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Regular Article

Negative affect reactivity to stress and internalizing symptoms over the transition to college for Latinx adolescents: Buffering role of family support

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Abstract

Affect reactivity to stress may play a role in the development of internalizing symptoms during the college transition, a critical developmental juncture for Latinx adolescents, the largest ethnic minority group on college campuses. This study examined whether affect reactivity during high school is associated with internalizing symptoms in college and explored two potential protective factors, perceived family and peer support. Participants were 209 Latinx adolescents (M_{age} = 18.10; 64.4% female) who completed standard surveys and four diary assessments per day over 7 days (N > 4,500 momentary observations). First, to measure affect reactivity, we assessed whether perceived stress was associated with negative affect at the momentary level during high school (senior year). Second, we tested whether affect reactivity predicted internalizing symptoms during the first year of college. Third, we tested whether perceived family or peer support buffered the negative consequences of affect reactivity. Results indicated statistically significant within- and between-person associations between stress and negative affect. Moreover, affect reactivity significantly predicted depressive, but not anxiety, symptoms. Buffering was found for family, but not peer, support. Findings extend previous research by detecting associations between momentary affect reactivity and internalizing symptoms during a sociocultural shift in Latinx adolescents' lives and have implications for culturally appropriate programs to prevent depressive symptoms.

Keywords: affect reactivity, college transition, internalizing symptoms, Latinx, social support

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Depression and anxiety are major public health burdens with significant consequences, including substance abuse, functional impairment, and physical health problems (e.g., Rice, Lifford, Thomas, & Thapar, 2007; Shankman et al., 2009; Sihvola et al., 2007). Stressful experiences, and in particular, individuals' cognitive and emotional reactions to stress, play a major role in the development of internalizing symptoms (Almeida, 2005). The transition from adolescence to young adulthood, including the entrance to college for many youth, is a critical developmental stage with unique ties to stress and increasing variability in mental health (Arnett, 2000; Eagan et al., 2017).

Currently, Latinx[1] individuals comprise 17% of the US population, and Latinx adolescents comprise one of the fastest growing ethnic minority groups (Stepler & Brown, 2016; US Census Bureau, 2015). Latinx adolescents may be particularly vulnerable to developing internalizing symptoms owing to increased exposure to stress (e.g., Jardin et al., 2018; McCord, Draucker, & Bigatti, 2019; Stein, Gonzalez, & Huq, 2012), though, see Georgiades, Paksarian, Rudolph, and Merikangas (2018) for an alternative account. Despite these potential stress-based vulnerabilities, important protective factors may buffer Latinx youth from risk for internalizing problems, such as perceived social support from peers and family (Neblett, Rivas-Drake, & Umaña-Taylor, 2012; e.g., Potochnick & Perreira, 2010). Focusing on protective processes among Latinx adolescents across the college transition is vital because they now comprise the largest ethnic minority group on college campuses, but, as a group, Latinx students are the least likely to graduate (Lopez & Fry, 2013). In addition to serving as a precursor for later health problems, internalizing symptoms has also been tied to college persistence rates (e.g., Arbona, Fan, & Olvera, 2018).

In the present study, we capitalized on an innovative ecological momentary assessment (EMA) design and longitudinal data to examine whether affective reactivity in high school (i.e., within-person relations between stress and negative affect) was associated with depressive and anxious symptoms in college in a sample of Latinx adolescents. Further we examined potential protective pathways by exploring whether family or peer support during the first year of college moderated such relations.

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[1]There are complex historical origins of the pan-ethnic labels "Latinx," "Latino/a," and "Hispanic," as well as individual and regional preferences for identifying terms. "Latinx" is used here as a gender-inclusive label to refer to an individual residing in the US with family ancestry in a Spanish-speaking country in Latin America, the Caribbean, and parts of the US that were formerly territories of Spain or México (Cardemil, Millán, & Aranda, 2019).

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Transition to college

The college attendance rate of Latinx students grew from 22% to 37% between 2000 and 2015 (McFarland et al., 2017). Despite this growing attendance, the 6-year graduation rates of Latinx students are still 10% lower than non-Latinx White students (Snyder, de Brey, & Dillow, 2019). The transition from high school to college is a distinctive period of identity development and new social and academic opportunities (Azmitia, Syed, & Radmacher, 2013), which can be accompanied by academic, interpersonal, and financial challenges (e.g., Beiter et al., 2015; Ross, Niebling, & Heckert, 1999). In addition to general daily stressors, many Latinx students experience stress resulting from ethnic-based discrimination, the process of acculturating to norms and expectations of mainstream US culture, and unwelcoming university environments (Aguinaga & Gloria, 2015; Corona, Campos, & Chen, 2017; Huynh & Fuligni, 2012; Juang, Ittel, Hoferichter, & Gallarin, 2016). Additionally, many Latinx students take on familial and work obligations while attending college, such as translating or assisting family members, which have been linked to higher stress (Sy, 2006). These factors may converge in a particularly stressful transition period, thereby contributing to students' persistence decisions (Aguinaga & Gloria, 2015) and internalizing symptoms (Arbona & Jimenez, 2014; Sirin, Ryce, Gupta, & Rogers-Sirin, 2013). In nationally representative samples of US college students, perceptions of stress are at an all-time high (Eagan et al., 2017; Pryor, Hurtado, DeAngelo, Palucki Blake, & Tran, 2010). Moreover, the experience of transitioning to college may exacerbate vulnerability to stressors (Compas, Wagner, Slavin, & Vannatta, 1986), though limited studies have examined this longitudinally in Latinx samples.

Stress, negative affect, and internalizing symptoms

In comparative studies, research has generally shown that Latinx adolescents have higher rates of depressive (Mikolajczyk, Bredehorst, Khelaifat, Maier, & Maxwell, 2007; Saluja et al., 2004), and anxiety (Anderson & Mayes, 2010; Varela & Hensley-Maloney, 2009) symptoms than non-Latinx White adolescents. However, there is significant variability in rates of internalizing symptoms among Latinx adolescents when other sociocultural and contextual factors are considered, including stress (e.g., Alegría, Canino, Stinson, & Grant, 2006, 2014; Georgiades et al., 2018). The relation between stress and depressive symptoms in Latinx adolescents is robust (Grant, Compas, Thurm, McMahon, & Gipson, 2004; McCord et al., 2019; Romero & Roberts, 2003). Stress may also play a role in the development and etiology of anxiety (e.g., Bolger & Zuckerman, 1995), though there have been mixed findings for stress–anxiety associations in Latinx samples (Badiee & Andrade, 2019; Hope, Velez, Offidani-Bertrand, Keels, & Durkee, 2018). Many studies conceptualize depressive and anxiety symptoms as a joint construct of internalizing or distress (e.g., Sirin et al., 2013), rather than focusing specifically on depression *and* anxiety.

Above and beyond reports of stress experiences, research points toward *affect reactivity* to stress as a key feature contributing to later internalizing symptoms. Affect reactivity refers to an emotional reaction to stress with symptoms of general distress, such as irritability, restlessness, and interpersonal sensitivity (Zinbarg, Anand, Lee, Kendall, & Nuñez, 2015). Negative affect in response to stress is a central theoretical link between stressful experiences and internalizing symptoms (Lazarus, 1993; Lovibond & Lovibond, 1995; Pascoe & Smart Richman, 2009).[2] Guided by this theoretical framework, recent research has isolated within-person relations between stress and negative affects at the daily level to better understand how an individual's negative affect changes relative to deviations from one's typical stress level. For example, in a sample of 58 middle-school-aged Latinx adolescents, Santiago et al. (2017) found a within-person association between daily stress and mood over 1 week of daily diary entries. In the same sample, Torres and Santiago (2018) found that daily family stress, but not economic stress, was linked to negative mood. In ethnically diverse samples, research has also shown within-person associations between daily stress/hassles and feelings of anxiety (Yip, Kiang, & Fuligni, 2008). Most relevant to the present study, we do not know of any study specifically addressing the distal association between these important momentary within-person relations and future internalizing symptoms in an adolescent Latinx sample, though Charles, Piazza, Mogle, Sliwinski, and Almeida (2013) have shown these distal relations in predominantly non-Latinx White adult samples.

Role of perceived social support from family and peers

There are two primary models that postulate how social support influences psychological outcomes (Cohen & Wills, 1985). The *main effect hypothesis* states that support fosters a positive environment, which should have a direct effect on promoting well-being and reducing internalizing symptoms, regardless of stress levels. Some research in Latinx adolescent samples has linked perceived family support with psychological health (Campos, Ullman, Aguilera, & Dunkel Schetter, 2014), and paternal support with depressive symptoms (Behnke, Plunkett, Sands, & Bámaca-Colbert, 2011). The *buffering hypothesis* states that support protects, or buffers, individuals from the consequences of stress. In support of the buffering hypothesis, a cross-sectional study of Mexican American college students found that both peer and parental support buffered the association between acculturative stress and anxiety symptoms, although only parental support buffered the association between acculturative stress and depressive symptoms (Crockett et al., 2007).

Theory and empirical evidence suggest that family influences are particularly central in the developmental and cultural ecologies of Latinx adolescents (e.g., Cupito, Stein, Gonzalez, & Supple, 2016). For example, many Latinx adolescents emphasize the role of the family through shared familism values (*familismo*; Sabogal, Marín, Otero-Sabogal, Marín, & Perez-Stable, 1987), sustain ties to cultural values via family connectedness (Dawson, Perez, & Suárez-Orozco, 2012), and routinely engage in family assistance behaviors (Telzer & Fuligni, 2009). As a guiding set of cultural values, *familismo* encourages family members to support one another (García-Coll & Vázquez García, 1995) and likely fosters environments that promote access to the benefits of social support (Corona et al., 2017, p. 549; Stein, Gonzalez, Cupito, Kiang, & Supple, 2015). For example, in an ethnically diverse sample of adults, higher familism values were associated with better psychological health via greater closeness to family members and perceived social support; familism values were higher for Latinx (and specifically Latina women) compared with European and Asian American adults (Campos et al., 2014). However, research has also found that peer support becomes

[2]This is distinct from more trait-like measures of negative affect or neuroticism, which also have links to internalizing symptoms (Watson et al., 1988).

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more central during college for students of color (Dennis, Phinney, & Chuateco, 2005; Juang et al., 2016), and peer support may make contributions to Latinx college students' wellbeing over and above family support (Rodriguez, Mira, Myers, Morris, & Cardoza, 2003). Following recent calls in the literature for more longitudinal work in this domain (Campos & Kim, 2017), we considered the roles of perceived support from both family and peers during the first semester of college as potential buffers in associations between affect reactivity in high school and internalizing symptoms in college.

The current study

In the present study, we tested three key questions longitudinally using a novel methodological approach in a sample of Latinx adolescents. Ethnic homogenous samples are advantageous for identifying variability and strengths among a diverse group, relative to ethnic group comparative designs that may reify a deficit framework by focusing only on ethnic minority–majority group differences (Fuller & García Coll, 2010; Gallo, Penedo, Espinosa de los Monteros, Arguelles, & Arguelles, 2009). First, we aimed to evaluate the within- and between-person associations between momentary stress experiences and negative affect in a Latinx sample during their senior year of high school, which falls at a critical developmental juncture, the transition to college. We hypothesized that at times when participants perceived higher than their typical levels of stress, negative affect would be higher (within-person association; i.e., affect reactivity; e.g., Santiago et al., 2017), and that participants with higher average stress overall would have higher negative affect (between-person association). Second, we evaluated whether adolescents' negative affect reactivity to stress, as indicated by the within-person relation between stress and negative affect, predicted depressive and anxiety symptoms in the first semester of college. We hypothesized that stronger affect reactivity to stress in high school would be associated with higher levels of depressive and anxiety symptoms (e.g., Charles et al., 2013; Lovibond & Lovibond, 1995). Third, we aimed to assess the potential buffering capacity of both perceived peer support and perceived family support during the first semester of college, the latter of which may be particularly salient for Latinx populations (e.g., Campos et al., 2014). Here, we hypothesized that adolescents who perceived higher degrees of family support would have a weaker association between affect reactivity to stress and depression and anxiety symptoms. We did not have strong theoretical predictions for peer support, and we treat those questions as exploratory.

To test these aims, we used multilevel modeling to examine the within-person relations between stress and negative affect, and we saved the Empirical Bayes slope estimates as indicators of affect reactivity. These estimates were then used as predictors of future depressive and anxiety symptoms in the first year of college. Using these estimates as predictors rather than outcomes is a novel approach. We know of only a few studies that used these estimates in this way (e.g., Bai & Repetti, 2018; Charles et al., 2013; Leger, Charles, & Almeida, 2018). This method allows us to examine change at a deeper level, considering how within-person change at the momentary level relates to future outcomes on a more distal time scale. We describe the analytic plan in detail in the Method section.

Most similarly to the current study, researchers (Charles et al., 2013) examined the long-term effects of affect reactivity to stress on affective outcomes 10 years later. Affect reactivity, measured via multilevel modeling at the daily level, significantly predicted general affective distress, self-reported disorder, and symptom-based diagnosis, although the latter was not significant after controlling for overall daily negative affect on stress-free days. A set of similar studies was conducted using concurrent and logged daily within-person relations between stress and negative affect to predict physical health outcomes (Leger et al., 2018; Piazza, Charles, Sliwinski, Mogle, & Almeida, 2013), and are examples of the potential gains in using these slopes as predictors of various outcomes. However, the present study differs from this earlier work in several key ways. First, our sample is comprised of adolescents, differing in age from the samples of adults used in the earlier studies (mean age at Wave 1: 55 in Leger et al., 2018; age range 25–74 given in Charles et al., 2013), allowing for direct inquiry into change processes at a critical developmental period. Second, our Latinx sample differs in ethnicity from the prior predominantly non-Latinx White (90–94%) samples. Third, we assessed family and peer support as potential moderators of the relation between affect reactivity and later internalizing, expanding focus to potential buffers that have implications for prevention. Fourth, our EMA data yielded four measures of stress and negative affect per day (26 measurement occasions total), rather than daily measures, assessing the association between stress and negative affect in a narrower time span. Finally, rather than focusing solely on the presence or absence of stress, we assessed the degree of stress at each measurement occasion.

Method

Participants

Participants consisted of $N = 209$ Hispanic/Latinx adolescents (84.7% Mexican, 8.6% South/Central American; 64.4% female) from over 90 high schools in the southwest US. Participants had varying immigrant generational status, parental education, and social class (see Doane et al., 2018 for a full description). Wave 1 occurred during (spring; 64.5%) or directly following (summer; 34.5%) participants' senior year of high school (December–July; M_{date} = April 27, $M_{age} = 18.10$, $SD_{age} = 0.41$). Wave 2 occurred during the fall of the adolescents' first year of college (September–December, M_{date} = October 20). Recruitment occurred via orientation sessions at a large southwestern university, e-mail, text, and phone calls, partnerships with university and community organizations, and word of mouth. Bilingual services were provided to potential participants and their parents. Inclusion criteria specified that participants needed to obtain acceptance into the university and pay or defer a deposit to indicate intent to enroll, be a high school senior identifying as Hispanic or Latinx, and live within a 60-mile radius from the focal university during their senior year of high school. Of the 239 adolescents that consented to participate, $N = 209$ formally participated in the study (5.9% did not meet inclusion criteria, 6.7% did not respond after consent).

$N = 207$ participants provided daily diary data used to estimate within-person associations between stress and negative affect. At the diary level, the overall percent missingness was 14%, which is lower than average for intensive longitudinal studies (Bolger & Laurenceau, 2013). The most common measurement occasions for participants to be missing on were (a) the final measurement occasion (31 participants) and (b) the final two measurement occasions (11 participants). The median percent missingness on any Wave 1 variable was 9% ($M = 15\%$, $SD = 16\%$), and the median percent missingness per person was 7% ($M = 14\%$, SD

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= 17%). The percent complete attrition at Wave 2 was 12% (N = 24 participants). Of the N = 185 participants who remained in the study at Wave 2, N = 175 participants provided complete data for all variables involved in the focal regression models of interest. This sample size achieves at least 80% statistical power (Faul, Erdfelder, Lang, & Buchner, 2007) for a regression coefficient between small and medium in size (f^2 = .045) in the most complex regression modeled in the present study. Given that maximum likelihood estimation was used to handle missing data (see the "Statistical analyses" section), which achieves greater statistical power than only using the N = 175 complete cases, this power analysis is conservative.

Procedure

All procedures were approved by the institutional review board as part of a broader longitudinal mixed methods study of the Latinx transition to college. Staff members obtained signed consent; parental consent was also collected if participants were under the age of 18. Forms were presented in the preferred language of the participant and their parent/guardian. During Wave 1, during the spring of senior year of high school for most adolescents, participants responded to a web-based survey, which included measures of depressive symptoms, anxiety symptoms, and participant demographic information including immigrant generation status, sex, and parental education. The survey was distributed either in-home or at a university lab, based on participant preference.

During the following week, participants provided information on stress in the last hour and negative affect using a web-based smartphone (97.5%) or paper and pencil (2.5%). This information was provided four times daily for 7 days: immediately after waking (M = 7:17a.m., SD = 1.70 hr), approximately 3 hr from waking (M = 12:21p.m., SD = 1.85 hr), approximately 8 hr from waking (M = 5:00p.m., SD = 1.68 hr), and at bedtime (M = 11:26p.m., SD = 1.45 hr). Participants initiated reports via links that were saved to their devices or on paper at waking and bedtime. Alerts were sent to participants to complete the two additional diary entries at varying times each day; the first alert was sent out between 2 and 4 hr postwaking (i.e., 2.5 hr postwaking on Monday, 3 hr postwaking on Tuesday) and the second alert was sent out between 7 and 9 hr postwaking. The mean number of complete diary entries provided by each participant was 21.00 (SD = 5.80). Note that an additional diary entry was completed approximately 30 min after waking (not a focus of these analyses; see Doane et al., 2018). The first sample occurred at bedtime on the first day (*Moment* = 1) and the final sample occurred in the morning on the eighth day (*Moment* = 26). Throughout the week, participants were reminded and staff were available to answer questions via text, e-mail, or phone. Following the daily diary portion, materials were collected by experimenters.

The second wave of data collection occurred during the participants' first semester of college. The average length of time between Wave 1 and Wave 2 survey assessments was 171.95 days (SD = 44.60 days; *range* = 85–313 days). Participants were contacted via e-mail, text, and phone to participate in a follow-up web-based questionnaire assessment. The N = 185 adolescents (89% retention) that completed the Wave 2 questionnaire did not significantly differ from the rest of the sample on key variables, such as Wave 1 depressive symptoms, anxiety symptoms, SES, and immigrant generational status. Participants were compensated for their participation at both waves of data collection.

Measures

The following sections outline the measures used both at Wave 1 (momentary level and standard survey measurements) and Wave 2 (standard survey measurements). When obtaining mean scale scores for the standard survey measures, we allowed for one missing item. However, item-level missingness for any measure was rare (on the relevant measures, no participant skipped more than a single item; the highest item level missingness was 4%).

Momentary stress

Stress at each measurement occasion was assessed by asking participants to "describe the most stressful situation or event you encountered in the past hour" and to rate "how stressful was this event?" on a 10-point scale, with 10 being the most stressful (Adam, 2006; Sladek, Doane, Luecken, & Eisenberg, 2016). For each stressful event reported and rated, participants were also asked to note whether or not the stressor was complete (63.8%) or was ongoing.

Momentary negative affect

Momentary negative affect was measured using the Negative Affect Scale of the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Carey, 1988). Items assessed the following seven negative emotions: distressed, upset, guilty, afraid, ashamed, nervous, and scared, on a 5-point Likert scale, from 0 (*very slightly/not at all*) to 4 (*extremely*). The mean of the seven items (allowing for three missing) was used as a measure of negative affect. Across the 26 measurement occasions, Cronbach's alpha ranged from .74 to .89 (M = .82, SD = .04).

Depressive symptoms

Depressive symptoms were measured at both Wave 1 and Wave 2 using the 20-item Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). Questions probed depressive symptoms over the past week, on a 4-point Likert scale from 0 (*rarely or none of the time (less than one day)*) to 3 (*most or all of the time (5–7 days)*). The four items with positive phrasing were reverse scored. The mean of the 20 items (allowing for one missing) was used in analyses as a measure of depressive symptoms. Given that suggested clinical cutoffs for depression from the CES-D are based on the sum scores, rather than the average, a sum scale score was also calculated at both waves to determine the percentage of the sample falling into normal (0–16), mild (16–22), and moderate to severe (>22; Roberts et al. 1990) symptom ranges. At Wave 1, the percentages of the sample falling into each category were 58.0%, 17.1%, and 24.9% for the increasing severities, respectively. At Wave 2, the corresponding percentages were 48.9%, 20.0%, and 31.1%. At both waves Cronbach's alpha was .89.

Anxiety symptoms

Anxiety symptoms over the previous week at both Wave 1 and Wave 2 were measured using the 14-item anxiety subscale of the Depression, Anxiety, and Stress Scales (DASS; Lovibond & Lovibond, 1995). Items were rated on a 4-point Likert scale from 1 (*did not apply to me at all*) to 4 (*applied to me very much, or most of the time*). Example items are "I was worried about situations in which I might panic and make a fool of myself" and "I perspired noticeably (e.g., hands sweaty) in the absence of high temperatures or physical exertion". The mean of the 14 items was used in analyses as a measure of anxiety symptoms (allowing for one missing). Clinical cutoffs are based on the

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0–3 scoring of the scale. Thus, to determine the percentage of the sample falling into distinct severities of anxiety symptoms at each wave, items were recoded to be on a 0 to 3 scale and the items were summed. At Wave 1, 59.2% of participants were in the normal range, 7.3% in the mild range, 18.9% in the moderate range, 7.3% in the severe range, and 7.3% in the extremely severe range. At Wave 2, the corresponding percentages were 44.7%, 12.8%, 22.4%, 9.5%, and 10.6% for normal, mild, moderate, severe, and extremely severe, respectively. Cronbach's alpha was .89 and .91, at Waves 1 and 2, respectively.

Perceived social support

Perceived emotional support from family and peers was assessed at Wave 2 with the Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet, & Farley, 1988). The scale was developed to assess support from several types of supporters, and it has been validated with ethnic minority samples (Canty-Mitchell & Zimet, 2000). Items were rated on a 5-point Likert scale, from 1 (*not at all true*) to 5 (*very true*). For the four items indicating family support, participants were asked to think about parents, brothers and sisters, cousins, aunts/uncles, and grandparents. An example item is "When you feel bad, you get the help and support you need from your family." The mean of the items (allowing for one missing) was calculated to measure perceived family support. Cronbach's alpha for the current sample was .90. For the four items indicating peer support, participants were asked to think about their friends. An example item is "You can talk about your problems with your friends." The mean of the items (allowing for one missing) was calculated to measure perceived peer support. Cronbach's alpha was .93.

Additional variables

Additional variables, selected along theoretical lines, were measured and included as covariates in the regression models predicting Wave 2 depressive and anxiety symptoms.[3] General perceived stress, included to adjust for concurrent levels of stress, was measured in the web-based survey at Wave 2 using the mean (allowing for one missing) of the four-item short form of the Perceived Stress Scale (Cohen & Williamson, 1991). Items probed feelings of stress over the past month and were scored on a 5-point Likert scale from 1 (*never*) to 5 (*fairly often*). An example item is "How often have you felt that you were unable to control the important things in your life?". The two positively worded items were reverse coded, before calculating the mean of the items as a measure of perceived stress. Immigrant generation status was measured using a 0–7 scale, where 0 indicates that the participant, both parents, and both sets of grandparents were born outside of the US, and 7 indicates that the participant, both parents, and both sets of grandparents were born in the US (Umaña-Taylor, Alfaro, Bámaca, & Guimond, 2009). Additional variables measured were participant sex, socioeconomic status (SES, indexed by participants' self-reported social class; measured on a 1–5 Likert scale, where 1 indicates upper class and 5 indicates working class), and whether the participant was living on campus or at home at Wave 2.

[3]We also ran all models, including each person's average negative affect at non-stressor moments as a predictor, which is consistent with Charles et al. (2013). Given considerable overlap between negative affect and Wave 1 depressive symptoms and given that average negative affect was not statistically significant in the multivariate models, we did not include this in final models. However, importantly, results for all other variables did not change meaningfully upon inclusion or exclusion of this variable.

Analytic strategy

For the diary measures at Wave 1, multiple measurement occasions are nested within individuals. Multilevel modeling accounts for this nesting and can isolate both within-person and between-person relations between stress and negative affect. In linear multilevel models, each individual has their own linear change equation, marked by an individual intercept and slope. In the present case, with appropriate centering, these participant-specific regression lines contain valuable information as indicators of affect reactivity: the individual-level concurrent within-person association between stress and negative affect. Notably, these within-person slopes may have important predictive implications for later internalizing symptoms.

Empirical Bayes slope estimates as predictors

Multilevel longitudinal analyses typically only use these individual slopes as outcomes. Importantly, these slopes can be estimated in two ways: ordinary least squares (OLS) and Empirical Bayes (EB). OLS slopes are not suited to use as predictors owing to imprecision and overestimation of between-person variation (see Singer & Willett, 2003). However, EB (model-based) slopes, used presently, represent an alternative, and are more precise than OLS slopes. Multilevel modeling yields fixed effects, which estimate population average effects, and random effects, which estimate how much individuals deviate from these averages. EB slopes effectively are a weighted average of OLS slopes and the population average estimates resulting from the fitted multilevel model. EB estimates take advantage of OLS slopes becoming more precise with decreasing residual variance, placing more weight on the individual-level OLS slope when residual variance is low and placing more weight on the population average estimates when residual variance is high, "borrowing strength" (Singer & Willett, 2003, p. 136).

Statistical analyses

Before fitting models, described below, to assess the three focal aims, a no-change (baseline) model was first fit to the EMA data to ensure that a multilevel model was appropriate. The intraclass correlation coefficient was $r = .44$, indicating considerable between- and within-person variation among the nested negative affect scores. A three-level no-change model was then fit, with moments nested within days nested within individuals. The intraclass correlation at the day level was $r = .03$, indicating negligible between-person variation across days, supporting a two-level model.

To test Aim 1, we fit a multilevel model predicting negative affect at each occasion. The Level 1 model can be written as:

$$NA_{ij} = \beta_{0i} + \beta_{1i}MomentC_{ij} + \beta_{2i}StressC_{ij} + \beta_{3i}CompleteC_{ij} + \epsilon_{ij}$$

NA_{ij} represents the negative affect for individual i at time j. $MomentC_{ij}$ represents each measurement occasion j for individual i, centered at the first moment (Day 1, evening). Preliminary analyses using a simple multilevel model with *Moment* predicting *NA* showed a small general trend of decreasing *NA* over the 26 measurement occasions ($b = -0.005$, $p < .001$). Thus, *Moment* was included in the model to appropriately detrend the data (Wang & Maxwell, 2015). Notably, results were essentially identical when *Moment* was not included in the model. $StressC_{ij}$ represents the stress reported by individual i at time j. *Stress* was person-mean centered to obtain the relevant within-person association:

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when an individual experiences higher stress relative to his/her own average, how does this influence negative affect (Hoffman & Stawski, 2009; Wang & Maxwell, 2015)? $CompleteC_{ij}$ indicates whether the stressor was completed or ongoing for individual i at time j, included as a covariate to control for whether the negative affect was in response to a completed or ongoing stressor, and centered at ongoing stress. ϵ_{ij} is the individual-level error for individual i at time j, and β_{0i}, β_{1i}, β_{2i}, and β_{3i} are individual is intercept and slope for *Moment*, *Stress*, and *Complete*, respectively.

The Level 2 model is:

$$\beta_{0i} = \gamma_{00} + \gamma_{01} MeanStress_i + u_{0i}$$

$$\beta_{1i} = \gamma_{10} + u_{1i}$$

$$\beta_{2i} = \gamma_{20} + u_{2i}$$

$$\beta_{3i} = \gamma_{30} + u_{3i}$$

In the Level 2 model, the β parameters are as previously defined. The γ parameters are fixed effects. u_{0i}, u_{1i}, u_{2i}, and u_{3i} are the random intercept terms and the random slopes for *Moment*, *Stress*, and *Complete*, respectively. $MeanStress_i$ is the average stress across all measurement occasions for individual i, included to isolate the between-person from within-person associations between stress and *NA* (Curran & Bauer, 2011; Hoffman & Stawski, 2009; Wang & Maxwell, 2015). For ease of interpretation, the composite model is:

$$\begin{aligned} NA_{ij} = {} & \gamma_{00} + \gamma_{01} MeanStress_i + \gamma_{10} MomentC_{ij} + \gamma_{20} StressC_{ij} \\ & + \gamma_{30} CompleteC_{ij} + [u_{0i} + u_{1i} MomentC_{ij} + u_{2i} StressC_{ij} \\ & + u_{3i} CompleteC_{ij} + \epsilon_{ij}], \end{aligned}$$

where the variance components are shown in brackets. This multilevel model was fit using restricted maximum likelihood estimation (REML) in SAS PROC MIXED, with the Satterthwaite approximation to denominator degrees of freedom.

To measure affect reactivity for tests of Aims 2 and 3, we obtained EB estimates of individual slopes measuring the within-person association between stress and negative affect. We followed the approach recommended in Singer and Willett (2003), which yields the appropriate weighted average between the OLS slopes and population average values. The population parameters in the Level 2 model were replaced with estimates obtained from the multilevel model:

$$\hat{\beta}_{2i} = \hat{\gamma}_{20} + \hat{u}_{2i}$$

In particular, the fixed effect of stress on negative affect ($\hat{\gamma}_{20}$) was manually combined with the individual specific random effect ($\hat{u}_{2i}$) using SAS. The resulting EB estimates were saved and used as predictors in the models that follow.

To test Aim 2, a series of hierarchical regression models was run to assess the association between the EB slopes representing adolescents' affect reactivity in their senior year of high school on internalizing symptoms in the first year of college. The models were fit with full information maximum likelihood estimation using SAS PROC CALIS. In the first level (Model D_1), the following covariates were included as predictors of depressive symptoms at Wave 2 (T_2Symps_i): depressive symptoms at Wave 1 (T_1Symps_i), perceived stress at Wave 2 ($T_2Stress_i$), immigrant generation status ($ImmGen_i$), sex (Sex_i, coded such that 0 = *female*, 1 = *male*), SES (SES_i), and whether the participant was living at home or away at Wave 2 (T_2Live_i, coded such that 0 = *away from home*, 1 = *at home*). In the second level (Model D_2), we added the focal predictor of mean-centered affect reactivity (T_1ARC_i). An identical series of models (Models A_1 and A_2) was run, instead predicting anxiety symptoms at Wave 2. The Wave 1 depressive symptoms covariate was replaced by Wave 1 anxiety symptoms in these models.

Finally, to test Aim 3, moderation by perceived social support, we tested another series of regression models. Specifically, in models D_{3a} and A_{3a}, mean-centered perceived family support ($T_2SupportC_i$) and the interaction between affect reactivity and support ($T_1ARC_i * T_2SupportC_i$) were added as predictors of depressive and anxiety symptoms, respectively. In models D_{3b} and A_{3b}, mean-centered perceived peer support and the corresponding interaction between affect reactivity and peer support were instead added as predictors of depressive and anxiety symptoms, respectively. A general template for the final four regression models is presented below:

$$\begin{aligned} T_2Symps_i = {} & \beta_0 + \beta_1 T_1ARC_i + \beta_2 T_2SupportC_i \\ & + \beta_3 (T_1ARC_i * T_2SupportC_i) + \beta_4 T_1Symps_i \\ & + \beta_5 T_2Stress_i + \beta_6 ImmGen_i + \beta_7 Sex_i + \beta_8 SES_i \\ & + \beta_9 T_2Live_i + \epsilon_i \end{aligned}$$

As noted, maximum likelihood estimation was used to estimate both the multilevel models and standard regression models. Maximum likelihood has shown to be state of the art for handling missing observations in longitudinal data, providing maximally unbiased and efficient estimates when data are missing at random (Schafer & Graham, 2002), even when participants have high degrees of missingness.

Results

Descriptive statistics and Pearson correlations among study variables are shown in Table 1. The highest correlations were among depressive symptoms, anxiety symptoms, and the perceived Wave 2 stress measure.[4]

[4]Some readers may note that the bivariate correlation between affect reactivity and depressive symptoms at Wave 1 was not significant. Developmental research has shown that transitioning to higher education can be associated with increases in depressive symptoms, particularly for adolescents with negative life events and negative school contexts (e.g., Lee, Wickrama, Kwon, Lorenz, & Oshri, 2017). For Latinx adolescents specifically, research by Huynh and Fuligni (2012) found that adolescents reported greater perceived devaluation by society across the transition to college, which was linked with subsequent increases in depressive symptoms. Thus, adolescents' concurrent reactivity may not be associated as strongly with depressive symptoms in their home environment, but reactivity may have more distal consequences as adolescents transition to college. We provide these theories with caution, given that concurrent associations between affect reactivity and depressive symptoms were not the focus of this study and that the difference between a statistically significant and nonsignificant (.054 in the present data) correlation is not statistically significant (Gelman & Stern, 2006).

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Table 1. Descriptive statistics and correlations among study variables

	M (*SD*)	T_1 AR	T_1 Dep	T_2 Dep	T_1 Anx	T_2 Anx	T_2 Fam Supp	T_2 Peer Supp	T_2 Stress	Sex	Imm Gen	T_2 Live	SES
T_1 AR	0.08 (0.04)												
T_1 Dep	16.38 (10.24)	.13											
T_2 Dep	18.58 (10.42)	.22**	.47**										
T_1 Anx	7.93 (7.29)	.05	.60**	.32**									
T_2 Anx	10.17 (7.19)	.13	.46**	.62**	.63**								
T_2 Fam Supp	3.76 (1.11)	−.11	−.19*	−.32**	−.00	−.04							
T_2 Peer Supp	3.89 (0.98)	−.05	−.13	−.24**	−.04	−.06	.42**						
T_2 Stress	2.89 (0.50)	.11	.31**	.61**	.24**	.32**	−.27**	−.15*					
Sex	64.4% female	.04	−.21**	−.22**	−.13	−.20**	−.03	−.02	−.24**				
Imm Gen	2.63 (2.32)	.05	−.03	.07	−.07	−.07	.11	.10	−.02	.04			
T_2 Live	63.8% away	−.04	.04	.08	−.08	−.09	−.11	−.02	.01	.02	.00		
SES	3.42 (0.86)	.09	.09	.08	.12	.06	.01	.04	.08	.08	−.26	−.07	

Note. T_1 = Wave 1 (spring/summer senior year high school); T_2 = Wave 2 (fall first year of college); AR = Empirical Bayes slope representing within-person affect reactivity; Dep = depressive symptoms, Anx = anxiety symptoms; Fam Supp = family support; Peer Supp = peer support, Sex = female (0), male (1); Imm Gen = immigrant generation status; Live = whether living away from home (0) or at home (1), SES = socioeconomic status. For depressive and anxiety symptoms, the mean and standard deviations shown are for sum scores calculated for each participant, owing to increased descriptive interpretability and relation to clinical cutoffs. However, means were used for all measures in analyses.
* $p < .05$; ** $p < .01$

Aim 1

Both fixed effects and random effects describing the relations among variables measured during the EMA assessments are displayed in Table 2. Regarding fixed effects, most focally, there was a statistically significant within-person association between momentary stress and concurrent negative affect. As stress increased relative to an adolescent's average level of stress, there was a corresponding increase in negative affect, controlling for whether or not the stressor was completed or ongoing, $b = 0.08$, $t(174) = 17.65$, $p < .0001$, 95% CI [0.07, 0.09]. A statistically significant between-person association was also found, such that adolescents with higher average levels of stress had higher average levels of negative affect, $b = 0.13$, $t(208) = 8.62$, $p < .0001$, 95% CI [0.10, 0.16]. Moreover, completed events were associated with lower negative affect than ongoing events, controlling for within- and between-person stress, $b = -0.06$, $t(143) = -3.33$, $p = .001$, 95% CI [−0.09, −0.02]. Finally, negative affect had a minor downward trend over time, $b = -0.01$, $t(162) = -4.51$, $p < .0001$, 95% CI [−0.01, −0.00] and thus all other results appropriately controlled for this trend (Wang & Maxwell, 2015). Pseudo R^2 for the full multilevel model was 21% (Snijders & Bosker, 2012).

Regarding random effects, there was statistically significant inter-individual variation in intercepts (negative affect in response to a stressor at the adolescent's average level of stress; $\hat{\sigma}^2_{11} = 0.15$, $z = 8.05$, $p < .0001$); random slopes for moment (change in negative affect over time; $\hat{\sigma}^2_{22} = 0.0001$, $z = 3.75$, $p < .0001$), random slopes for stress (within-person association between stress and negative affect, relative to adolescents' average stress; $\hat{\sigma}^2_{33} = 0.002$, $z = 5.97$, $p < .0001$), and random slopes for whether the stress was completed or ongoing ($\hat{\sigma}^2_{44} = 0.02$, $z = 2.47$, $p = .007$). The significant random slope for stress level indicated there was sufficient variability across participants in their individual slopes describing the within-person relation between stress and negative affect, which was used as a predictor in the regression analyses that followed. See Table 2 for correlations among pairs of random intercepts and slopes.

Aim 2: Depressive symptoms

Results for regression models D_1 and D_2, predicting depressive symptoms at Wave 2, are displayed in the top panel of Table 3. For brevity, only the results for model D_2 are described here, given that the slopes for the covariates were essentially identical across the two models. Most importantly, there was a statistically significant association between adolescents' affect reactivity at Wave 1 and depressive symptoms at Wave 2. Increases in Wave 1 affect reactivity were associated with expected increases in Wave 2 depressive symptoms, controlling for perceived stress at Wave 2, depressive symptoms at Wave 1, immigrant generation status, sex, SES, and whether the participant was living at home or away, $b = 1.68$, $p = .014$, 95% CI [0.34, 3.02], $\Delta R^2 = .015$. Higher levels of Wave 1 depressive symptoms, $b = 0.32$, $p < .0001$, 95% CI [0.20, 0.44], and higher levels of Wave 2 perceived stress, $b = 0.37$, $p < .0001$, 95% CI [0.29, 0.45], were also associated with significantly higher levels of Wave 2 depressive symptoms, controlling for the other variables in the model.

Aim 2: Anxiety symptoms

Results for regression models A_1 and A_2, predicting anxiety symptoms at Wave 2, are displayed in the bottom panel of Table 3.

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Table 2. Multilevel model relations between stress and negative affect at Wave 1

EMA variables descriptive statistics				
	Overall mean	Overall *SD*	Person mean	Person *SD*
Momentary stress	3.96	3.09	3.97	1.68
Negative affect	0.48	0.63	0.49	0.44
Fixed effects				
	Estimate	*SE*	*t* value	*p* value
Intercept	0.029	0.067	0.44	.662
Moment	−0.005	0.001	−4.51	<.0001
Momentary stress	0.079	0.004	17.65	<.0001
Person average stress	0.131	0.015	8.62	<.0001
Stressor complete	−0.059	0.018	−3.33	.001
Random effects				
	Estimate	*SE*	*z* value	*p* value
Intercept	0.146	0.018	8.05	<.0001
Slope (moment)	< 0.001	<0.001	3.75	<.0001
Slope (momentary stress)	0.002	<0.001	5.97	<.001
Slope (stressor complete)	0.017	0.007	2.47	.007
Correlations among random effects				
	1	2	3	4
1. Intercept				
2. Slope (moment)	−.368**			
3. Slope (momentary stress)	.392**	−.099		
4. Slope (stressor complete)	−.198	.101	−.194*	

Note. EMA = ecological momentary assessment. Moment is the time variable, centered at the first occasion. Momentary stress was person mean centered to represent the within-person association between stress and negative affect. Stressor complete designates whether the stressor was completed (0) or ongoing (1) at the time of reporting. Person average stress is the mean stress level for each adolescent, averaged across all time points, to represent the between-person association between stress and negative affect.
For correlations, * $p < .05$; ** $p < .01$.

Again, only results for model A_2 are described here. There was not a statistically significant association between Wave 1 affect reactivity and Wave 2 anxiety symptoms, controlling for all covariates, $b = 1.37$, $p = .071$, 95% CI [−0.12, 2.85], $\Delta R^2 = .011$. In this model, higher levels of Wave 1 anxiety symptoms, $b = 0.61$, $p < .0001$, 95% CI [0.49, 0.74], and higher levels of Wave 2 perceived stress, $b = 0.12$, $p = .012$, 95% CI [0.03, 0.21], were associated with significantly higher levels of Wave 2 anxiety symptoms, controlling for other variables in the model.

Aim 3: Depressive symptoms

Results considering Wave 2 perceived family (model D_{3a}) or peer (model D_{3b}) support as a buffer to the association between Wave 1 affect reactivity and Wave 2 depressive symptoms are presented in the top panel of Table 4.[5] Importantly, perceived family support significantly moderated the relation between Wave 1 affect reactivity and Wave 2 depressive symptoms, and this interaction was consistent with buffering. Increases in Wave 2 family support were associated with a weakening of the positive association between Wave 1 affect reactivity and Wave 2 depressive symptoms, controlling for all covariates, $b = 1.33$, $p = .028$, 95% CI [−2.52, −0.15], $\Delta R^2 = .013$. This interaction is graphed in Figure 1, depicting the simple slopes of Wave 1 affect reactivity on Wave 2 depressive symptoms for participants at low (−1 *SD*), moderate (mean), and high (+1 *SD*) levels of family support.[6] As is evident in Figure 1, adolescents reporting higher levels of family support experienced a weaker connection between their affect reactivity and later depressive symptoms. Additionally, the simple effect for Wave 2 perceived family support was statistically significant. For participants with average affect reactivity, increases in family support were associated with expected decreases in Wave 2 depressive symptoms, controlling for all covariates, $b = -0.06$ $p = .027$, 95% CI [−0.11, −0.01].

Regions of significance for the buffering association are shown in Figure 2. The plot shows how the simple slope of Wave 1 affect reactivity predicting depressive symptoms at Wave 2 changes as a function of an adolescent's level of perceived family support (solid, bold, regression line). The

[5]Only results relating to family and peer support are described in Aim 3, as the significance of other predictors remained the same compared with what was described in Aim 2.

[6]It was ensured that a large enough proportion of the sample fell beyond −1 or +1 *SD* before selecting these values. Over 20% of participants fell beyond −1 or +1 *SD* for the perceived family support variable.

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Table 3. Regression results for Wave 2 depressive (top panel) and anxiety (bottom panel) symptoms

	Model 1			Model 2		
Predictor	Est	*SE*	*p* value	Est	*SE*	*p* value
Predicting T_2 depressive symptoms						
T_1 depressive symptoms	0.33	0.06	<.0001	0.32	0.06	<.0001
T_2 stress	0.38	0.04	<.0001	0.37	0.04	<.0001
Immigrant generation status	0.02	0.01	.079	0.02	0.01	.111
Sex	−0.04	0.06	.486	−0.06	0.06	.362
SES	0.03	0.03	.386	0.02	0.03	.493
T_2 Live	0.08	0.06	.177	0.08	0.06	.141
T_1 affect reactivity				1.68	0.68	.014
Predicting T_2 anxiety symptoms						
T_1 anxiety symptoms	0.61	0.06	<.0001	0.61	0.06	<.0001
T_2 stress	0.13	0.05	.006	0.12	0.05	.012
Immigrant generation status	−0.01	0.01	.597	−0.01	0.01	.499
Sex	−0.10	0.07	.161	−0.11	0.07	.121
SES	−0.02	0.04	.527	−0.03	0.04	.434
T_2 live	−0.04	0.07	.573	−0.03	0.06	.625
T_1 affect reactivity				1.37	0.76	.071

Note. Est = estimate; T_1 = Wave 1 (spring/summer senior year high school); T_2 = Wave 2 (fall first year of college); Sex = female (0) or male (1); SES = socioeconomic status; live = whether living away from home (0) or at home (1).

Table 4. Moderation results for Wave 2 depressive (top panel) and anxiety (bottom panel) symptoms

	Family support			Peer support		
	Est	*SE*	*p* value	Est	*SE*	*p* value
Predicting T_2 depressive symptoms						
T_1 affect reactivity	1.55	0.67	.020	1.73	0.67	.010
T_2 support	−0.06	0.03	.027	−0.07	0.03	.018
T_1 AR*support	−1.33	0.60	.028	−0.96	0.75	.204
T_1 depressive symptoms	0.32	0.06	<.0001	0.31	0.06	<.0001
T_2 stress	0.35	0.04	<.0001	0.35	0.04	<.0001
Immigrant generation status	0.02	0.01	.077	0.02	0.01	.108
Sex	−0.07	0.06	.252	−0.07	0.06	.228
SES	0.03	0.03	.394	0.03	0.03	.350
T_2 live	0.07	0.06	.231	0.08	0.06	.132
Predicting T_2 anxiety symptoms						
T_1 affect reactivity	1.35	0.76	.073	1.36	0.76	.075
T_2 support	0.002	0.03	.941	−0.01	0.03	.861
T_1 AR*support	0.99	0.68	.145	−0.04	0.85	.961
T_1 anxiety symptoms	0.62	0.06	<.0001	0.61	0.06	<.0001
T_2 stress	0.12	0.05	.016	0.12	0.05	.015
Immigrant generation status	−0.01	0.01	.562	−0.01	0.01	.521
Sex	−0.11	0.07	.110	−0.11	0.07	.120
SES	−0.03	0.04	.439	−0.03	0.04	.456
T_2 live	−0.03	0.06	.674	−0.03	0.06	.623

Note. Est = estimate; T_1 = Wave 1 (spring/summer senior year high school); T_2 = Wave 2 (fall first year of college); AR = affect reactivity; Sex = female (0) or male (1); SES = socioeconomic status; live = whether living away from home (0) or at home (1).

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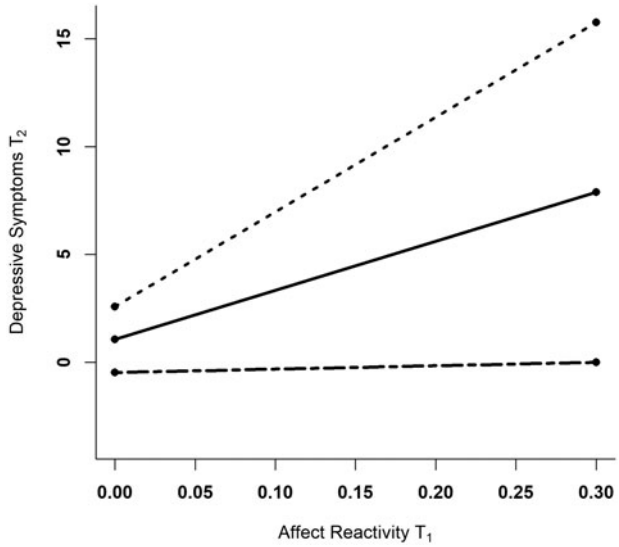

Figure 1. Plot showing the nature of the statistically significant interaction between affect reactivity and family support in predicting depressive symptoms at Wave 2. The plot depicts the simple slopes of affect reactivity on depressive symptoms for participants at −1 *SD* (dotted line), the mean (solid line), and +1 *SD* values of family support (dashed line).

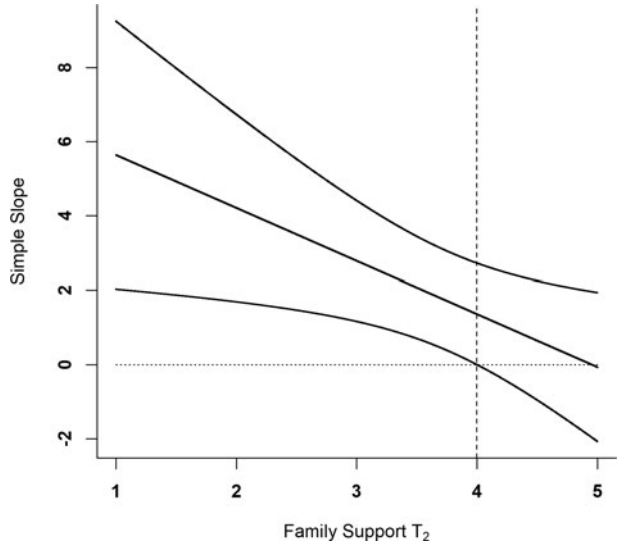

Figure 2. Regions of significance plot for interaction between affect reactivity and family support in predicting depressive symptoms at Wave 2. The focal regression line (plotted as a bold, solid line) depicts how the value of the simple slope of affect reactivity predicting depressive symptoms changes as a function of level of family support, and the curved lines represent 95% confidence bands. The vertical dashed line represents the point at which the simple slope becomes nonsignificant, such that the region to the left of this line is statistically significant, while the region to the right is nonsignificant. In the present data, this corresponds to the positive, statistically significant relationship between affect reactivity and depressive symptoms for individuals with lower levels of support, and the nonsignificant association for individuals with greater levels of support. The horizontal dotted line shows where the simple slope is exactly zero, which occurs at the maximum level of support in the present data.

horizontal line indicates at what level of family support the simple slope would be exactly zero (close to the maximum level of support in the present data), and the dark gray curved lines represent 95% confidence bands around the simple slope. Additionally, Figure 2 shows that this simple slope is statistically significant for low to moderate levels of family support (values less than 4; dotted vertical line) and nonsignificant for high levels of family support, again, consistent with buffering. Regions of significance for values of family support outside of the boundaries of the present data are not shown.

In the parallel model predicting Wave 2 depressive symptoms with peer support as a moderator, moderation by peer support was not statistically significant, $b = -0.96$, $p = .204$, 95% CI [−2.43, 0.52], $\Delta R^2 = .005$. There was a statistically significant association between peer support and depressive symptoms at Wave 2. For participants with average affect reactivity, increases in peer support were associated with expected decreases in Wave 2 depressive symptoms, controlling for all covariates, $b = 0.07$, $p = .018$, 95% CI [−0.12, −0.01].

Aim 3: Anxiety symptoms

Results for the regression models considering Wave 2 perceived family (model A_{3a}) or peer (model A_{3b}) support in predicting anxiety symptoms are presented in the bottom panel of Table 4. Wave 2 family support did not have a statistically significant association with Wave 2 anxiety symptoms, $b = 0.002$, $p = .941$, 95% CI [−0.06, 0.06], and moderation by family support was not statistically significant, $b = 1.00$, $p = .145$, 95% CI [−0.34, 2.32], $\Delta R^2 = .006$.

In the parallel model predicting Wave 2 anxiety symptoms with perceived peer support as a moderator, Wave 2 peer support did not have a statistically significant association with Wave 2 anxiety symptoms, $b = -0.01$, $p = .861$, 95% CI [−0.07, 0.06], and moderation by peer support was not statistically significant, $b = -0.04$, $p = .961$, 95% CI [−1.70, 1.62], $\Delta R^2 = .0001$.

Discussion

Given the importance of promoting a successful college experience for the growing presence of Latinx adolescents on college campuses, it is paramount to evaluate the relations between stress and internalizing symptoms during the college transition for these adolescents, in addition to focusing on protective factors. In this study of Latinx late adolescents, we assessed the relations between affect reactivity during senior year of high school with depressive and anxiety symptoms in the first year of college, as well as the potential buffering capacity of family and peer social support. Results indicated that affect reactivity, measured using innovative EB estimates from momentary EMA data, was significantly associated with depressive symptoms, but not anxiety symptoms in the following year. This was true even when controlling for immigrant generation status, sex, SES, whether the adolescent lived away from home, current perceived stress, and most importantly, prior depressive symptoms. Moreover, perceived family support, but not peer support, showed evidence of buffering this association. This investigation is the first of its kind among Latinx adolescents at the college transition.

Aim 1: Adolescent negative affect reactivity to stress

We found evidence for both within-person and between-person relations between momentary stress and negative affect during adolescents' senior year of high school. Such evidence indicates that, at times when adolescents were experiencing greater levels of stress than were typical for them, they experienced greater

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negative affect in response. Further, adolescents who had higher average stress across the week reported higher negative affect overall. These results are consistent with diary studies focusing on predominantly non-Latinx White adolescents (e.g., O'Hara, Armeli, Boynton, & Tennen, 2014) and the limited work with Latinx samples (Santiago et al., 2017), and indicate that the relations hold at a momentary in addition to at the daily level identified in other studies.

Importantly, research has not implicated a single mechanism that underlies negative affect in response to stress, and both theoretical and empirical evidence suggests there are likely multiple pathways underlying negative affectivity to stress. For example, studies have linked affect reactivity to biological mechanisms (e.g., the brain-derived neurotrophic factor (*BDNF*) *Val66Met* gene; Alexander et al., 2010; hypothalamic pituitary adrenal axis activity; Dickerson & Kemeny, 2004; Suarez & Sundy, 2017). Cognitive mechanisms involved in the maintenance of negative affect, such as rumination and the inability to remove negative thoughts from working memory (Foland-Ross et al., 2013), may also be relevant for affect reactivity. These mechanisms have been linked to increased activation in the dorsal anterior cingulate cortex and posterior cingulate cortex in college students with elevated depressive symptoms (Kaiser et al., 2015). Certainly, within-person research at the daily or momentary levels is warranted to determine the potential mechanisms and timelines for affect reactivity in Latinx adolescents. In a study using the present sample of adolescents, researchers found that ongoing stress at the momentary level was linked to within-person increases in cortisol (Sladek, Doane, Gonzales, Grimm, & Luecken, 2019).

Aim 2: Predicting internalizing symptoms from affect reactivity

Affect reactivity at the daily level has been indicated as a consequence of prior (e.g., O'Hara et al., 2014), symptom of current (e.g., van Winkel et al., 2015), and precursor to future internalizing symptoms (e.g., Charles et al., 2013). Our investigation indicated that affect reactivity during the final year of high school significantly predicted future depressive symptoms in the first year of college, even after controlling for prior depressive symptoms. Although the prospective time frame is less than 1 year, elucidating these relations across a pivotal developmental transition period is particularly important. Although focusing on discrimination rather than general stress, in a high school sample of Latinx and African American adolescents, researchers hypothesized that a potential mechanism linking affect reactivity to later mental health issues is the heightened reaction and prolonged initial response to stress (Stein, Supple, Huq, Dunbar, & Prinstein, 2016). Additionally, a daily diary study found that college students with a previous history of depression showed higher negative emotion following stress in comparison with those without such history (Husky, Mazure, Maciejewski, & Swendsen, 2009), though individual differences in this reactivity were not used as predictors of future depression. The present study adds to the existing literature by demonstrating that differences in momentary reactivity to stress were predictive of future depressive symptoms at a critical developmental juncture.

It may be advantageous to consider, then, what ecological contexts may link affect reactivity and depressive symptoms specifically for Latinx adolescents across the college transition. Studies have indicated that the university environment (i.e., "the practices, policies, and behaviors that constitute the working and learning environment"; Castillo et al., 2006, p. 268), which is a novel context for all college students, is a particularly salient feature in Latinx adolescents' college experiences, with implications for persistence and mental health (Castillo et al., 2006; Hurtado & Carter, 1997). For example, despite recent changes in access (Snyder et al., 2019), US college campuses remain predominantly White settings that differ in ethnic composition and cultural norms from many ethnic minority adolescents' home and secondary school environments (e.g., cultural mismatch hypothesis; Stephens, Fryberg, Markus, Johnson, & Covarrubias, 2012); thus, the college transition presents an especially important context for identifying developmental mechanisms of depressive symptoms for groups of underrepresented students, including Latinx adolescents. A potential consequence of this cultural mismatch is changes in emotion regulation. A recent study found that acculturative stress predicted both depression and anxiety symptoms in Latinx college students, mediated by difficulties in emotion regulation (Mayorga et al., 2018). Mayorga et al. (2018) theorized that accumulating acculturative stress may erode emotion regulation capabilities, leading to mental health symptoms in college. Our work echoes this from another perspective: adolescents who are already more highly emotionally reactive to stress showed higher levels of depressive symptoms in college. Given that difficulties in emotion regulation have been linked to experiences of negative affect in Latinx adults (Archuleta & Lakhwani, 2016), it is possible that adolescents with higher reactivity are faced with additional challenges to regulate their emotions in the face of stress. Importantly, we focused on stress more generally, and our findings show that these theories may not only pertain to acculturative stress, but to a variety of daily events for Latinx adolescents.

We did not find evidence for the same prospective relations for anxiety symptoms. The previous research most similar to the present study investigating these relations assessed depression and anxiety jointly (i.e., affective disorder; Charles et al., 2013). Anxiety is indicated as a stress- or fear-reactive set of disorders (e.g., Bolger & Zuckerman, 1995; Dieleman et al., 2015). Some theoretical models posit that youth and adolescents with anxiety function physiologically as if under chronic stress, owing to stress reactivity that does not abate (Dieleman et al., 2015). Yet, empirical tests linking affect reactivity and anxiety symptoms in primarily non-Latinx individuals have been mixed (e.g., McLaughlin et al., 2010; Nelemans, Hale, Branje, Meeus, & Rudolph, 2018). A recent daily diary study found that anxious middle-school-aged adolescents experienced more negative affect in response to daily parent- and teacher-related events, though individual differences were not used to predict future anxiety symptoms (Herres, Caporino, Cummings, & Kendall, 2018). It is possible that the way that reactivity was assessed in the current study, through negative affect emotional responses to daily stressors rather than a more anticipatory, fear-related response, may be more associated with depressive as opposed to anxious symptoms. In line with this, researchers studying university students noted that the anxiety felt in anticipation of a stressor is more likely to be indicative of trait anxiety than anxiety experienced as reactivity to a stressor (Walker, O'Connor, Schaefer, Talbot, & Hendrickx, 2011). Future research should incorporate multiple indicators of stress to understand whether affect reactivity to particular types of stress is differentially predictive of depressive and anxiety symptoms during the transition to college.

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Aim 3: Buffering by family and peer support

Aim 3 assessed the buffering capability of family and peer support during adolescents' first year of college on the association between affect reactivity and depressive and anxiety symptoms. The literature often focuses on negative aspects of Latinx adolescents' environment that may make the college transition difficult and/or place them at risk for mental health issues later. However, it may be more beneficial to shed light on the adaptive features of these adolescents' lives during the college transition (e.g., Corona et al., 2017). The present results illustrate buffering (Cohen & Wills, 1985), such that perceived family social support in college minimized the negative consequences of affect reactivity in high school on depressive symptoms in college.

In particular, this buffering relationship was shown for family support, but not for peer support. Although these findings are in contrast to the notion that adolescents have often left their family environment and that peers become more salient (e.g., Dennis et al., 2005), the findings are compatible with recent empirical work finding that peer support did not moderate the association between stress and depressive symptoms in Latinx college students (Lee, Goldstein, Dik, & Rodas, 2020). On a theoretical level, the results are also in line with the literature emphasizing the importance of family in Latinx adolescents' lives. Placing value or importance on the family is distinct from perceiving support from family members, but the cultural importance of family may shape the implications of perceived support for Latinx adolescents (e.g., Campos & Kim, 2017; Stein et al., 2015). For example, *familismo* may create a context wherein being able to rely on or seeking support after transitioning to college is more available and takes primacy over other forms of support. It is not surprising, then, that family support had a more notable role in buffering support relative to that of peer support. Moreover, given that support was measured during the first semester of college, it is possible that perceived support from peers was not from individuals that the adolescents had such longstanding or trusting relationships with compared with family members. For example, adolescents transitioning to college may be developing new friendships that are in more nascent stages that do not offer deeper levels of support. While our participants did not differ across the college transition in their levels of peer support (Wave 1: 3.894, Wave 2: 3.889), other work has shown that peer support rises in late adolescence and is less stable than family support (e.g., Newcomb, 1990).

However, peer support may be changing over time, research from ethnically diverse samples suggests that peer support and socialization are especially important during this transition and predict adjustment outcomes for college students (e.g., Azmitia et al., 2013; Hurtado, Carter, & Spuler, 1996). The present findings are similar with respect to main effects, as adolescents in our sample who perceived more peer support still tended to have lower depressive symptoms, regardless of affect reactivity to stress. Consequently, future investigations should disentangle whether peer support operates primarily as a promotive factor during the transition to college (i.e., Azmitia et al., 2013) or whether closer measurement of changes in peer support over this transition may serve as a potential buffer between stressors and adjustment outcomes.

Limitations and implications for prevention

There are some limitations to note. First, an alternative approach to measuring affect reactivity would be to consider lagged associations between momentary stress and negative affect, rather than concurrent associations. Some research has implicated lingering negative affect in response to stress as particularly problematic in predicting mental and physical health outcomes (Charles et al., 2013; Leger et al., 2018). However, owing to the large variability in the amount of time between assessments (e.g., a few hours vs. overnight), we chose to focus on concurrent associations. Although using several assessments per day contributed to the need to focus on concurrent affect reactivity, we were able to address these relations more frequently than at the daily level, leading to an average of 21 data points to draw on per participant, which is much larger than many previous studies using a similar approach (e.g., Leger et al., 2018).

Second, as described below, all variables were measured via self-report, indicating adolescents' perceptions of stress, negative affect, and support. Although it is illuminating to define these constructs as adolescents perceive them, studies focusing on objective indices of stress reactivity (e.g., physiological response) and different dimensions of family support (e.g., audiotaped conversations between adolescents and family members about the college transition) could offer a different perspective on what was shown presently (see Epel et al., 2018). Third, adolescents in the current sample were mainly transitioning to a single institution of higher education, and thus questions pertaining to variability across college/university environments could not be addressed. Fourth, the time frame between waves was shorter than in previous studies (e.g., months vs. years; Charles et al., 2013), although this permitted focusing on the development of internalizing symptoms during an important transition period. Relatedly, although the number of days between waves differed fairly widely across participants (85–313 days), only 20 participants fell outside of the range of 1.5 standard deviations from the average time between surveys (105–239 days).

As the present focus was on the consequences of reactivity to general experiences of stress, future studies should investigate how varying types of stressors (e.g., bicultural stressors) may be associated with differential affect reactivity in Latinx adolescents at this developmental stage. Previous research has indicated ethnic-minority and acculturative stressors, including discrimination and microaggressions, as salient sources of stress for Latinx adolescents (e.g., Arbona & Jimenez, 2014). However, other research has identified academic stress, interpersonal stress, and economic stress as the most frequently reported daily stress by Latinx adolescents (Santiago, Torres, Brewer, Fuller, & Lennon, 2016). Considering the domains suggested by Rudolph and Hammen (1999), stressors in the present sample were diverse, encompassing dependent (e.g., "discovering I woke up late and missed school") and independent (e.g., "ceiling leaked from all the rain when I came home"), and social (e.g., "being told I'm wasting potential by family") and non-social (e.g., "falling on my knee that I had reconstructed") dimensions. Consistent with Santiago et al. (2016), stressors were commonly academic (e.g., "studying for my math final"), interpersonal (e.g., "had an argument with my girlfriend"), and economic (e.g., "money problems with school") rather than acculturative in nature, but future qualitative work will be integral to elucidating domain-specific affect reactivity in Latinx adolescents at the college transition.

After identifying the buffering potential of family support for Latinx adolescents transitioning to college, a logical follow-up is to consider how to leverage this potential to mitigate the emergence of depressive symptoms over this transition. Family support may protect Latinx adolescents from stress-based risk for

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depression and thus may represent a beneficial place to intervene for adolescents displaying high affect reactivity, in addition to promoting more adaptive stress responses. It may also be advantageous to investigate whether high schools and universities could be instrumental in facilitating this support through greater connections with families across the college transition, in ways that are culturally congruous for Latinx students.

Conclusion

Using rigorous methodology, we found that negative affect reactivity to stress at the momentary level was associated with depressive symptoms across the college transition for Latinx adolescents. The college transition can be a transformative period in adolescents' lives, and experiences within this developmental window can have implications for internalizing symptoms, which may lead to more chronic or recurrent disorder in adulthood and have implications for academic success. Importantly, the present results also suggest that perceptions of family support may play a key role in buffering these associations and are a promising target for preventive interventions aimed at mental health in higher education for Latinx adolescents.

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