous reactivity in close friendships and romantic relationships and thus statements about causality are limited. This is commonly a problem in studies that examine behaviors and emotions enacted in romantic relationships. However, our study is one of the only studies to use multiple waves of data to examine which youth are the most vulnerable to the transmission of emotions across contexts and thus marks an improvement over previous studies focusing solely on behaviors or using only one wave of data.

In regards to the analyses, the current study examined individual vulnerabilities that were averaged across four years of the study as our moderators with the intent of capturing a relational template that would be applied outside of the family. This approach may obscure changes in these vulnerabilities across time and the resulting impact on transmission. Future research should examine vulnerabilities that may change over time and also across relationship contexts (e.g., self-blame in romantic relationships). Additionally, we made the decision to

estimate multiple-group models using a dichotomous moderator that grouped youth into two groups with those evidencing a vulnerability being the youth who scored in the top 33% of the sample on a given vulnerability. We made this decision because we were interested in examining moderation of the entire structural pathway as opposed to the effect of an interaction on a specific outcome (e.g., interparental conflict emotional reactivity to friendship emotional reactivity). Nevertheless, dichotomizing continuous data to estimate moderation has been criticized by past researchers because of misestimating effect sizes and arbitrary decisions about where to split the data (MacCallum et al. 2002). In regards to the decision of where to split the data, the current study chose a cut point (top 33%) that is rather common in research examining psychological vulnerabilities but additional models we estimated using the cut points of a mean split, a top 25% approach and including the moderators in the model. As reported in the sensitivity analyses, results were nearly identical across the models, with the exception that coping efficacy problems were no longer a significant moderator when using the top 25% approach and when estimating the moderator in the structural equation model.

Due to power concerns, we only controlled for gender in our models and did not estimate three-way interactions. Previous research has suggested that emotional reactions to conflict are gendered such that there are stronger associations between interpersonal conflict and emotional reactivity for girls than boys (Cook et al. 2013). Thus, it is possible that the impact of psychological vulnerabilities on the response to conflict and transmission of reactivity across context might be different for girls and boys. Future research with larger samples should examine gender differences.

Finally, we chose to examine four separate multiple-group models to examine the impact of a given vulnerability on the transmission of reactivity across contexts because we were interested in understanding if these specific vulnerabilities, that indicate a lack of psychological resources, might have different impacts on transmission. We believe that these variables represent important individual vulnerabilities during adolescence that might be particularly relevant to the transmission of emotions across context. It is important to note, however, that other vulnerabilities also may impact the transmission of reactivity. Of particular interest would be using an attachment perspective to examine the transmission of emotional reactivity across contexts as attachment theory theorizes that attachment styles impact the expression of emotions and transmission from family to romantic relationships and that insecurely attached individuals, particularly anxiously attached individuals focus on the threatening aspects of interpersonal interactions and hold onto pessimistic beliefs about

managing stress, which may overgeneralize past the attachment relationships to new situations (Shaver and Mikulincer 2007). Although anxious attachment shares some conceptual overlap with the variables in the current study, we did not specifically measure attachment in the current study and thus it remains an important area for future research.

Conclusion

This study adds to a body of research that suggests that the family-of-origin sets the tone for how adolescents will react to conflict in their close peer relationships and that this may be impacted by psychological vulnerabilities. Individuals high in a given psychological vulnerability may have a depleted resource pool which will then impair their ability to cope with further conflict that they may experience in relationships resulting in transmission of emotional reactivity across contexts (Krohne 2001). These findings need replication but mark an important first step in understanding how psychological vulnerabilities associated with how youth might process stressful interpersonal interactions affect the transmission of behaviors across context.

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Authors' Contributions C.B. conceived of this initial research study, received funding for this study, and oversaw the design and data collection. E.C.C., C.B., and B.L.B. collaborated in the generation of the specific research question addressed in this manuscript. E.C.C. conducted all of the statistical analyses, wrote the methods and discussion sections, as well as helped write the literature review. B.L.B. took primary responsibility for writing the literature review and provided comments on the manuscript. C.B. also provided comments on all parts of the manuscript and helped provide support in the framing of the study. All authors read and approved the final manuscript.

Compliance with Ethical Standards All ethical standards were complied with for this study.

Conflict of Interest The authors declare that they have no competing interests.

Ethical Approval This study was approved by the IRB.

Informed Consent All families gave informed consent for the adolescents and themselves to participate in this study. In addition, adolescents assented to participation.

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