J Youth Adolescence
DOI 10.1007/s10964-013-9964-y

EMPIRICAL RESEARCH

Positive Daily Family Interactions Eliminate Gender Differences in Internalizing Symptoms Among Adolescents

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Received: 18 March 2013 / Accepted: 20 May 2013

Abstract By the age of 18, girls are more than twice as likely as boys to experience internalizing symptoms. Focusing upon the family, a significant factor for adolescent mental health, we examined how positive and negative daily family interactions relate to gender differences in internalizing symptoms. 681 12th grade students (54 % female) completed diary checklists each night for 2 weeks in which they indicated whether they got along with their family (positive family interactions) and argued with their family (negative family interactions). Results indicate that negative daily family interactions explain, in part, why females experience heightened internalizing symptoms. Yet, even in the face of negative family interactions, positive daily family interactions have salutatory effects, reducing females' emotional distress and eliminating gender differences in internalizing symptoms at high levels of positive interactions. These findings underscore the importance of positive family interactions for adolescent girls' mental health.

Keywords Gender differences · Internalizing · Family interactions · Daily diary · Adolescence

Introduction

Internalizing symptoms, including depressive and somatic complaints, rise dramatically during adolescence, peaking around 17–18 years (Peterson et al. 1993). Whereas boys and girls show similar rates of internalizing symptoms before age 11, a striking pattern begins to emerge in adolescence when girls become more than twice as likely as boys to experience internalizing symptoms by age 18 (Angold and Rutter 1992; Hankin et al. 1998; Mezulis et al. 2010). This gender difference is found across cultures, ethnic groups, nations, socioeconomic backgrounds, as well as decades of research, making it one of the most robust mental health findings (Nolen-Hoeksema 2001; Shih et al. 2006). Although the reasons for this gender difference are not fully understood, a substantial body of work has now identified several factors to explain, in part, why girls experience more depression than boys, including girls' greater experience of stressors and interpersonal conflicts (Crawford et al. 2001; Hankin et al. 2007; Schraedley et al. 1999; Shih et al. 2006). In contrast to research explaining why these gender differences emerge, comparatively less research has identified protective factors that may mollify gender disparities in internalizing symptoms. Focusing upon the family, a highly significant factor for adolescent mental health (Repetti et al. 2002), the current study examines how positive and negative daily family interactions relate to gender differences in internalizing symptoms.

Two models have been proposed to explain gender differences in internalizing symptoms (Hankin et al. 2007). The *Mediational Stress Exposure Model* suggests that girls tend to experience more interpersonal conflicts and social stressors than boys, and, as a result, girls experience greater internalizing symptoms (Rudolph 2002; Hankin et al. 2007; Schraedley et al. 1999). Indeed, several studies have found evidence that girls report more interpersonal stressors with family members and peers compared to boys (e.g., Hankin et al. 2007), and these stressors explain, in part, why girls experience more internalizing symptoms (Rudolph 2002; Crawford et al. 2001; Hankin et al. 2007; Rudolph and

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Published online: 04 June 2013

Hammen 1999; Charbonneau et al. 2009). In fact, girls are particularly likely to report greater interpersonal stressors, whereas boys report more achievement related stressors (Hankin et al. 2007). Interpersonal stressors are most predictive of subsequent depression, highlighting the important role of social relations for girls (Hankin et al. 2007).

The *Moderational Stress Exposure Model* suggests that girls experience greater levels of depression in response to interpersonal stressors (Hankin et al. 2007). Given the same interpersonal stressor, girls are more emotionally reactive to that stressor and experience greater depression than boys. Indeed, girls tend to experience more distress than boys following disruptive relationships, such as family discord and peer stress (Charbonneau et al. 2009; Chung et al. 2009; Davies and Windle 1997; Hankin et al. 2007; Hampel and Petermann 2006; Calvete et al. 2011). This model suggests that girls do not necessarily experience quantitatively more stressors than do boys, but, rather, girls perceive the same stressors as qualitatively more stressful. A similar model, the *Differential Vulnerability Hypothesis*, suggests that girls are more vulnerable to the effects of stressors, which accounts for the gender difference in internalizing symptoms (Gore et al. 1993). In sum, females may be at heightened risk for internalizing symptoms via increased exposure to interpersonal stressors, heightened reactivity to stressors, or both.

Each of these models emphasize negative interpersonal stressors in youths' daily lives. Less research has examined the impact of positive interpersonal relationships on adolescents' health. The quality of parent-adolescent relationships plays a key role during adolescence, functioning as both a stressor and buffer for the development of depression (Greenberger et al. 2000; Steinberg and Morris 2001). Even during a time when youth begin to place more emphasis on autonomy and peer affiliation, supportive family relationships continue to be beneficial for adolescents' well-being, often above the effects of peer support (Greenberg et al. 1983; Raja et al. 1992). Positive family relationships help youth to develop effective emotion regulation abilities and provide them with emotional support, companionship, and protection from the deleterious effects of negative life stressors (Rudolph 2002; Schraedley et al. 1999). Although positive family relationships are salutary for all youth, girls tend to be affected more strongly by their emotional relationships with their parents (Davies and Windle 1997; Formoso et al. 2000; Operario et al. 2006), perhaps because they are more relationship oriented than boys and tend to strive for closer emotional communication, intimacy, and responsiveness than boys (Cyranowski et al. 2000; Rudolph 2002). For example, greater social support, especially from parents, is particularly salient for adolescent girls, for whom depressive symptoms are more strongly related to the level of social support they experience than it is for boys (Schraedley et al. 1999). Thus, because girls are more likely than boys to rely on their family as a source of emotional support and to strive for harmonious relationships (Cyranowski et al. 2000), positive interpersonal relationships within their family may be especially important for girls.

Current Study

Researchers have highlighted the importance of incorporating both negative and positive dimensions of daily life to gain a more complete understanding of the "person-in situ" (Zautra et al. 2005; Parrish et al. 2008). Therefore, in the current study, we examined 12th grade girls' and boys' day-to-day levels of both positive and negative family interactions. We focus on 12th graders, as the peak in gender differences in internalizing symptoms emerges at this time (Angold and Rutter 1992; Hankin et al. 1998). We explored the specific role of one aspect of positive interpersonal family relationships—whether adolescents got along with their family on a daily basis—and one aspect of negative interpersonal family relationships—whether adolescents argued with or were punished by their parents on a daily basis. Getting along with and arguing with or being punished by family members are important dimensions of interpersonal family relations (Amato 1990). These two types of daily family interactions are commonly examined aspects of parent–child relations that are experienced across the adolescent years and across different cultural groups (Fuligni 1998; Almeida et al. 2001; Amato 1990).

We used a daily diary method to better understand how day-to-day levels of family interactions are related to youths' well-being. Daily sampling results in more accurate and reliable responses than retrospective questions from a single survey and taps more dynamic aspects of family relationships (Bolger et al. 2003; Laurenceau and Bolger 2005). Prior studies utilizing the same dataset as the current study found that adolescent girls experience greater variations in mood in response to interpersonal events than do boys. For instance, girls report heightened positive mood and dampened negative mood on days when they report positive interpersonal events and vice versa on days when they reported negative events (Flook 2012; Chung et al. 2009), suggesting not only that girls' well being may be particularly affected by daily interpersonal experiences, but also that girls are sensitive to both negative *and* positive daily experiences. This prior work demonstrated gender differences in the daily link between interpersonal events and daily well-being showing that girls' mood is more reactive to their interpersonal experiences. In the current study, we build upon this prior work and take advantage of the daily diaries in a new way by aggregating

daily family interactions over the 2-week study period in order to examine how individual differences in the *frequency* of daily family interactions affect adolescents' internalizing symptoms. Rather than focusing on gender differences in daily reactivity to interpersonal experiences, our goal was to identify how the frequency with which adolescents experience positive and negative family interactions may ameliorate gender differences in internalizing symptoms. This method of aggregation successfully has been used in previous research (e.g., Telzer and Fuligni 2009; Chung et al. 2009) and is a useful method for examining how stable levels of family interactions (i.e., positive and negative family interactions experienced on more days) relate to well being.

In the current study, we examined how positive and negative family interactions mediate and moderate gender differences in internalizing symptoms. First, following the *Mediational Stress Exposure Model,* we conducted mediation analyses to examine whether negative daily family interactions explain, in part, why females experience heightened internalizing symptoms compared to boys. Consistent with previous research, we expected that girls would experience greater negative family interactions than boys on a daily basis, and this would account, in part, for the gender differences in internalizing symptoms. We also expected girls to experience greater levels of positive family interactions than boys, and we examined whether positive family interactions counteracted the effects of negative interactions. Finally, we tested whether family relationships explain gender differences in internalizing symptoms above and beyond peer interactions.

Second, following the *Moderational Stress Exposure Model,* we conducted moderation analyses to examine whether positive and negative family interactions relate to internalizing symptoms differentially for boys and girls. Given that girls may be more sensitive to the quality of their daily interpersonal relationships (Flook 2012), we expected that females may show greater sensitivity to family interactions, thus relating to internalizing symptoms, whereas boys would show similar levels of internalizing symptoms regardless of the level of positive or negative family interactions they experience. Importantly, we sought to examine whether positive family interactions experienced on more days would eliminate the gender difference in internalizing symptoms. In other words, we expected that boys would show low levels of internalizing symptoms regardless of the amount of positive family interactions they experienced. In contrast, because girls may strive for and benefit more from positive family relationships (Cyranowski et al. 2000), we expected that girls' internalizing symptoms would be lower when they experienced higher levels of positive family interactions, such that the gender difference would be eliminated at high levels of daily positive family interactions. We examined the effects of positive and negative family interactions in the same model to test whether positive family interactions have salutatory effects above and beyond the effects of negative family interactions. Finally, we tested whether positive and negative family interactions relate to internalizing symptoms differentially for boys and girls above and beyond peer interactions and whether peer interactions would similarly moderate the gender differences in internalizing symptoms to test whether girls and boys are similarly reactive to family and peer interactions.

Method

Participants

Of the 742 12th grade adolescents who participated in the study, 681 (54 % female) are included in the current study. Sixty-one youth were not included in the analyses because they did not complete the daily diary portion of the study. The 681 participants were from diverse ethnic backgrounds (30.2 % Latin-American, 36 % Asian, 15.1 % European, 14.5 % multiethnic, 2.2 % African-American) ranging in age from 16.21 to 19.15 years ($M_{age} = 17.79$, $SD = .37$). Approximately two-thirds of participants' biological parents were married to each other, and 77 % of students lived with at least 2 adults (e.g., parents, step-parents, grandparents, aunts, uncles). The students were recruited from three public high schools in the Los Angeles metropolitan area whose ethnic composition and socioeconomic distribution reflected those of the communities from which the students were drawn. The first school primarily enrolled lower-middle to middle-class students from Latin-American and Asian backgrounds, the second school primarily enrolled lower-middle to middle class students from Latin-American and European backgrounds, and the third school primarily enrolled middle- to upper-middle class students from Asian to European backgrounds (California Department of Education 2006). All 12th grade students in the target schools were eligible to participate, and approximately 63 % of the sampled students participated in the study. The final sample of participants reflected the ethnic and socioeconomic composition of the schools.

Procedure

Participants were recruited during school hours in the spring semester from three public high schools. Researchers visited classrooms, made announcements, and sent consent forms home with the students. Students who

returned parental consent forms and provided their own assent to participate completed a questionnaire and were provided with 14 days of diary checklists to complete every night before going to bed for two subsequent weeks. During class, participants completed a questionnaire, which assessed demographic information (e.g., ethnicity, date of birth) as well as internalizing symptoms (depressive and somatic complaints). That same evening, participants began the daily diary checklists. The three page diary checklists took approximately 5–10 min to complete each night. Participants were called once per week during the 2 week period to remind them to complete the diary checklists. Participants were instructed to put their completed diary checklists into a sealed envelope each night and stamp the seal of the envelope with an electronic time stamper. The time stamper imprinted the current date and time and was programmed with a security code such that adolescents could not alter the correct time and date. At the end of the 2 week period, participants returned the materials to the school and received $30 for participating. If inspection of the data indicated that they had completed the checklists correctly and on time, participants also received two movie passes. The time-stamper monitoring and the cash and movie pass incentives resulted in a high rate of compliance, with adolescents completing 96 % of the dairies on average.

Measures

Internalizing Symptoms

We focused on three common aspects of internalizing symptoms (Galambos et al. 2004; Peterson et al. 1993): (1) depressive symptoms which include feeling lonely and sad (2) somatic complaints, which include experiencing headaches, sleep problems, and low energy, and (3) daily distress, which include feelings of depressed and anxious mood on a daily basis.

Depressive Symptoms Depressive symptoms were measured during the in-class questionnaire using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff 1977). Using a 4-point scale (0 = rarely to 3 = most or all of the time), participants answered 20 questions indicating whether they experienced depressive symptoms in the past month. Example items include, "I was bothered by things that don't usually bother me" and "I thought my life had been a failure." Participants' responses to the 20 items were summed. Thus, depressive symptoms ranged from 0 to 60, with higher scores indicating greater symptoms. In the current sample, scores ranged from 0 to 56, with a mean of 22.42 (SD = 8.6). The scale had good internal consistency (α = .89).

Somatic Complaints Somatic complaints were assessed during the in-class questionnaire using a measure adapted from Resnick et al. (1997) and Udry and Bearman (1998). Participants used a 4-point scale (1 = not at all to 4 = almost every day) to respond to 12 questions indicating whether they had experienced a variety of physical symptoms in the past 2 weeks, such as headaches, stomachaches, dizziness, and low energy. This scale has demonstrated good reliability among adolescents from diverse cultural backgrounds (Huynh and Fuligni 2010; Nishina et al. 2005). Scores were calculated by taking the average of the 12 items. Total scores can range from 1 to 4. In the current study, scores ranged from 1 to 3.75 with a mean of 1.87 (SD = .54). The scale had good internal consistency (α = .84).

Daily Distress Day-to-day levels of distressed mood were assessed during the daily diary using questions from the Profile of Mood States (Lorr and McNair 1971), a widely used measure in previous work on daily stress and psychological well being (Bolger and Zuckerman 1995; Telzer and Fuligni 2009). Every evening for 14 days, adolescents used a 5-point scale (1 = not at all to 5 = extremely) to indicate the extent to which they felt on edge, nervous, uneasy, unable to concentrate (anxious symptoms), sad, hopeless, and discouraged (depressed symptoms). Daily Distress was indexed by taking the average distress ratings of the 6 items each day, and then averaging those ratings across the 14 days. Total scores range from 1 to 5, with higher scores indicating greater daily distress. In the current study, scores ranged from 1 to 3.90, with a mean of 1.55 (SD = .50). The scale had excellent internal consistency (α = .94).

Positive Daily Family Interactions

Day-to-day levels of positive family interactions were measured using the daily dairy. Each night for the 2 week period, adolescents indicated whether they had gotten along with their family that day (1 = yes, 0 = no). From these 14 days of responses, we created an index of *Positive Daily Family Interactions*, which represents the proportion of days out of 14 days that the adolescent reported getting along with his/her family. Scores can range from 0, indicating getting along with one's family on 0–1 days, indicating getting along on all 14 days. In the current study, scores ranged from 0 to 1 with a mean of .65 (SD = .30). Thus, on average, participants got along on 65 % of the study days.

Given the 14 separate reports of positive daily family interactions each day across the 2 weeks, this scale represents a reliable measure of the frequency with which adolescents experienced getting along with their family.

Similar indices of the frequency of daily family interactions have been used in previous research (Telzer and Fuligni 2009). Additionally, previous research has successfully used single item measures in daily diary studies (Ong et al. 2006; Almeida et al. 1999; Chung et al. 2009). The scale had good internal consistency ($\alpha = .88$).

Negative Daily Family Interactions

In order to examine whether positive family interactions protect females from depressive to somatic symptoms, even in the face of negative interactions, we measured adolescents' day-to-day levels of negative interactions with their parents using the daily dairy. Each night for the 2 week period, adolescents answered three questions indicating whether they had (1) argued with their mother (2) argued with their father (3) and whether they had been punished by their parents (1 = yes, 0 = no). From these 14 days of responses, we created an index of *Negative Daily Family Interactions*, which represents the proportion of days out of 14 days that the adolescent reported any one of these negative family interactions occurring. A similar index of negative interpersonal events has been used in previous research (Flook 2012). Scores can range from 0, indicating negative family interactions occurring on 0–1 days, indicating negative interactions occurring on all 14 days. In the current study, scores ranged from 0 to 1 with a mean of .20 (SD = .20). Thus, on average, participants experienced family conflict on 20 % of the study days. The scale had good internal consistency ($\alpha = .74$).

Positive Peer Interactions

Day-to-day levels of positive peer interactions were measured using the daily dairy. Each night for the 2 week period, adolescents indicated whether they had gotten along with their friends that day (1 = yes, 0 = no). From these 14 days of responses, we created an index of *Positive Daily Peer Interactions*, which represents the proportion of days out of 14 days that the adolescent reported getting along with his/her peers. Scores can range from 0, indicating getting along with one's family on 0–1 days, indicating getting along on all 14 days. In the current study, scores ranged from 0 to 1 with a mean of .69 (SD = .27). Thus, on average, participants got along with their peers on 69 % of the study days. The scale had good internal consistency ($\alpha = .84$).

Negative Peer Interactions

Each night for the 2 week period, adolescents whether or not they argued with close friends each day (1 = yes, 0 = no). From these 14 days of responses, we created an index of *Negative Daily Peer Interactions*, which represents the proportion of days out of 14 days that the adolescent reported arguing with their close friends. A similar index of negative interpersonal events has been used in previous research (Flook 2012). Scores can range from 0. In the current study, scores ranged from 0 to 1 with a mean of .10 (SD = .16). Thus, on average, participants experienced arguing with close friends on 10 % of the study days. The scale had good internal consistency ($\alpha = .78$).

Control Variables

All analyses described in this paper control for socioeconomic status and ethnicity. Participants reported their mother's and father's highest level of education by responding to a scale that ranged from "elementary/junior high school," "some high school," "graduated from high school," "some college," "graduated from college," to "law, medical, or graduate school." Participants also indicated their parents' occupational status. Occupation was coded on a five point scale (0 = unemployed, 1 = unskilled, to 5 = professional level). Approximately 24 % of mothers and 14 % of fathers were unemployed, with 15 % of mothers and 10 % of fathers in unskilled or semi-skilled jobs and 29 % of mothers and 28 % of fathers in semi-professional or professional jobs. Seventeen percent of mothers and 18 % of fathers had graduated from high school, 21 % of mothers and fathers had graduated from college, and 10 % of mothers and 14 % of fathers had attained a graduate degree. Socioeconomic status was calculated by standardizing mother and father education and mother and father occupation and taking the average of these scores. Ethnicity was measured through participants' self-report of their ethnicity. Ethnicity was coded as Latin American, Asian, European, or other backgrounds. Analyses controlled for ethnicity by dummy coding each ethnic group and using youth from European backgrounds as the comparison group.

Results

Gender Differences in Study Variables

Consistent with prior work, we found significant gender differences in internalizing symptoms. As shown in Table 1, females reported significantly higher depressive symptoms, somatic complaints, and daily distress than males. In addition, females reported both getting along with their family (positive family interactions) on more days (67 % of days) as well as arguing and being punished by their family (negative family interactions) on more days (22 % of days) than boys (62 and 15 % of days, respectively). Girls reported

Table 1 Gender differences and bivariate correlations between all study variables

Study variable	Gender differences			Bivariate correlations						
	Female M (SD)	Male M (SD)	*t*	1	2	3	4	5	6	7
1. Negative family interactions	.22 (.20)	.16 (.20)	3.8***	1	−.35***	.19***	−.12*	.14**	.12*	.19***
2. Positive family interactions	.67 (.27)	.62 (.33)	2.4*	−.14*	1	−.08	.62***	−.29***	−.24***	−.22***
3. Negative peer interactions	.13 (.18)	.07 (.13)	4.9***	.34***	.02	1	.01	.17***	.20***	.09
4. Positive peer interactions	.70 (.24)	.66 (.30)	1.8	.06	.69***	.08	1	−.10*	−.04	−.09
5. Depressive symptoms	23.6 (8.5)	21.1 (8.4)	3.9***	.20***	−.02	.19***	.06	1	.51***	.46***
6. Physical complaints	.95 (.52)	1.78 (.53)	4.3***	.09	−.05	.19***	−.03	.37***	1	.42***
7. Daily distress	1.61 (.51)	2.47 (.47)	3.6***	.23***	−.1	.15**	−.01	.36***	.40***	1

Boys' bivariate correlations are on the bottom of the diagonal, and girls' correlations are on the top of the diagonal. Negative and Positive family interactions and daily distress were measured during the 14-day daily diary and depressive symptoms and somatic complaints were measured during the initial questionnaire. Positive and negative family interactions represent proportion scores, such that females report positive interactions on 67 % of days compared to 62 % reported by males

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

experiencing negative peer interactions on more days (13 %) than boys (7 %), but there were no significant gender differences in positive peer interactions.

Bivariate Correlations Between all Study Variables

Next, we ran bivariate correlation analyses with all study variables separately for boys and girls. The results for boys are depicted along the bottom diagonal of the right panel of Table 1. Results show that negative family interactions related to greater depressive symptoms and daily distress but not to somatic complaints for boys. Positive family interactions were not associated with any of the internalizing symptoms for boys. Negative peer interactions related to greater depressive symptoms, somatic complaints, and daily distress, but positive peer interactions were not related to internalizing symptoms. Whereas boys who experienced greater negative family interactions tended to report higher positive family interactions, positive and negative peer interactions were not related. Boys who experienced greater negative family interactions also reported greater negative peer interactions.

The results for girls are depicted along the top diagonal of Table 1. Results show that negative family interactions are associated with greater depressive symptoms, somatic complaints, and daily distress for girls whereas positive family interactions are related to lower levels of each internalizing symptom. Negative peer interactions are related to greater depressive symptoms and somatic complaints, but not to daily distress. Girls who report greater positive peer interactions show slightly lower levels of depressive symptoms but not somatic complaints or daily distress. Girls who experience greater negative daily family interactions report lower positive daily family interactions. Girls who experience greater negative family interactions also report greater negative peer interactions.

Plan of Analysis

In order to test our primary research questions examining the mediating and moderating role of positive and negative family relationships on gender differences in internalizing symptoms, we conducted two sets of analyses. First, we tested the meditational stress exposure model by examining whether negative family interactions mediate the association between gender and internalizing symptoms. Mediation analyses were conducted using multiple regression and the procedures outlined by MacKinnon et al. (2007). In addition, we examined whether family interactions explain gender differences in internalizing symptoms above and beyond the effects of negative peer interactions.

Second, we tested the moderational stress exposure model by examining whether negative and positive family interactions differentially relate to internalizing symptoms for males and females. The moderation analyses were conducted using the procedures outlined by Aiken and West (1991). Again, we tested whether positive and negative family interactions relate to internalizing symptoms differentially for boys and girls above and beyond peer interactions.

Testing the Mediational Stress Exposure Model

Given that girls reported greater internalizing symptoms (depressive symptoms, somatic complaints, daily distress) than boys, and girls experienced greater negative and positive family interactions than boys, we sought to examine whether each of these family interactions mediate the association between gender and internalizing symptoms. We ran regression analyses, predicting each internalizing symptom by gender, controlling for socioeconomic status and ethnicity. As shown in Table 2, model 1, there is a significant gender effect. The coefficients for gender are positive and significant, consistent with the *t* tests showing that females report higher levels of depressive symptoms, somatic complaints, and daily distress. One significant effect for ethnicity emerged, such that youth from Latin American backgrounds reported significantly lower daily distress than youth from European backgrounds. In addition, there was one significant effect for SES, such that adolescents with higher SES reported significantly lower physical symptoms.

Table 2 Mediating gender differences in internalizing symptoms

	Model 1		Model 2		Model 3		Model 4	
	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β
Depressive symptoms								
Intercept	22.12 (.85)***		20.72 (.90)***		23.33 (1.24)***		20.42 (.89)***	
Gender	1.26 (.33)	.15***	1.06 (.33)	.12**	1.18 (.33)	.14***	.87 (.33)	.10**
Latin American	−.48 (1.07)	−.03	−.85 (1.06)	−.05	−.99 (1.05)	−.05	−1.26 (1.05)	−.07
Asian	.50 (1.01)	.03	.76 (1.00)	.04	.42 (1.00)	.03	.70 (.99)	.04
Other ethnicity	.84 (1.13)	.04	.62 (1.12)	.03	.61 (1.11)	.03	.22 (1.11)	.01
SES	−.36 (.46)	.46	−.32 (.46)	−.03	−.32 (.45)	−.03	−.40 (.45)	−.03
Negative family interactions			7.54 (1.65)	.18***	6.26 (1.69)	.15***	6.10 (1.68)	.14***
Positive family interactions					−3.40 (1.12)	−.12**		
Negative peer interactions							8.19 (2.16)	.15***
R^2	.03		.06		.07		.08	
Somatic complaints								
Intercept	1.88 (.05)***		1.82 (.06)***		1.99 (.08)***		1.78 (.06)***	
Gender	.09 (.02)	.16***	.08 (.02)	.15***	.09 (.02)	.16***	.07 (.02)	.12***
Latin American	−.09 (.07)	−.08	−.11 (.07)	−.09	−.11 (.07)	−.10	−.14 (.07)	−.12*
Asian	.03 (.06)	.03	.04 (.06)	.04	.02 (.06)	.02	.04 (.06)	.03
Other ethnicity	−.01 (.07)	−.01	−.01 (.07)	−.01	−.01 (.07)	−.01	−.05 (.07)	−.03
SES	−.07 (.03)	−.10*	−.07 (.03)	−.10*	−.07 (.03)	−.09*	−.08 (.03)	−.10**
Negative family interactions			.31 (.10)	.12**	.23 (.11)	.09*	.21 (.10)	.09*
Positive family interactions					−.21 (.07)	−.12**		
Negative peer interactions							.64 (.13)	.19***
R^2	.04		.05		.07		.08	
Daily distress								
Intercept	1.60 (.05)***		1.48 (.05)***		1.63 (.07)***		1.47 (.05)***	
Gender	.07 (.02)	.15***	.05 (.02)	.11**	.06 (.02)	.12***	.05 (.02)	.10*
Latin American	−.19 (.06)	−.17**	−.21 (.06)	−.20***	−.22 (.06)	−.20***	−.23 (.06)	−.21***
Asian	.01 (.06)	.01	.04 (.06)	.04	.02 (.06)	.02	.04 (.06)	.03
Other ethnicity	−.07 (.07)	−.05	−.08 (.07)	−.06	−.08 (.07)	−.07	−.09 (.07)	−.07
SES	.00 (.03)	.00	.00 (.03)	.00	.00 (.03)	.00	.00 (.03)	.00
Negative family interactions			.64 (.10)	.24***	.56 (.11)	.21***	.58 (.10)	.22***
Positive family interactions					−.19 (.07)	−.21***		
Negative peer interactions							.28 (.13)	.09*
R^2	.05		.10		.11		.11	

SES = socioeconomic status; gender was coded males = −1, females = 1. This coding of gender made the intercept to be estimates for the overall sample in the study; ethnicity was dummy coded with adolescents from European backgrounds serving as the reference group

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

In the second model, we entered negative family interactions into the regression analysis to examine whether the gender differences in internalizing symptoms would be reduced. As shown in Table 2, model 2, the gender differences in depressive symptoms, somatic complaints, and daily distress were reduced, suggesting mediation. To test for mediation, the magnitude and the significance of the indirect effects of gender on internalizing symptoms, through negative daily family interactions, were estimated using commonly-used procedures recommended by MacKinnon and colleagues, in which the asymmetric confidence limits were computed based on the distribution of products (MacKinnon et al. 2007). The product of coefficients test uses the path weights for each indirect pathway (e.g., from the predictor to the mediator, and from the mediator to the outcome variable) and the corresponding standard errors to compute the test statistic.

Girls' greater tendency to experience more negative family interactions accounted for a significant portion of the tendency for girls to experience heightened internalizing symptoms. The indirect effects of gender on depressive symptoms (B = .03, SE = .01, $p < .001$), somatic complaints (B = .02, SE = .01, $p < .001$), and daily distress (B = .03, SE = .01, $p < .001$) through negative family interactions were all significant. Although the gender differences in internalizing symptoms remained significant when negative family interactions were entered into the model, the gender differences were reduced significantly. We calculated the percentage of the total effect that was accounted for by negative family interactions by dividing the indirect effect (i.e., the effects of gender on internalizing symptoms through negative family interactions) by the total effect (i.e., the effects of gender on internalizing symptoms). Negative family interactions accounted for 16.2 % of the effect of gender on depressive symptoms, 9.5 % of the effect of gender on somatic complaints, and 23.2 % of the effect of gender on daily distress. The confidence intervals of the indirect effects were calculated using MacKinnon and colleagues' RMediation program (Tofighi and MacKinnon 2011), which calculates the asymmetric confidence interval based on the distribution of the products. The confidence intervals do not include zero, consistent with statistically significant mediation (depressive symptoms: [.07, .37]; somatic complaints: [.01, .02]; daily distress: [.01, .03]).

Next, we entered positive family interactions into the third model to test whether positive family interactions counteracted the effects of negative interactions. Although positive family interactions relate to lower levels of internalizing symptoms, they do not account for significant variance in the gender difference. In fact, the original coefficients become slightly larger, suggesting a suppression effect. Moreover, negative family interactions continue to predict internalizing symptoms.

Finally, we tested whether negative family interactions account for gender differences in internalizing symptoms above and beyond negative peer interactions. Given that there were not gender differences in positive peer interactions, and positive peer interactions were not correlated with internalizing symptoms, we did not enter this variable into the model. Moreover, we did not include positive family interactions in this model, given that it did not mediate the association between gender and internalizing symptoms in the prior model. As shown in the last column of Table 3, negative peer interactions are associated with greater internalizing symptoms. Negative family interactions continued to predict increased internalizing symptoms above and beyond the effects of negative peer interactions. Mediation analyses accounting for negative peer interactions show that, although negative peer interactions account for a significant portion of the gender difference in internalizing symptoms (17.5, 19.6, and 17.2 %, respectively), negative family interactions continued to explain a significant portion of the gender difference.

Testing the Moderational Stress Exposure Model

Next, we examined whether positive and negative daily family interactions differentially relate to internalizing symptoms for boys and girls. Given that the moderator (daily family interactions) is a continuous variable, we computed an interaction term by centering daily family interactions and multiplying it by gender (effects coded male = −1, female = 1). The interaction term was then entered into multiple regression analyses along with the centered moderator (daily family interactions) and gender to predict internalizing symptoms. Both positive and negative family interactions along with both moderators were entered simultaneously into one regression analysis. Ethnicity and socioeconomic status were entered into the models as controls.

Whereas positive daily family interactions significantly moderated the gender difference in depressive symptoms, somatic complaints, and daily distress, negative family interactions did not moderate the gender difference (see Table 3). As shown by the slopes of the lines in Fig. 1, females who experienced greater positive family interactions on a daily basis showed significantly lower levels of internalizing symptoms, whereas males' symptoms remained the same at different levels of positive family interactions. Moreover, when positive family interactions were experienced on most days of the study period, the gender differences in internalizing symptoms were eliminated (i.e., the lines of both genders cross).

To determine at which frequency of positive family interactions the gender difference in internalizing symptoms is no longer significant (i.e., at what frequency do

Table 3 Moderating positive and negative daily interactions on gender differences in internalizing symptoms

	Depressive symptoms		Somatic complaints		Daily distress	
	B (SE)	β	B (SE)	β	B (SE)	β
Intercept	22.51 (.82)***		1.90 (.05)***		1.63 (.05)***	
Gender	1.19 (.32)	.14***	.09 (.02)	.17***	.07 (.02)	.13***
Latin-American	−1.07 (1.04)	−.06	−.11 (.07)	−.09	−.23 (.06)	−.21***
Asian	.55 (.98)	.03	.03 (.06)	.02	.01 (.06)	.01
Other ethnicity	.85 (1.09)	.04	.00 (.07)	.00	−.07 (.07)	−.06
SES	−.24 (.45)	−.02	−.06 (.03)	−.09	.01 (.03)	.01
Positive daily family interactions	−1.20 (.33)	−.14***	−.07 (.02)	−.14***	−.07 (.02)	−.13***
Gender × positive daily family interactions	−1.36 (.33)	−.16***	−.06 (.03)	−.09**	−.04 (.02)	−.08*
Negative daily family interactions	1.45 (.33)	.17***	.05 (.02)	.08*	.10 (.02)	.20***
Gender × negative daily family interactions	−.70 (.33)	−.08	−.02 (.02)	−.04	−.03 (.02)	−.06
R^2	.10		.08		.12	

SES = socioeconomic status; gender was coded males = −1, females = 1. This coding of gender made the intercept to be estimates for the overall sample in the study; ethnicity was dummy coded with adolescents from European backgrounds serving as the reference group

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

girls need to experience positive family interactions for their internalizing symptoms to be similar to boys' symptoms?), we used Stata11 (StataCorp, College Station, Texas) with the *margins* and *parmest* functions to explore the interactions (Ender 2010; Newson 2008). Figure 2 displays the gender difference for each internalizing symptom with the 95 % confidence interval. Where the confidence interval crosses 0 on the y-axis, the gender difference is no longer significant. As shown in the top graph, when positive daily family interactions are experienced on 71 % of days or more, the gender difference in depressive symptoms is no longer significant. For somatic complaints, the gender difference is no longer significant when positive daily family interactions are experienced on more than 78 % of days. Finally, for daily distress, the gender difference is no longer significant when positive daily family interactions are experienced on at least 86 % of days.

Finally, we tested whether positive family interactions differentially relate to internalizing symptoms for boys and girls above and beyond peer interactions, and whether peer interactions would similarly buffer the gender differences in internalizing symptoms. Using the same model as described in Table 2, we entered pos itive and negative peer interactions (centered), along with the interaction terms for gender × positive peer interactions and gender × negative peer interactions. The significant moderation for positive family interactions remained significant after accounting for peer interactions. Moreover, there were no significant moderations for peer interactions, suggesting that positive peer interactions do not have the same salutatory effects as positive family interactions.

Discussion

Internalizing symptoms begin to rise during adolescence, especially for girls who become more than twice as likely as boys to experience depressive symptoms by age 18 (Angold and Rutter 1992; Hankin et al. 1998). Such gender differences are found across cultures and nations, making it an important public health concern not only to explain why these gender differences emerge but also to identify protective factors that may mollify gender disparities in internalizing symptoms. The results of this study indicate that negative family interactions may be one reason why females experience heightened internalizing symptoms. Yet, even in the face of these heightened negative interactions, positive family interactions have salutatory effects, eliminating gender differences in internalizing. Importantly, our findings indicate that girls report low levels of internalizing symptoms at levels similar to boys only when positive family interactions are experienced on most days of the week.

According to the *Mediational Stress Exposure Model,* the emergence of gender differences in internalizing symptoms may be related to gender differences in the experience of daily stressors. Past research has shown that girls experience heightened interpersonal stressors and this accounts for their greater tendency to experience internalizing symptoms (Rudolph 2002; Hankin et al. 2007). Consistent with this model, we found that girls reported greater negative family interactions than boys, and this explained, in part, why girls also experienced greater internalizing symptoms. Interestingly, girls also experienced more positive family interactions, yet these positive

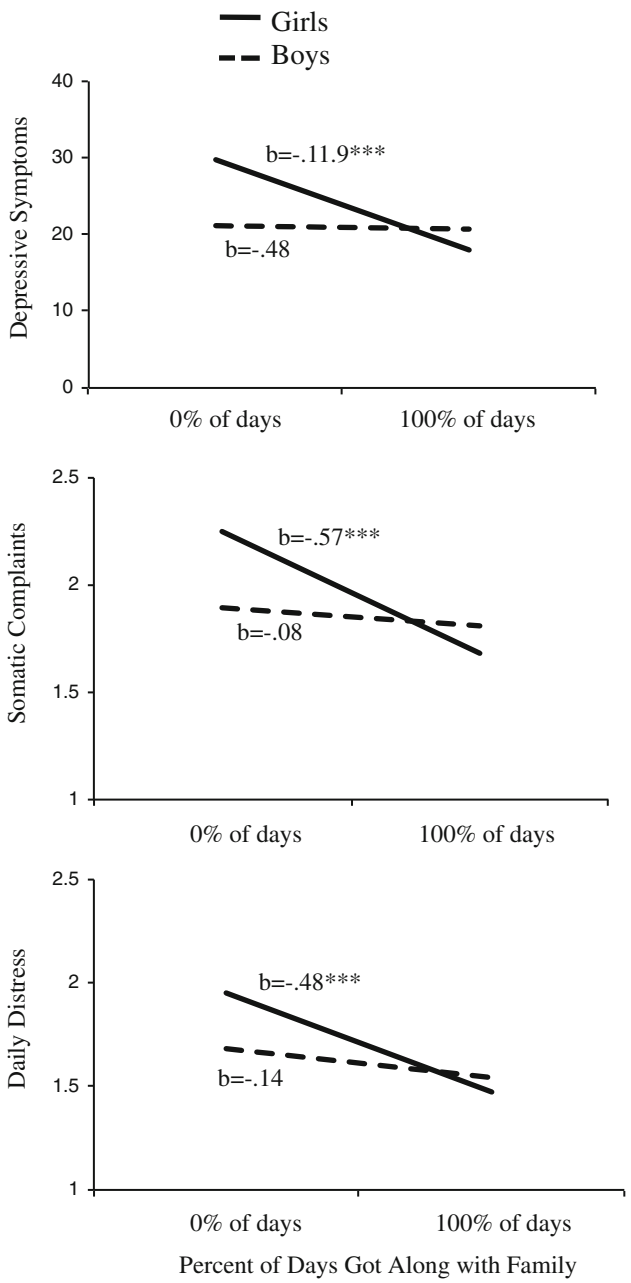

Fig. 1 Positive daily family interactions moderate gender differences in internalizing symptoms. Whereas girls' symptoms improve significantly as a function of their positive family interactions, boys' symptoms remain stable across different frequencies of positive family interactions. At low frequencies of positive daily family interactions, females report higher internalizing symptoms, but at high frequencies, these gender differences are eliminated. *Note* ***$p < .001$

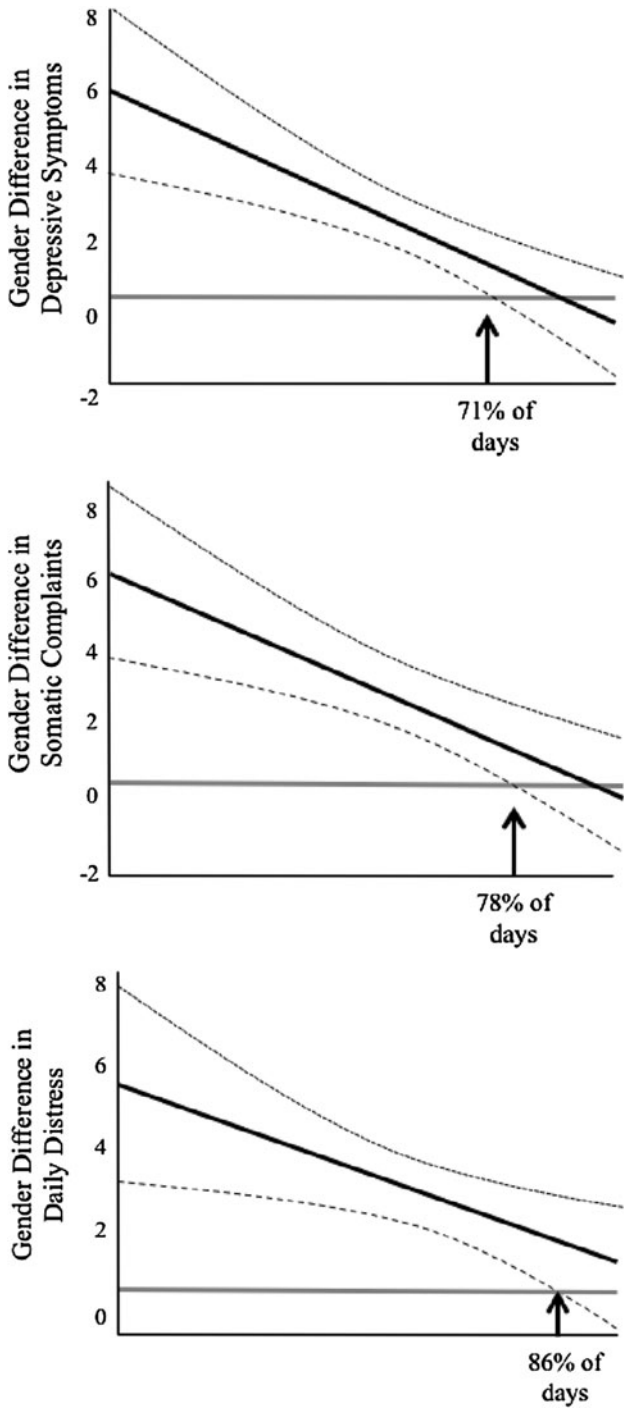

Fig. 2 Gender differences in internalizing symptoms are eliminated at high levels of daily family cohesion. The *graphs* represent the gender difference (*solid black diagonal line*) for each internalizing symptom with the 95 % confidence interval depicted with a *dotted line*. The gender differences decrease as the frequency of positive daily family interactions increases. When the 95 % confidence interval for the difference does not include zero, the gender difference is statistically significant. Where the 95 % confidence interval crosses 0 (i.e., touches the *horizontal grey line*), the gender difference is no longer significant. The percentage on the *x*-axis of each figure indicates at what frequency of positive daily family interactions (i.e., percent of days) the gender difference in each internalizing symptom is no longer significant

family relationships did not counteract the effects of negative interactions. Perhaps this is because girls need to experience high levels of positive interactions, given the large percentage of days that are needed to eliminate the gender differences in internalizing symptoms. These

findings speak to the deleterious impact of negative family interactions for girls' mental health.

Importantly, negative family interactions continued to explain gender differences in internalizing symptoms even after controlling for negative peer interactions. These findings highlight the salience and importance of family relationships for girls' mental health, even during late adolescence, a time when youth begin to place more emphasis on autonomy and peer affiliation. These findings are consistent with others who have found that unsupportive family relationships are predictive of adolescents' mental health, even above the effects of friendships (Greenberg et al. 1983; Raja et al. 1992). Negative peer interactions also accounted for a significant portion of the gender difference in internalizing symptoms, suggesting that both family and peer relations can have negative impacts on girls' well-being. Therefore, negative interpersonal experiences are salient for girls, and perhaps create an additive stressor, such that negative peer and family interactions each uniquely contribute to internalizing symptoms.

In contrast to the *Moderational Stress Reactivity Model* (e.g., Hankin et al. 2007; Shih et al. 2006; Davies and Lindsay 2004), we did not find that girls were more reactive than boys to negative family interactions. That is, negative family interactions similarly related to internalizing symptoms for both boys and girls. Some prior research has found that boys may be more sensitive to disruptive family relationships than girls (Tesser et al. 1989), whereas other research has found that girls are more sensitive than boys (Hankin et al. 2007; Shih et al. 2006; Fergusson et al. 1995), and we found that boys and girls are similarly reactive to negative family stressors. Thus, future research should attempt to resolve these conflicting findings, uncovering when and why boys or girls may be more reactive to interpersonal conflicts. Perhaps girls and boys differ in their emotional reactivity across different developmental periods (boys may be more reactive prior to puberty whereas girls may become more reactive post puberty), depending on the type of conflict (inter-parental conflict vs. parent–child conflict), or depending on the measure of well-being (internalizing vs. externalizing symptoms; Davies and Lindsay 2004).

Our most novel and important finding is that positive family interactions serve as a protective factor, eliminating gender differences in internalizing symptoms. At high levels of positive daily family interactions—when girls report getting along with their family on at least 71–86 % of days—girls no longer report greater internalizing symptoms than boys. These findings are the first to examine how positive family interactions experienced on a daily basis may be protective for females' internalizing symptoms. Given girls' greater emotional reactivity to interpersonal events (Flook 2012), as well as their tendency to rely on their family as a source of emotional support (Cyranowski et al. 2000), positive daily family interactions may provide girls with the companionship and support to protect them from the deleterious effects of negative life stressors, such as their greater experience of negative family and peer interactions. Furthermore, because girls strive for closer emotional communication (Cyranowski et al. 2000), positive daily family interactions may help girls to develop more effective emotion regulation abilities (Rudolph 2002; Schraedley et al. 1999). Thus, positive family relationships act as a protective factor, decreasing the likelihood of internalizing symptoms for females. Even in the face of higher levels of negative family relationships, positive family relationships are particularly protective for girls' mental health. These findings contribute to our understanding of how both negative and positive dimensions of adolescents' family life contribute to their well-being.

Interestingly, we did not find that positive peer interactions had the same salutatory effect for females as did positive family interactions. Prior work also has shown that positive affect with the family buffers against stress, whereas positive affect towards peers does not (Greenberg et al. 1983), suggesting that family relationships may have salutatory effects whereas peers may evidence more negative effects on youths' mental health. Perhaps females are particularly sensitive to parental closeness, and a lack of or change in positive family relations may relate to a greater orientation towards peers, and such peer relations may increase rather than protect against internalizing symptoms (Operario et al. 2006). Our findings suggest that positive interactions are salutatory for girls, but only within the context of family relations and not peer relations, underscoring the importance of positive family relationships for girls' well-being.

The use of daily diaries is a strong methodological tool in the current study, as it provides more reliable estimates of the frequency with which events occur (Bolger et al. 2003; Laurenceau and Bolger 2005). Rather than relying on adolescents' recollection of the frequency of their daily family interactions, our method of aggregating adolescents' daily reports allowed us to examine closely the *frequency* with which these events take place. Our findings indicate that girls report both getting along with and arguing with their family on more days than boys. Although the adolescent years are suggested to be a time of high family conflict, our results suggest that boys and girls report family conflict on less than 25 % of days whereas they get along with their family on nearly two-thirds of days. By using the daily diary method and aggregating the days to examine the frequency with which events occur, researchers and interventionists can gain a deeper understanding of the occurrence of stressors in adolescents' daily

lives. Future studies and the design of interventions can utilize the daily diary method to identify the frequency of other negative (e.g., school problems) and positive (e.g., school successes) events in youths' lives and how girls and boys differentially respond to and experience such events.

A few limitations should be acknowledged. First, our report of positive family interactions is based on a one-item daily event. Although previous research successfully has used single item measures in daily diary studies (Ong et al. 2006; Almeida et al. 1999; Chung et al. 2009), future studies should examine how multiple aspects of positive family interactions, such as eating meals together, and spending leisure time together, relate to gender differences in internalizing symptoms. In addition, our data are from one time point in 12th grade. Although internalizing symptoms peak in late adolescence, and gender differences are largest around age 17–18 (Angold and Rutter 1992; Hankin et al. 1998), future studies should examine how family interactions influence girls' and boys' internalizing symptoms across a wide age range. Moreover, the cross sectional nature of the study precludes our ability to test the direction of our effects. It is possible that girls tend to exhibit greater emotional problems by virtue of multiple processes (e.g., physiological, general stresses), and internalizing symptoms, in turn, may be a significant predictor of negative family interactions. Thus, causality might be bidirectional; negative family interactions might increase internalizing symptoms, and internalizing symptoms may increase negative family interactions. Future research should examine how internalizing symptoms and family relationships relate to one another across time. Finally, future studies should measure additional risk and protective factors, such as parental mental health. Maternal depression is related strongly to adolescent depression, and maternal depression may impact the quality of family interactions in the home. While our dataset is a sample of adolescents from diverse socioeconomic and cultural backgrounds, our sample is primarily from an urban area. Although we control for SES and ethnicity, suggesting that our findings are robust across these groups, future studies should examine adolescents from other types of neighborhoods, such as rural and suburban areas.

In summary, our results underscore the importance of day-to-day levels of positive family interactions for adolescent girls' mental health. When they experience positive family interactions on more days, gender differences in internalizing symptoms are eliminated. Preventive interventions should focus on improving the relational context of the family. Providing adolescents and their families with tools to interact in more positive ways, as well as reducing conflict, can have dramatic effects on girls' mental health. Focusing on positive events in youths' daily lives can help researchers to identify protective factors that may reduce the gender disparity in internalizing symptoms.

Acknowledgments Support for this study was provided by a Grant from the Russell Sage Foundation to Andrew J. Fuligni.

Author Contributions ET and AF, conceived of the study design, drafted the manuscript, participated in the design and interpretation of the data. ET performed the statistical analyses. All authors read and approved the final manuscript.

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