

ORIGINAL ARTICLE

A daily diary investigation of the influence of early family adversity on social functioning during the transition to adulthood

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Abstract

Early life stressors are associated with maladaptive social functioning in childhood and adolescence, but it is unclear whether and how the negative interpersonal effects of stress persist into adulthood. Daily diary surveys were used to examine young adults' social behavior and mood reactivity to social stressors as a function of experiences of early family adversity. Stressful early family environments predicted more daily reassurance seeking, but not aggression, withdrawal, or positive social behavior. Early family adversity also moderated the within-person effects of social stressors on next-day mood, such that individuals with high levels of adversity had elevated next-day negative affect in response to higher than average social stress. Findings highlight the enduring impact of early adversity on social development, with implications for developing targeted policies and interventions.

KEYWORDS

early experience, emerging adulthood, stress, social behavior

1 | INTRODUCTION

Stressful experiences early in life, particularly those associated with maladaptive family functioning (e.g., family conflict, maltreatment), are often associated with social impairment in childhood and adolescence (Bolger & Patterson, 2001; Fantuzzo, Weiss, Atkins, Meyers, & Noone, 1998; Howe & Parke, 2001). Moreover, mounting evidence suggests that certain types of early life stress continue to predict maladaptive social functioning during and after the transition to adulthood (e.g., Luecken, Rodriguez, and Appelhans, 2005; Styron & Janoff-Bulman, 1997). However, much of the current research on this topic with young adult participants utilizes self-report questionnaires of social behavior and experiences, or examines young adults' social functioning within the context of a laboratory. Additional research is needed to determine the specific ways in which the negative effects of early family adversity are translated into individuals' everyday social experiences across a variety of social contexts. Such research could identify the day-to-day social processes that are disrupted by early family adversity, and thereby identify targets for prevention and intervention efforts designed to ameliorate the negative mental health effects of early family adversity. The current study used

a daily diary framework to capture day-to-day variability in healthy young adults' social behavior and mood reactivity to social stressors, as a function of experiences of early family adversity.

The influence of early adversity on social behavior is particularly important to examine during adolescence and the transition to adulthood, when individuals are gaining more independence from their parents, and functioning in peer relationships becomes especially relevant for mental health (Daley & Hammen, 2002; Hartup, 1989; Lempers & Clark-Lempers, 1992; Schulenberg, Sameroff, & Cicchetti, 2004). Maladaptive social patterns during this developmental stage are likely to contribute to stressful interpersonal relationships that could serve as an important mechanism of the enduring effects of childhood adversity on emotional functioning (Green et al., 2010; Kessler et al., 2010; Levitan, Rector, Sheldon, & Goering, 2003). This is particularly true given the strong link between difficulties in interpersonal relationships and emotional disorders, such as depression (Hammen, 2005; Slavich, O'donovan, Epel, & Kemeny, 2010).

Much of the past research on early adversity and youth development has focused on the effects of experiencing childhood maltreatment, including severe abuse and neglect (e.g., Bolger & Patterson, 2001; Conaway & Hansen, 1989; Kaufman & Cicchetti, 1989). However, it is now clear that early adversities tend to co-occur at high rates, and that the negative emotional, social, and physiological effects of early adversity are likely not specific to maltreatment (Felitti et al., 1998; Green et al., 2010). Instead, maladaptive family functioning appears to serve as a vulnerability factor for exposure to multiple adversities that can have an iatrogenic effect throughout development (Green et al., 2010; Kessler et al., 2010; McLaughlin et al., 2010). This cluster of family-related adversities includes maltreatment, such as abuse and neglect, but also includes circumstances such as parental mental illness, substance use, and criminality (Green et al., 2010; Kessler et al., 2010; McLaughlin et al., 2010).

There are numerous genetic, emotional, cognitive, and neurobiological pathways by which this cluster of early family adversities might influence later social functioning. Family adversity tends to occur in the context of parental mental illness (Green et al., 2010), which can create genetic and behavioral risk for emotional distress in offspring. Individuals who suffer from emotional disorders, such as depression or anxiety, or who are at elevated risk for these disorders, in turn tend to show elevated rates of social impairment during adolescence and young adulthood (Davila & Beck, 2002; Hammen & Brennan, 2001). Moreover, chaotic or violent early family environments foster the development of cognitive biases that can contribute to maladaptive social behavior. For example, children and adolescents who have experienced family adversity tend to over-estimate the hostile intent of others (Dodge, Bates, & Pettit, 1990), and exhibit more insecure attachment styles in adulthood (Styron & Janoff-Bulman, 1997), both of which can contribute to problematic social patterns in peer relationships. In addition, early adverse family environments disrupt the acquisition of emotion regulation skills in children (Repetti, Taylor, & Seeman, 2002). Children who have experienced early family adversity endorse more pronounced and enduring negative emotions, including distress, anger, and fear, in response to acute stressors such as observing a parental conflict within a laboratory context (Ballard, Cummings, & Larkin, 1993; Davies & Cummings, 1998). This inability to regulate emotions in turn contributes to more stressful experiences in social relationships (Morgan, Izard, & Hyde, 2014; Repetti et al., 2002; Teisl & Cicchetti, 2007).

1.1 | Daily diary assessments of social functioning

Research using time-sensitive assessments, such as daily diary surveys or ecological momentary assessment (EMA), has begun to explore how the effects of early life and ongoing stressors on social behavior are translated into day-to-day experiences. These studies are an important complement to the majority of existing findings in this research area, which tend to relate early life stress to social and emotional functioning within the context of laboratory studies, or use retrospective reports at a single time point. In particular, daily diary studies provide a greater understanding of the time course of symptoms. For example, these methods can be used to test whether a stressful experience causes a greater severity of negative affect on the day of the stressor, and also whether this negative affect persists across a greater number of days for certain individuals. In addition, because daily diary methodology uses repeated measures within individuals, within-person processes can be modeled in addition to the between-person effects of stress. This permits a more nuanced understanding of the interplay between stress and social behavior for a given individual.

This type of daily diary methodology has been used successfully to track a variety of everyday interpersonal tensions, such as conflict with one's spouse or child, as well as individuals' behavioral reactivity to these tensions (e.g., Birditt, Fingerman, & Almeida, 2005). Past findings suggest that, in general, more minor, daily stressors play a significant role in health and emotional well-being (Bolger, DeLongis, Kessler, & Schilling, 1989; Lippold, Davis, McHale, Buxton, & Almeida, 2016), with interpersonal stressors often identified as the most impactful type of daily stressor (Bolger et al., 1989). Moreover, mood reactivity to stress differs within-persons across time, suggesting that it is important to model dynamic within-person processes with daily diary studies (Lippold et al., 2016; Sliwinski, Almeida, Smyth, & Stawski, 2009). That is, higher than usual stress for a particular person (regardless of whether it is a particularly high level of stress for the sample) is predictive of negative affect.

1.2 | Current study

The current study built upon past findings by examining whether an individual's exposure to early family adversity predicts his or her daily social behavior and stress reactivity, while taking into account both within-person and between-person processes. Each participant completed a self-report questionnaire about experiences of adversity in his or her family of origin during childhood, and then completed daily surveys about social experiences and mood for 14 consecutive days. In contrast to studies that have focused exclusively on specific, severe forms of early family adversity, such as physical or sexual abuse, our measure of family adversity captured a wide range of stressful early family environments, including exposure to domestic violence, chaos and disorganization in the family structure, lack of parental warmth or caring, and experiences of physical abuse and neglect. Assessments of social behavior and stressful experiences were not specific to a particular relationship (e.g., peers, family members), but instead provided information about each individual's general levels of problematic social behavior and social stress across all relationships in young adulthood.

We chose to examine two aspects of daily social functioning that might be particularly relevant to risk for negative outcomes such as peer rejection and depression. First, we tested associations between levels of family adversity and four categories of social behavior that have been consistently linked to early adverse experiences in past research with children: aggression, withdrawal, reassurance-seeking, and positive social behavior. Prior studies of children have shown that severe stressors such as maltreatment are associated with elevated rates of aggression (Bolger & Patterson, 2001; Conaway & Hansen, 1989; Kaufman & Cicchetti, 1989; Teisl & Cicchetti, 2007) and withdrawal (Kaufman & Cicchetti, 1989), as well as decreased prosocial behavior (Conaway & Hansen, 1989; Howes & Espinosa, 1985). There is also evidence that exposure to family adversities other than maltreatment, such as maternal mental illness (Hammen & Brennan, 2001), marital conflict, and domestic violence (Kitzmann, Gaylord, Holt, & Kenny, 2003) predicts social impairments in offspring. As a result, we hypothesized that young adults who report higher levels of family adversity would also report elevated rates of daily aggression and withdrawal, as well as reduced positive social behaviors, on average, across the study period. In addition, daily levels of reassurance-seeking were expected to be higher in young adults who experienced family adversity, given that early adverse experiences contribute to insecure attachment (McCarthy & Taylor, 1999; Styron & Janoff-Bulman, 1997), which in turn has been associated with excessive reassurance-seeking behavior (Shaver, Schachner, & Mikulincer, 2005).

Second, we examined the moderating role of early adverse family environments on within-person daily affective reactivity to stressful social interactions. Past research within a laboratory context has shown that early family adversity can lead to deficits in emotion regulation in response to an acute stressor (Ballard et al., 1993; Davies & Cummings, 1998). However, it is less clear whether individuals who have experienced family adversity also show higher levels of negative emotion, including distress, anger, and fear, in response to naturally occurring stressors in everyday life. We hypothesized that individuals with higher levels of early family adversity would show elevated mood reactivity to social stressors (i.e., stronger associations between within-person levels of daily social stress and same-day and next-day levels of negative affect) in naturalistic social contexts. Given that women generally report higher rates of reactivity to interpersonal stressors (Kelly, Forsyth, & Karekla, 2006; Kudielka, Buske-Kirschbaum, Hellhammer, & Kirschbaum, 2004), we also explored the role of gender in early family adversity's effects on mood reactivity.

2 | METHOD

2.1 | Participants

Participants were 129 students (66% female) enrolled in psychology courses and offered course credit for completion of the study. Participants' ages ranged from 18 to 31 years old ($M = 19.90$, $SD = 1.97$; median = 20.00), and the sample was ethnically diverse, (43% Asian, 30% European American, 15% Latino, 5% African American, 8% Multiracial). Participants were part of a larger study examining the effects of early life adversity and health. Exclusion criteria included experiences of sexual abuse, past or present diagnosis of Posttraumatic Stress Disorder (PTSD), a major medical or health problem (e.g., asthma, diabetes), steroid medication use, or a body mass index greater than or equal to 30. Participants were recruited to represent a range of early family adversity scores on the risky families questionnaire (RFQ), a well-validated questionnaire designed to assess perceived levels of conflict and parental warmth in family environments (Taylor, Lerner, Sage, Lehman, & Seeman, 2004).

2.2 | Procedure

Participants who met criteria for the study attended a baseline visit, during which they were instructed on how to complete daily diary assessments. Participants completed the first daily diary assessment on the night of the baseline visit, and the remaining daily diary assessments on the following 13 days. Each evening an automated email message reminded participants to complete daily diaries at bedtime (between 20:00 and 03:00), and provided a link to the daily diary website. To encourage compliance, participants who completed all daily diary surveys on time were entered into a drawing for gift certificates. Participants all gave informed consent, and the institutional review board of the University of California, Los Angeles approved the research protocol.

2.3 | Measures

2.3.1 | Early adversity

The RFQ was administered at pre-screening to measure levels of early adversity, as described above. The RFQ was designed to capture a wide range of dysfunction within families, which can include, but is not limited to, more extreme cases of physical or sexual abuse (Repetti et al., 2002). Questions assess whether participants have been exposed to family stressors such as abuse, neglect, family substance abuse, a chaotic or disorganized household, family conflict or violence, and a lack of nurturance or physical affection. Example items include, "How often would you say that a parent or other adult in the household behaved violently toward a family member or visitor in your home?" and "How often did a parent or other adult in the household push, grab, shove, or slap you?" Participants report the extent to which they have been exposed to each stressor between the ages of 5 and 15 on a scale from 1 "not at all" to 5 "very often." The RFQ has shown high agreement with clinical interviews designed to assess early life stress, and scores on the RFQ have been reliably linked to adverse mental and physical health outcomes (Lehman, Taylor, Kiefe, & Seeman, 2005; Taylor et al., 2004). Scores across all items were averaged, and higher scores indicate greater family adversity.

2.3.2 | Daily social behavior

Social behavior was assessed using 21 questions about daily reassurance-seeking (five items; e.g., "I found myself asking the people I feel close to how they *truly* feel about me."), withdrawal (five items; e.g., "I avoided others"), aggressive behavior (seven items; e.g., "I got so mad I yelled at or insulted someone"), and positive social behavior (four items; e.g., "I showed affection toward someone else"). Due to a lack of comprehensive social behavior assessments validated for within-person daily diary studies, questions were drawn from a variety of measures, including the Depressive Interpersonal Relationships Inventory (Joiner, 1994), the Inventory of Interpersonal Problems—48 item version (Gude, Moum, Kaldestad, & Friis, 2000), the Aggression Questionnaire (Buss & Warren, 2000), and the relational aggression subscales of the Revised Self Report of Aggression and Social Behavior (Morales & Crick, 1999). These items were chosen because they have been shown to be representative of overall reassurance-seeking, withdrawal, aggression, and

positive social behavior in a college student sample, and are also likely to occur on a daily basis. Each social behavior was endorsed as either present or absent each day, and if an item was endorsed as present, participants were asked to report how many times it occurred that day. Counts of reassurance-seeking, withdrawal, aggression, and positive social behavior were used as four social behavior outcomes.

2.3.3 | Daily social stress

A checklist of 14 social stressors was administered each day. Again, in order to create a scale appropriate for a daily diary study within a college student sample, items were drawn from instruments designed to elicit self-reports of recent social stress, including the social conflict subscale of the Diary of Ambulatory Behavioral States (Kamarck et al., 1998), the Inventory of Small Life Events (Zautra, Guarnaccia, & Dohrenwend, 1986), the Objective and Subjective Event Checklist (Seidlitz & Diener, 1993), and the Brief Adolescent Life Event Scale (Shahar, Henrich, Reiner, & Little, 2003). Items were chosen to represent a range of negative social experiences that might occur on a daily basis, such as rejection, conflict, and criticism. Example items include "had an argument/problem with significant other" and "was rejected or excluded from a group event (party, group project, etc.)." Participants endorsed each item as either present or absent over the past day, and if an item was marked as present, indicated the number of times that the event occurred throughout the day. A count of all events endorsed for a given day was then used as a measure of daily social stress.

2.3.4 | Daily negative affect

Daily negative affect was assessed using 10 items that represent the General Negative Affect Dimension Scale from the Positive and Negative Affect Scales-Expanded Form (PANAS-X; Watson & Clark, 1999). The PANAS-X is a validated measure of positive and negative affect, for which participants rate the extent to which they have felt each feeling state (e.g., afraid, irritable, distressed) over the past day from 1 (very slightly or not at all) to 5 (extremely). Items were summed to create an overall measure of negative affect, with higher scores indicating greater negative affect.

2.4 | Data analysis

Hypotheses were examined using hierarchical linear modeling (HLM), which accounts for the nesting of time points within individual by estimating both within-person (Level 1) and between-person (Level 2) error variances (Raudenbush & Bryk, 2002; Raudenbush, Bryk, & Congdon, 2004). The effects of early family adversity on social behaviors were examined using four separate HLM functions, each predicting a different type of daily social behavior from RFQ score. The following is an example of the HLM functions tested.

$$\begin{aligned} \text{AGG}_t &= \pi_0 + \pi_1(\text{DAY}_t) + e_t \\ \pi_0 &= \beta_{00} + \beta_{01}(\text{GENDER}_j) + \beta_{02}(\text{AGE}_j) + \beta_{03}(\text{ETHNICITYD1}_j) \\ &\quad + \beta_{04}(\text{ETHNICITYD2}_j) + \beta_{05}(\text{RFQ}_j) + u_{0i} \\ \pi_{1j} &= \beta_{10} \end{aligned}$$

AGG_t is a Level 1, within-person variable that represents the number of aggressive behaviors reported on day *t* for a given individual. RFQ score, the between-person predictor of social behavior, was entered as a grand-mean centered variable on Level 2. Time effects across the course of the study were controlled for by entering day of the study on Level 1, and gender (0 = male, 1 = female), age (grand-centered), and ethnicity were entered as covariates on Level 2. Given the high percentages of European American and Asian American students, ethnicity was incorporated into the model by creating two dummy codes that represented "Asian American versus other" and "non-Asian American minority group versus other," with European Americans coded as the reference group.

Next, the moderating effects of early family adversity on the relationship between daily social stress and negative affect on a given day were examined using the following HLM functions.

$$\begin{aligned} \text{NEGAFFECT}_t &= \pi_0 + \pi_1(\text{DAY}_t) + \pi_2(\text{NEGAFFECT}_{t-1}) + \pi_3(\text{SOCSTRESSWI}_t) + e_t \\ \pi_{0j} &= \beta_{00} + \beta_{01}(\text{SOCTRESSBW}_j) + \beta_{02}(\text{GENDER}_j) + \beta_{03}(\text{AGE}_j) \\ &\quad + \beta_{05}(\text{ETHNICITYD1}_j) + \beta_{06}(\text{ETHNICITYD2}_j) + \beta_{06}(\text{RFQ}_j) + u_{0j} \\ \pi_{1j} &= \beta_{10} \\ \pi_{2j} &= \beta_{20} \\ \pi_{3j} &= \beta_{30} + \beta_{31}(\text{RFQ}) + u_{3j} \end{aligned}$$

NEGAFFECT_t represents the level of negative affect on Day_t for a particular individual. The Level 1 predictor of interest, daily social stress, was person-centered, such that SOCSTRESSWI_t represents within-person fluctuations in social stress around participants' average levels of daily social stress across all 14 days of the study. The between-person effects of social stress on negative affect (SOCSTRESSBW_j) were then accounted for by adding this variable as a predictor of the intercept on Level 2. This method allows for the disaggregation of within-person and between-person effects of social stress on negative affect (Mroczek & Almeida, 2004; Raudenbush & Bryk, 2002; Scholz, Kliegel, Luszczynska, & Knoll, 2012). Prior day negative affect (NEGAFFECT_{t-1}) was included as a Level 1, within-person covariate to account for the potentially confounding effects of continuity of negative affect across days. Time effects (DAY_t) were included as a covariate on Level 1, and gender, age, and ethnicity were included as covariates in Level 2 of the model.

We also ran time-lagged models to test the effects of daily social stress on *next-day* negative affect. This question was examined using this same set of functions as above, except that within-person fluctuations in the *prior day's* social stress level were used as the predictor in the Level 1 equation (SOCSTRESSWI_{t-1}).

Finally, exploratory analyses tested the role of gender in these processes by including a three-way cross-level interaction between gender, family adversity, and within-person daily variations in social stress in two models predicting same-day and next-day negative affect. See below for an example of the HLM functions used to test this question.

$$\begin{aligned} \text{NEGAFFECT}_t &= \pi_0 + \pi_1(\text{DAY}_t) + \pi_2(\text{NEGAFFECT}_{t-1}) + \pi_3(\text{SOCSTRESSWI}_t) + e_t \\ \pi_{0j} &= \beta_{00} + \beta_{01}(\text{SOCTRESSBW}_j) + \beta_{02}(\text{GENDER}_j) + \beta_{03}(\text{AGE}_j) \\ &\quad + \beta_{04}(\text{ETHNICITYD1}_j) + \beta_{05}(\text{ETHNICITYD2}_j) + \beta_{06}(\text{RFQ}_j) + \beta_{07}(\text{RFQ}_j \times \text{GENDER}_j) + u_{0j} \\ \pi_{1j} &= \beta_{10} \\ \pi_{2j} &= \beta_{20} \\ \pi_{3j} &= \beta_{30} + \beta_{31}(\text{RFQ}) + \beta_{32}(\text{GENDER}) + \beta_{33}(\text{RFQ} \times \text{GENDER}) + u_{3j} \end{aligned}$$

3 | RESULTS

Descriptive statistics and example items for daily diary questionnaires are presented in Table 1. Participant scores on the RFQ averaged 2.12 (*SD* = 0.69), and ranged from 1.00 to 4.46 across the sample, indicating a wide range of family adversity experiences. Levels of family adversity did not differ by gender ($t(127) = -0.32, p = .75$) and were not correlated with age of participant ($r = -.04, p = .64$). Levels of reported early family adversity did differ by ethnicity ($F(2, 126) = 4.81, p < .05$). Post hoc Bonferroni-corrected *t*-tests were run to explore these differences, and showed that participants in the "other" category (African American, Latino, or Multiracial) reported significantly higher levels of early family adversity than European American participants ($t(126) = 3.09, p < .01$). On average, participants completed 12.48 (*SD* = 2.22) out of 14 daily diaries and completed 92% (*SD* = 26%) of submitted surveys on time, a rate comparable to or better than that of other daily diary studies conducted in college student samples (e.g., Covault et al., 2007; Sahl, Cohen, & Dasch, 2009). Individuals with higher levels of family adversity also reported higher levels of daily social stress ($b = 1.22, SE = 0.36, p < .01$) and negative affect ($b = 1.39, SE = 0.61, p < .05$) on average across the 14 days, when co-varying for gender, age, ethnicity, and day of study. Pearson correlations between an individual's level of family adversity and average scores across days for individual daily social stress items ranged from $r = .07 (p = .44)$ for the item "had an argument with a family member" to $r = .43 (p < .001)$ for the item "friends weren't available when I

TABLE 1 Descriptive statistics and example items for daily diary measures

Variable	M (SD)	Autocorrelation b (SE)	Cronbach's α	Most highly endorsed items
Risky families questionnaire	2.12 (0.69)	-	0.87	<ol style="list-style-type: none"> 1. How often would you say there was quarreling, arguing, or shouting between your parents? 2. How often would you say there was quarreling, arguing, or shouting between a parent and you?
Social behaviors				
Aggression	1.05 (2.99)	0.37** (0.02)	0.88	<ol style="list-style-type: none"> 1. Was mean to others. 2. Spread rumors or gossiped about someone.
Reassurance-seeking	1.77 (3.36)	0.35** (0.02)	0.74	<ol style="list-style-type: none"> 1. Posted something on social media or checked for responses to see whether others like me. 2. Sought reassurance from people I feel close to as to whether they really care about me.
Withdrawal	1.61 (3.30)	0.31** (0.02)	0.89	<ol style="list-style-type: none"> 1. Felt like being alone rather than spending time with others. 2. Avoided someone
Positive social behavior	6.40 (5.87)	0.34** (0.02)	0.86	<ol style="list-style-type: none"> 1. Showed affection toward someone else. 2. Sent or received an enjoyable letter/email/phone call from someone
Social stressors				
	1.61 (3.97)	0.13** (0.02)	0.85	<ol style="list-style-type: none"> 1. Someone teased or made fun of me. 2. I was criticized by someone.
Negative affect				
	15.98 (6.23)	0.26** (0.03)	0.93	<ol style="list-style-type: none"> 1. Distressed 2. Nervous

Note. The autocorrelation for each daily measure represents the lag1 (i.e., day_{t-1} to day_t) autocorrelation and indicates the amount of consistency or reliability in the measure across days of the study.

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

wanted to socialize." The median correlation between family adversity and average scores for individual social stress items was $r = .19$.

3.1 | Family adversity and daily social behavior

Results for analyses examining the between-person effects of early family adversity on average daily social behavior are presented in Table 2. Individuals who reported higher levels of early adversity reported more instances of daily reassurance seeking across the 2-week period, co-varying for the effects of gender, age, ethnicity, and study day. Family adversity did not predict daily aggressive behavior, withdrawal, or positive social behavior.

3.2 | Family adversity, daily social stress, and negative affect

First, the moderating effect of family adversity on the day-to-day relationship between person-centered social stress and *same-day* negative affect was examined. In main effects analyses (see Table 3), between-subject differences in average social stress levels across the 14 days of the study predicted daily negative affect, such that individuals who reported higher than average social stress levels, relative to the rest of the sample, also had higher daily negative affect. Importantly, within-person fluctuations in daily social stress were also associated with negative affect, such that higher than average social stress (relative to one's own central tendency) was associated with significantly higher levels of negative affect on a given day, even after co-varying for the continuity of negative affect across days. However,

TABLE 2 Effects of early family adversity on daily social behavior

Predictors	Reassurance-seeking			Aggression			Withdrawal			Positive social behavior		
	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>
For overall intercept												
Intercept, β_{00}	3.23	1.77	0.07	2.39	1.18	<0.05	3.26	1.36	<0.05	10.54	3.90	<0.01
Gender, β_{01}	0.15	0.18	0.39	-0.10	0.12	0.38	-0.03	0.14	0.84	0.45	0.39	0.25
Age, β_{02}	-0.04	0.09	0.61	-0.06	0.06	0.33	-0.04	0.07	0.56	-0.07	0.19	0.72
Ethnicity ^a (D1), β_{03}	-0.09	0.41	0.73	-0.04	0.27	0.89	-0.22	0.31	0.48	-1.75	0.89	0.05
Ethnicity (D2), β_{04}	-0.16	0.46	0.73	-0.19	0.31	0.54	-0.25	0.35	0.47	-1.44	1.01	0.16
Family adversity, β_{05}	0.59	0.25	<0.05	0.24	0.17	0.16	0.35	0.20	0.08	0.82	0.55	0.14
For day of study slope												
Intercept, β_{10}	-0.11	0.01	<0.001	-0.05	0.01	<0.001	-0.13	0.01	<0.001	-0.25	0.02	<0.001

Note. Variables indented under the overall intercept (i.e., gender, age, ethnicity, and family adversity) are between-person or Level 2 variables, while the day of study variable is a within-person or Level 1 variable.

^aIn all analyses, European American participants are coded as the reference group. That is, Ethnicity (D1) represents Asian American participants (1) versus other participants (0), and Ethnicity (D2) represents participants who identified with a minority racial/ethnic group other than Asian American (1) vs. other participants.

between-person levels of family adversity did not moderate this relationship between within-person variations in stress and negative affect (see Table 4).

Next, the moderating role of family adversity in the effects of daily social stress on *next-day* negative affect was examined. Main effects analyses showed that between-subjects differences in social stress predicted next-day negative affect, such that individuals who reported greater social stress, on average, across all 14 days of the study also reported greater levels of negative affect the next day. In contrast, within-person fluctuations in social stress were not associated with the next day's negative affect when co-varying for the effects of the previous day's negative affect (see Table 3). However, there was a significant interaction between an individual's exposure to family adversity and within-person fluctuations in daily social stress in predicting next-day negative affect (see Table 4). Simple slope analyses

TABLE 3 Main effects of daily social stress on same-day and next-day negative affect

Predictors	Same-day negative affect			Predictors	Next-day negative affect		
	<i>b</i>	<i>SE</i>	<i>p</i>		<i>b</i>	<i>SE</i>	<i>p</i>
For overall intercept, π_0				For overall intercept, π_0			
Intercept, β_{00}	14.76	3.16	<0.001	Intercept, β_{00}	14.80	3.11	<0.001
Social stress person mean, β_{01}	0.55	0.11	<0.001	Social Stress person mean, β_{01}	0.52	0.10	<0.001
Gender, β_{02}	0.31	0.31	0.33	Gender, β_{02}	0.36	0.31	0.24
Age, β_{03}	-0.17	0.15	0.28	Age, β_{03}	-0.17	0.15	0.26
Ethnicity (D1), β_{04}	-0.69	0.71	0.33	Ethnicity (D1), β_{04}	-0.67	0.69	0.34
Ethnicity (D2), β_{05}	-0.10	0.79	0.89	Ethnicity (D2), β_{05}	-0.04	0.77	0.96
For Day _t slope, π_1				For Day slope, π_1			
Intercept, β_{10}	-0.01	0.03	0.80	Intercept, β_{10}	-0.03	0.03	0.31
For NegAffect _{t-1} slope, π_2				For NegAffect _{t-1} slope, π_2			
Intercept, β_{20}	0.24	0.03	<0.001	Intercept, β_{20}	0.25	0.03	<0.001
For Social Stress _t slope, π_3				For Social Stress _{t-1} slope, π_3			
Intercept, β_{30}	0.30	0.05	<0.001	Intercept, β_{30}	0.06	0.04	0.19

Note. Variables indented under the overall intercept (i.e., social stress person mean, gender, age, and ethnicity) are between-person or Level 2 variables, while the remaining variables are within-person or Level 1 variables. The within-person effect of interest (social stress on negative affect) is indicated by the Social Stress slope (π_3), while between-person effects are labelled as Social Stress person mean (β_{01}).

TABLE 4 The moderating role of family adversity in the relationship between daily social stress and same-day and next-day negative affect

Predictors	Same-day negative affect			Predictors	Next-day negative affect		
	<i>b</i>	<i>SE</i>	<i>p</i>		<i>b</i>	<i>SE</i>	<i>p</i>
For overall intercept				For overall intercept			
Intercept, β_{00}	14.77	3.16	<0.001	Intercept, β_{00}	15.19	3.10	<0.001
Social Stress person mean, β_{01}	0.53	0.11	<0.001	Social Stress person mean, β_{01}	0.45	0.10	<0.001
Gender, β_{02}	0.29	0.31	0.35	Gender, β_{02}	0.37	0.30	0.22
Age, β_{03}	-0.16	0.15	0.29	Age, β_{03}	-0.17	0.15	0.24
Ethnicity (D1), β_{04}	-0.78	0.71	0.27	Ethnicity (D1), β_{04}	-0.82	0.70	0.24
Ethnicity (D2), β_{05}	-0.26	0.81	0.75	Ethnicity (D2), β_{05}	-0.26	0.79	0.74
Family adversity, β_{06}	0.40	0.46	0.38	Family adversity, β_{06}	0.40	0.45	0.37
For Day slope, π_1				For Day slope, π_1			
Intercept, β_{10}	-0.01	0.03	0.83	Intercept, β_{10}	-0.03	0.03	0.28
For NegAffect _{t-1} slope, π_2				For NegAffect _{t-1} slope, π_2			
Intercept, β_{20}	0.24	0.03	<0.001	Intercept, β_{20}	0.25	0.03	<0.001
For Social Stress slope, π_3				For Social Stress slope _{t-1} , π_3			
Intercept, β_{30}	0.38	0.09	<0.001	Intercept, β_{30}	-0.05	0.06	0.47
Family adversity, β_{31}	-0.03	0.12	0.81	Family adversity, β_{31}	0.19	0.09	<0.05

Note. Variables indented under the overall intercept (i.e., social stress person mean, gender, age, ethnicity, and family adversity) are between-person or Level 2 variables, while the remaining variables are within-person or Level 1 variables. Within-person effects of social stress on negative affect are indicated by Social Stress slopes (π_3), and between-person effects are labelled as Social Stress person mean (β_{01}). Variables indented under the Social Stress slopes (π_3) involve cross-level interactions with daily social stress. The Family adversity x Social Stress interaction of interest is listed here (β_{31}).

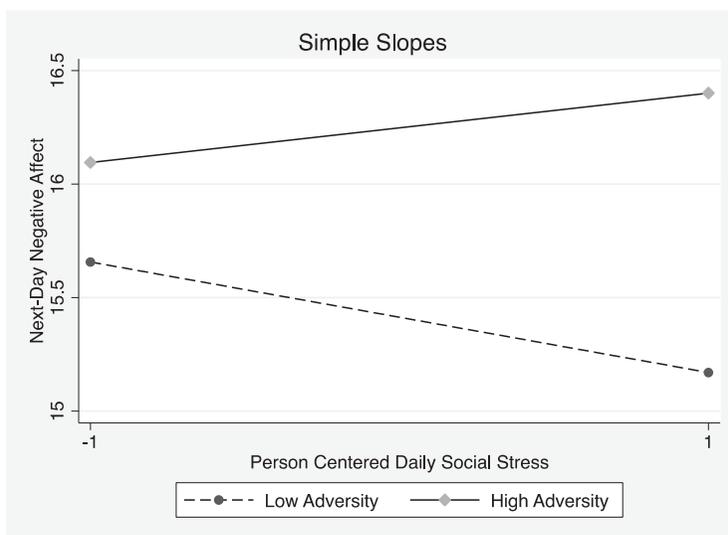


FIGURE 1 Individuals who reported high levels of childhood family adversity (1.5 standard deviations above the average for the sample) showed a positive association between within-person variations in daily social stress and next-day negative affect. In contrast, individuals who reported low levels of family adversity (1.5 standard deviations below the average for the sample) did not show a relationship between within-person variations in social stress and next-day negative affect

TABLE 5 Three-way interactions between gender, early family adversity, and within-person variations in social stress in predicting same-day and next-day negative affect

Predictors	Same-day negative affect			Predictors	Next-day negative affect		
	<i>b</i>	<i>SE</i>	<i>p</i>		<i>b</i>	<i>SE</i>	<i>p</i>
For overall intercept,				For overall intercept			
Intercept, β_{00}	14.29	3.31	<0.001	Intercept, β_{00}	14.46	3.25	<0.001
Social Stress person mean, β_{01}	0.53	0.11	<0.001	Social stress person mean, β_{01}	0.47	0.11	<0.001
Gender, β_{02}	0.58	0.63	0.36	Gender, β_{02}	0.71	0.61	0.25
Age, β_{03}	-0.15	0.16	0.34	Age, β_{03}	-0.16	0.15	0.30
Ethnicity (D1), β_{04}	-0.77	0.72	0.29	Ethnicity (D1), β_{04}	-0.77	0.70	0.28
Ethnicity (D2), β_{05}	-0.22	0.82	0.79	Ethnicity (D2), β_{05}	-0.20	0.80	0.80
Family adversity, β_{06}	0.24	0.77	0.75	Family adversity, β_{06}	0.18	0.75	0.82
Family adversity x Gender, β_{07}	0.25	0.93	0.79	Family adversity x Gender, β_{07}	0.30	0.91	0.74
For Day slope, π_1				For Day slope, π_1			
Intercept, β_{10}	-0.01	0.03	0.84	Intercept, β_{10}	-0.03	0.03	0.29
For NegAffect _{t-1} slope, π_2				For NegAffect _{t-1} slope, π_2			
Intercept, β_{20}	0.24	0.03	<0.001	Intercept, β_{20}	0.25	0.03	<0.001
For Social Stress slope, π_3				For Social Stress slope _{t-1} , π_3			
Intercept, β_{30}	0.44	0.16	<0.01	Intercept, β_{30}	-0.04	0.11	0.73
Family adversity, β_{31}	0.08	0.29	0.78	Family adversity, β_{31}	0.25	0.19	0.20
Gender, β_{32}	-0.10	0.19	0.61	Gender, β_{32}	-0.04	0.14	0.77
Family adversity x Gender, β_{33}	-0.12	0.31	0.70	Family adversity x Gender, β_{33}	-0.08	-0.22	0.70

Note. Variables indented under the overall intercept (i.e., social stress person mean, gender, age, ethnicity, family adversity, and the family adversity by gender interaction) are between-person or Level 2 variables, while the remaining variables are within-person or Level 1 variables. Within-person effects of social stress on negative affect are indicated by Social Stress slopes (π_3), and between-person effects are labeled as Social Stress person mean (β_{01}). Variables indented under the Social Stress slopes (π_3) involve cross-level interactions with daily social stress. The Family adversity x Gender x Social Stress interaction of interest is listed here (β_{33}).

were run to probe the nature of this interaction (see Figure 1). Results showed that, as expected, for individuals who had high levels of family adversity (i.e., 1.5 standard deviations above the mean for the sample), higher than usual social stress on a given day (relative to one's own average) predicted elevated next-day negative affect ($b = 0.15$, $SE = 0.07$, $p < .05$). In contrast, individuals with a history of low family adversity (i.e., 1.5 standard deviations below the mean) actually showed a negative (though not statistically significant) relationship between higher than usual social stress and next-day negative affect ($b = -0.24$, $SE = 0.15$, $p = .10$).

Finally, exploratory analyses examined the role of gender in the effects of family adversity on stress reactivity, by including a three-way interaction between gender, family adversity, and social stress as a predictor of negative affect (see Table 5). Results showed no significant moderating role for gender for same-day or next-day negative affect.

4 | DISCUSSION

The present study used a daily diary methodology to investigate the impact of early family adversity on day-to-day social behavior and reactivity to stressful social interactions in a sample of young adults. Consistent with our hypotheses, higher levels of reported family adversity were associated with higher levels of reassurance-seeking across a two-week period. In addition, early family adversity moderated the effects of within-person variability in social stress on negative affect, such that individuals who reported higher levels of early family adversity showed elevated negative affect the day after experiencing higher than average social stress. However, early family adversity was not associated with levels of aggressive, withdrawn, or positive social behaviors, and family adversity did not moderate the relationship between within-person variations in social stress and same-day negative affect.

Previous studies on the effects of early adversity on problematic social behaviors (e.g., aggression, withdrawal) have tended to examine these relationships in abused or neglected children. The current results extend this literature by suggesting that a more inclusive measure of risky early family environments predicts elevated reassurance-seeking, in healthy young adults. As such, results suggest that family environments that lack warmth or involve exposure to family chaos or violence can have an enduring impact on offspring social behavior, even if the child does not experience maltreatment. These results also expand upon past research by using a daily diary format, which is able to capture the occurrence of these problematic social behaviors within a naturalistic setting, across a number of relationship contexts. This type of daily diary methodology has recently become more popular in studies of social behavior, in part because it avoids overly generalized self-reports about participants' social behaviors (e.g., Birditt et al., 2005).

Although previous literature has not directly examined the effects of early family adversities on daily reassurance-seeking, this finding is consistent with evidence that early adverse experiences are associated with insecure attachment styles (Styron & Janoff-Bulman, 1997), which have in turn been linked to excessive reassurance-seeking (Shaver et al., 2005). Interestingly, current findings did not replicate past research showing that children who have experienced abuse and neglect tend to show higher levels of aggression and withdrawal (Kaufman & Cicchetti, 1989; Teisl & Cicchetti, 2007) and fewer positive social behaviors (Conaway & Hansen, 1989; Howes & Espinosa, 1985) in interactions with others. This is likely at least partially due to the fact that our sample consisted of relatively healthy students attending college with some, but not necessarily marked, early adversity exposure. Individuals who have experienced early family adversity, but have been able to function adequately in the social and academic contexts of college, might be less likely to show ongoing struggles with significant social deficits.

It is also possible that the cultural diversity of our sample, with 30% of participants identifying as European American and 43% identifying as Asian American, might contribute to differences between our findings and past research. For example, Asian American adolescents tend to engage in aggressive behaviors less frequently, on average, compared to European American and African American adolescents (e.g., Vazsonyi & Keiley, 2007). Future studies on culture and social behavior will therefore be needed to better define the types of dysfunctional behaviors that might arise from early family adversity within different subcultures in the United States. Moreover, evidence suggests that there might be different rates of certain family adversities across families from different racial and ethnic backgrounds (e.g., higher rates of physical abuse for African American and Asian American youth compared to European American youth; Elliott & Urquiza, 2006). At the same time, parenting patterns considered to be adverse within majority culture in the United States, such as corporal punishment, hostile control, and inconsistent parenting, are sometimes considered normative and often are not strongly related to offspring emotional difficulties in minority cultures (Elliott & Urquiza, 2006). As a result, future studies should adequately sample participants from diverse ethnic and racial backgrounds, so that analyses can account for the nuanced relationships among culture, early family experiences, and social functioning.

Results also showed that individuals who have experienced family adversity might be more likely to experience lingering effects of social stressors on their mood. Across the entire sample, individuals showed higher negative affect on days when they experienced more than usual social stress; however, only individuals with higher levels of early family adversity tended to experience higher negative affect the *day after* they experienced more than usual social stress. These findings are consistent with between-subjects evidence that children who have experienced early adversity show more intense and enduring negative affect in response to stressors (Ballard et al., 1993; Davies & Cummings, 1998), as well as a stronger relationship between stressful life events and depression in adulthood (Kendler, Kuhn, & Prescott, 2004; Starr, Hammen, Conway, Raposa, & Brennan, 2015).

However, most of these past studies on early adversity and stress reactivity have tended to use major life stressors or experimentally manipulated stressors in the laboratory, without exploring the timing of stress reactivity across a range of naturalistic settings. Using daily diary surveys across a two-week span, current findings show that individuals who have experienced elevated family adversity show prolonged reactivity to naturalistic, interpersonal stressors that occur on a day-to-day basis, consistent with past studies that have used a similar methodology (e.g., Birditt et al., 2005; Bolger et al., 1989). In particular, results suggest that for relatively high-functioning young adults who have experienced family adversity, differences in stress reactivity might not be evident in the intensity of one's immediate

reaction to a stressful social situation. Instead, early family adversity might affect an individual's ability to return to baseline in the days following an increase in negative affect. Moreover, this prolonged stress response might be missed if only between-person stress reactivity is modeled, further highlighting the importance of modeling both between- and within-person processes when examining stress reactivity (Lippold et al., 2016; Sliwinski et al., 2009). A more enduring stress response for these individuals could be due to higher rates of perseverative cognitive processes, such as rumination and worry, which have been shown to increase the duration of negative mood (e.g., Nolen-Hoeksema, 1991; Segerstrom, Tsao, Alden, & Craske, 2000), as well as interfere with one's ability to engage in interpersonal problem-solving (Lyubomirsky & Nolen-Hoeksema, 1995). It is also possible that higher rates of withdrawal, as well as difficulties in one's family of origin, might combine to create fewer social supports that could assist one in coping with difficult interpersonal situations.

It is important to note that individuals who reported higher levels of family adversity also tended to report higher levels of daily social stress. However, the within-subject nature of the data was able to statistically account for these higher baseline levels of stress. Regardless of how much daily social stress an individual tended to experience on average across the study, family adversity was a moderator of his or her next-day negative affect in response to *higher than usual* social stress for that individual. Thus, findings cannot be completely attributed to higher levels of daily social stress, on average, in participants with higher levels of early family adversity. Nevertheless, it is possible that interpersonal problems are experienced differently by individuals with a history of family adversity because they occur within a context of elevated stress burden.

Our analyses did not show main effects of gender on key outcomes, nor did we observe any moderating role of gender in the effects of early family adversity on stress reactivity. This is somewhat surprising, given that females tend to show higher rates of reactivity to interpersonal stressors (Kelly et al., 2006; Kudielka et al., 2004). However, it is important to note that our sample was approximately two thirds female, which limited the ability to detect a three-way interaction involving gender. Thus, further research examining the role of gender in the effects of stress on social functioning will be needed to replicate and extend our findings.

Several limitations of the current study should be acknowledged. First, as noted above, the college student sample used is likely not representative of the general population in terms of early childhood experiences. For example, the present sample likely represents less severe levels of family adversity, than a non-college student sample, and college students might also have reduced emotional reactivity to daily stressors compared to other individuals. Moreover, college students with high levels of family adversity might be more likely to benefit from certain resilience factors (e.g., non-familial social supports, high optimism, high intelligence), while other individuals with high levels of family adversity do not have these characteristics. It is also important to note that the exclusion criteria for the larger study did not allow for inclusion of college students with certain physical (e.g., obesity, asthma) and mental (e.g., PTSD) health conditions. Findings will therefore need to be replicated in more diverse community or clinical samples. Despite this limitation, the use of a relatively healthy, college student sample establishes that some negative social and emotional effects of early family adversity exist in the absence of confounding factors such as chronic mental or physical illness.

Second, given that there was only one assessment per day, it is impossible to know the temporal sequence of stressors and negative affect on a given day, particularly in same-day analyses. All analyses co-varied for the previous day's negative affect, which ensured that the findings were not simply accounted for by emotional symptoms on the previous day. However, multiple assessments per day are needed to fully untangle the temporal associations between social experiences and negative emotional outcomes. Moreover, contemporary assessment of family adversity would be preferable, in that it would allow for assessment of stressors during infancy and early childhood, as well as avoid potential bias in retrospective reports of early family environments (Hardt & Rutter, 2004; Maughan & Rutter, 1997).

Finally, brevity in daily diary measures is crucial for encouraging compliance. As a result, daily social stressors in the current study were not assessed using gold standard semi-structured interviews, such as the UCLA Life Stress Interview (Hammen, 2003), which could provide additional contextual information as a basis for independent rating teams to score the severity of each event given its circumstances and consequences. The subjective recall of daily social stressors was addressed to some extent in the current analyses by person-centering the daily social stress

variable. This method allows for examination of the effects of within-person fluctuations in daily social stress, which control for an individual's tendency to report relatively high or low levels of stress on average (Mroczek & Almeida, 2004; Raudenbush & Bryk, 2002). Nevertheless, these methods do not allow for objective evaluation of stressor severity. Moreover, measures of daily social behavior were created for this study, and future research is needed on the development and validation of daily diary scales for assessing social behavior on a frequent, within-person basis. Finally, current analyses focused only on negative affect. Future studies should examine whether early life experiences might shape mood reactivity to social experiences with respect to positive affect as well.

Despite these limitations, the present project addresses several important gaps in our understanding of the long-term impact of early adversity on social and emotional functioning. The use of a daily diary format tested whether models of the effects of early adverse family experiences on social functioning could be applied to a variety of naturally occurring social interactions. Results suggest that stressful early family environments can have an enduring impact on multiple aspects of social functioning, even in relatively healthy adults. These findings have important implications for policies and interventions designed to improve outcomes in youth exposed to a variety of stressors such as maltreatment, domestic violence, or poverty. For example, prevention efforts aimed at reducing child exposure to maltreatment, such as abuse and neglect, might be more impactful if they were designed to assess and address a broader range of family stressors, including a lack of parental warmth and more general exposure to conflict within the family. Moreover, training parents to engage in effective emotion socialization practices with their adolescent and young adult children might be a particularly helpful intervention for families identified as having low levels of warmth or high levels of conflict (e.g., Kehoe, Havighurst, & Harley, 2014).

Future research should explore the extent to which problematic social behaviors, such as reassurance-seeking and withdrawal, and social stress reactivity might mediate the negative effects of early adversity on quality of close relationships during the transition to adulthood. In addition, future research should investigate physiological alterations that might result from, or contribute to, prolonged reactivity to naturally occurring social stressors in individuals who have experienced family adversity. This slow return to baseline in response to social stress might be associated with chronic over-activation of, and therefore increased wear-and-tear on, stress-related biological systems (McEwen, 1998). Methodologies such as daily diaries and EMA, in combination with sampling of biomarkers, could help to clarify the time course of the effects of social stress across individuals with different early rearing environments. Such research has important implications for reducing the enduring social, emotional, and physical cost of growing up in a stressful family environment.

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NOTE

¹ In all analyses, European American participants are coded as the reference group. That is, Ethnicity (D1) represents Asian American participants (1) versus other participants (0), and Ethnicity (D2) represents participants who identified with a minority racial/ethnic group other than Asian American (1) vs. other participants.

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