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Early life stress, subjective social status, and health during late adolescence

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ABSTRACT

Objective: Both lower subjective social status (SSS)—or viewing oneself as having lower status relative to others—and greater early life stress consistently relate to poorer health in adolescence. Early life stress can also negatively influence one's social relationships and may thereby shape social status. The present studies investigated how early life stress relates to the development of SSS and how SSS relates to health across the transition to college.

Design: In Study 1, 91 older adolescents ($M_{\text{age}} = 18.37$) reported early life stress, society SSS, and school SSS, and they reported their society SSS and school SSS again 2 years later. In Study 2, 94 first-year college students ($M_{\text{age}} = 18.20$) reported early life stress and society SSS at study entry and reported their dorm SSS, university SSS, and mental health monthly throughout the year.

Results: Greater early life stress was related to lower society SSS, but not school SSS, in both studies. In Study 2, dorm and university SSS and early life stress were uniquely related to mental health, although associations weakened over time.

Conclusion: Early life stress may predispose people to have low society SSS, and both low school SSS and high early life stress may increase risk for poorer health during transition periods.



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Subjective social status; social status; early life stress; mental health; college transition

Subjective social status (SSS) refers to one's hierarchical standing relative to others and shows robust associations with health in adolescents, over and above income and education (Adler et al., 2000; Quon & McGrath, 2014). Having lower SSS may be especially salient during adolescence and specifically during the transition to college, when youth are developing their identities and especially attuned to social status concerns (Dahl & Forbes, 2010; Yang et al., 2019). However, the factors that contribute to youths' development of SSS remain unclear. To address this issue, we investigated how early life stress shapes SSS. Also, given prior research showing that early life stress

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is linked with poor health (Taylor, 2010), we investigated the extent to which early life stress and SSS in society and in a local context (i.e. relative to high school and university peers) relate to health.

Social status and late adolescence

SSS accounts for one's overall life circumstances relative to other people. Studies have consistently found that SSS is only moderately related to income and education, suggesting that SSS indexes aspects of status that are not captured by objective measures of socioeconomic status (e.g. Adler et al., 2000; Singh-Manoux et al., 2003). As they age, adolescents develop a sense of both their family's social status in society and also their own social status in school. Interestingly, school and society SSS are only moderately related to each other (e.g. Finkelstein et al., 2006; Goodman et al., 2001). Whereas factors related to socioeconomic status seem more related to SSS in society, individual factors such as humor and ability appear to shape adolescents' SSS relative to peers (Andersson, 2018; Sweeting et al., 2011).

SSS is especially likely to change in adolescence. Adolescents become more sensitive to social status concerns as they become more invested in peers, develop a stronger self-concept, and become more autonomous (Somerville, 2013). Cognitive development during this period enables adolescents to better understand their status relative to others. For instance, adolescents' society SSS more closely aligns with their parents' perceptions of standing over time and stabilises into adulthood (Goodman et al., 2001). School status may be especially tenuous during school transitions, when social networks change and adolescents experience more diverse peers (e.g. Bowker et al., 2010; Bowman, 2012). To our knowledge, however, no study has assessed how SSS changes across the first year of college.

Early life stress and SSS

The home environment can contribute to lower status in society and school for adolescents. SSS ratings have been posited to involve 'cognitive averaging' of one's overall life circumstances, including objective indices of socioeconomic status and their social status from earlier in life (Singh-Manoux et al., 2003). Yet, more refined measurement of economic indicators like school economic disadvantage and neighborhood income inequality cannot explain differences in SSS in adolescents (Rivenbark et al., 2019). Other life circumstances, including stressors occurring in early life (e.g. abuse, neglect, conflict, non-nurturant parenting) have lasting psychological impacts (e.g. Kim & Cicchetti, 2004; Poole et al., 2018; Taylor, 2010). Early life stress may also contribute to having low SSS.

Furthermore, early life stress may degrade one's social status by shaping psychosocial resources. Youth with early life stress have more limited emotion regulation, self-esteem, and social competence (Kim & Cicchetti, 2004; Poole et al., 2018; Repetti et al., 2002; Taylor, 2010). Early deficits in these resources can contribute to poorer status in adulthood (Burt et al., 2008; Jones et al., 2015; Ladd, 1999). Indeed, youth, and particularly females, who experience physical maltreatment report more social

problems, social withdrawal, and mental illness during adolescence, as well as both less satisfying close relationships and smaller social networks in adulthood (Ford et al., 2011; Lansford et al., 2002). Social relationship deficits may be especially challenging as adolescents orient more toward peers and as school transitions disrupt pre-existing social relationships (Nelson et al., 2016; Oswald & Clark, 2003). Taken together, early life stress may be a significant risk factor for having lower status in both adolescence and adulthood.

Early life stress, SSS, and health in late adolescence

Early life stress may increase risk for poorer health during late adolescence (e.g. Heim & Binder, 2012; Murphy et al., 2017; Price et al., 2013). Early life stress has been linked with greater inflammation, which can serve as a precursor for poorer mental and physical health later in life, as well as greater psychological and inflammatory responses to threat (e.g. Chiang et al., 2015; Kuhlman et al., 2017; Seo et al., 2014; Slavich & Cole, 2013). Further, pubertal changes occurring during adolescence can promote both risk-taking and greater threat sensitivity (Spielberg et al., 2014). As youth develop peer relationships and experience social transitions during this developmental period, the effect of early life stress on enhanced threat sensitivity may result in social withdrawal and heightened psychopathology (Hoglund & Leadbeater, 2007; Pérez-Edgar et al., 2010; Weissman et al., 2019).

Likewise, having low SSS—regardless of objective socioeconomic status—may worsen health as youth transition to college. Transitioning to college is accompanied by academic, social, and financial stressors, and the number of students reporting concerns with mental health is increasing (Hunt & Eisenberg, 2010). Indeed, chronic and ongoing stress is especially high during the first year of college (Misra & McKean, 2000; Towbes & Cohen, 1996). Low social status may magnify the impact of transitions, as temporarily feeling low in status can activate physiological stress responses (e.g. adrenocortical and cardiovascular physiology) that degrade health (Pieritz et al., 2016; Sapolsky, 2004). Perceptions of lower status can also promote fear responses and depressive thinking following stress, which can contribute to poor health outcomes (Rahal et al., 2019; Schubert et al., 2016). However, it is unclear whether early life stress and low SSS uniquely affect adolescent health specifically during school transitions.

To address these issues, we pursued two aims. First, we assessed how adolescents' early life stress related to SSS in U.S. society in general as well as SSS in school relative to peers. Links between SSS and early life stress were tested in two distinct samples of late adolescents. In Study 1, a community sample of adolescents reported SSS in 12th grade and after graduating high school. A subset of this sample reported SSS again 2 years later (i.e. 2 and 3 years post-high school). In Study 2, undergraduate students reported their SSS each month, for up to 8 months, across their first academic year in college. Youth with more early life stress were hypothesised to have lower SSS with respect to society and with respect to school peers in both studies.

Next, in the sample of university undergraduates, we assessed how both early life stress and SSS related to health across the first year of college. Both early life stress and low SSS have been linked with poorer health and were hypothesised to be

associated with poorer mental and general perceived health across the first year of college. We explored whether the strength of associations between early life stress, SSS, and health became stronger or weaker after the initial college transition.

Study 1: SSS and early life stress in high school and college

Method

Participants

Participants were 91 older adolescents ($M_{\text{age}} = 18.37$, $SD = 0.51$, range 18–20; 52 females; 62.64% Latino, 37.36% European American) recruited from the community as part of a larger longitudinal study of health. One participant did not report age and was excluded from all analyses, and one participant did not report either school SSS or society SSS, leaving 89 participants in the analytic sample. Primary caregivers reported a median family income of \$79,000 over the past year. Roughly half of adolescents' parents averaged a college education between both parents (49.5%), with some families averaging less than a high school degree (16.5%) or a degree from high school or a vocational school (33.0%).

Procedures

Participants reported their society and school SSS using an online questionnaire and completed an additional survey assessing early life stress an average of 5 ± 2.7 months later. Participants received \$75 for participating and an additional \$150 for completing additional survey and experimental measures (Chiang et al., 2017; Park et al., 2019). Participants could report SSS again 2 years later as part of additional data collection either 2 or 3 years following their high school graduation for \$100. Of the original sample of 89 adolescents, 68 adolescents (76.40%; $M_{\text{age}} = 20.27$, $SD = 0.61$, range 19–21; 42 females) completed additional data collection 2 years later. All 68 participants reported society SSS, and only the 53 participants who were attending college reported school SSS at the 2-year follow-up. Participants with higher income, $t(61) = 2.21$, $p = .03$, with higher parental education, $t(61) = 2.48$, $p = .02$, and who were female, $\chi^2(1) = 6.37$, $p = .01$, were more likely to attend college. Participants who provided data 2 years later did not differ from those who did not with respect to gender, income, parental education, ethnicity, school SSS, society SSS, or early life stress, all $ps > .05$.

Measures

Society subjective social status

Participants completed the MacArthur Scale of SSS-Youth Version (Adler et al., 2000; Goodman et al., 2001). Participants were asked to 'Imagine a 10-rung ladder representing where people stand in society. At the top of the ladder are the people who are the best off, those who have the most money, most education, and best jobs. At the bottom are the people who are the worst off, those who have the least money, least education, and worst jobs or no job. Mark your response on the scale below that best

represents where you think you stand on the ladder'. This single-item measure has been consistently associated with many different indices of health. It also corresponds to reports of status from mixed-methods research and is a well-validated scale of SSS that shows significant links with objective measures of socioeconomic status, such as income and education (e.g. Goodman et al., 2001; Mistry et al., 2015; Quon & McGrath, 2014).

School subjective social status

Participants rated their 'rank' in their school using the same 10-rung ladder, where: 'At the top of the ladder are people at your school who are most respected, esteemed, and admired. At the bottom of the ladder are those who are least respected, esteemed, and admired'. This measure has also been extensively used and associated with adolescent health (Quon & McGrath, 2014).

Early life stress

Participants completed the 13-item Risky Families Questionnaire (Taylor et al., 2004), rating early family environment conflict, violence, harsh discipline, affectionate behaviors, neglect, and chaos on a scale ranging from 1 (not at all) to 5 (very often). This scale has been validated against clinical interviews (Taylor et al., 2004), and the items showed good internal consistency ($\alpha = .86$). The observed mean and distribution were consistent with prior research on adolescents and adults (Lehman et al., 2005; Miller & Chen, 2010; Taylor et al., 2006).

Family income and parental education

Primary caregivers reported their annual household income before taxes from all family members and the parental education for both parents on a scale from 1 (Some elementary school) to 11 (Graduated from medical, law or graduate school). Parental education was averaged across both parents when possible.

Data analytic plan

First, correlations were calculated among continuous study variables, and group differences in early life stress by gender, age, and ethnicity were assessed. Regression analyses were then conducted to assess whether early life stress was related to society SSS and school SSS. In concurrent analyses, relations between early life stress and society SSS and school SSS assessed at the same time points were estimated. In prospective analyses, relations between early life stress and society SSS and school SSS reported 2 years later were estimated. All analyses controlled for gender, ethnicity, age, income, and parental education. Gender (male = -1, female = 1), ethnicity (European American = -1, Latino = 1), and age were effect-coded (age 18 = -1, age 19 = 1). Income, parental education, and early life stress were grand-mean centered.

Results

Means and correlations are presented in Table 1. School SSS and society SSS were modestly correlated with one another and were both modestly correlated with income and parental education. Although there were no changes in society SSS across the 2 years, $t(66) = 0.21$, $p = .8$, school SSS significantly decreased following the transition to college, $t(63) = 2.01$, $p = .049$. Early life stress was also significantly related to income and parental education. Early life stress did not vary by gender, $t(89) = 0.75$, $p = .46$, or age, $t(89) = 0.88$, $p = .38$, although Latino youth reported slightly more stress than European Americans, $t(89) = 2.46$, $p = .02$.

Concurrent analyses revealed that participants reporting greater early life stress had lower society SSS, $B = -0.59$, $SE = 0.25$, $\beta = -.24$, $p = .02$. Although attenuated, this association remained significant after accounting for income and parental education (Table 2, column 1). In contrast, early life stress was not associated with concurrent school SSS with or without covariates (Table 2, column 2). Females and Latino adolescents also reported lower school SSS than males and European American adolescents, respectively.

Table 1. Descriptive statistics and correlations for Study 1 and Study 2 variables.

Variables	Study 1		Study 2		1.	2.	3.	4.	5.	6.
	M	SD	M	SD						
1. Early life stress	1.92	0.58	2.03	0.67	–	–.39***	–.34**	–.44***	–.19	–.28*
2. Income	91.34	65.17	5.80	1.97	–.10	–	.47***	.77***	.34***	.37***
3. Parental education	7.41	2.02	4.62	1.79	–.12	.49***	–	.53***	.38***	.46***
4. Society SSS	6.00	1.45	6.51	1.82	–.30**	.41***	.34***	–	.33**	.41***
5. School SSS ^a	7.29	1.63	5.29	2.06	–.22*	.09	.02	.21*	–	.66***
6. Dorm SSS	–	–	6.36	1.83	–	–	–	–	–	–

Note. SSS = subjective social status; income was divided by 10^3 .

^aSchool SSS reflects ratings of SSS in school in Study 1 and ratings of SSS at the university in Study 2. Correlations for Study 1 are listed in grey below the diagonal, and correlations for Study 2 are above the diagonal.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2. Society and school SSS as a function of early life stress (Study 1).

Variable	Concurrent analyses						Prospective analyses					
	Society SSS			School SSS			Society SSS			School SSS		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Constant	6.14***	0.15		7.42***	0.18		6.02***	0.18		7.20***	0.20	
Early life stress	–0.59*	0.23	–.24	–0.47	0.28	–.18	–1.30***	0.28	–0.46	–0.73*	0.31	–0.30
Ethnicity	–0.25	0.16	–.17	–0.46*	0.19	–.28	0.10	0.19	0.06	–0.56**	0.19	–0.42
Gender	0.11	0.14	.08	–0.40*	0.17	–.25	0.04	0.16	0.02	–0.27	0.18	–0.20
Age	0.36*	0.15	.24	–0.25	0.18	–.15	0.39*	0.17	0.23	0.35	0.18	0.25
Income	0.04	0.03	.21	0.01	0.03	.05	0.12**	0.03	0.43	0.00	0.03	–0.01
Parental education	0.16	0.08	.22	–0.16	0.10	–.20	0.07	0.10	0.09	–0.16	0.11	–0.23
F	6.58			3.06			8.61			3.86		
R ²	.33			.12			.46			.33		

Note. SSS = subjective social status; income was divided by 10^4 .

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Next, prospective links between early life stress and society and school SSS reported 2 years later (i.e. 2 and 3 years after adolescents graduated high school) were examined. Higher early life stress was still associated with lower society SSS 2 years later (Table 2, column 3). Although early life stress was not related to the initial report of school SSS, adolescents with more early life stress had lower school SSS 2 or 3 years after high school (Table 2, column 4). These results suggested that early life stress consistently related to lower society SSS and may become more strongly associated with school SSS following the transition to college. To explore whether school SSS becomes more strongly related to early life stress across this transition, Study 2 examined changes in monthly reports of SSS across students' first year of college.

Study 2: SSS, early life stress, and health during the transition to college

The first year of college can amplify social status concerns (Destin et al., 2017; Shane & Heckhausen, 2013), as students enter a novel social environment and actively develop social relationships to gain status. By studying youth after this transition, we can better understand how early life stress relates to status development in a new social context. Using a longitudinal study across the first year of college, we assessed the development of SSS and predicted that early life stress would relate to lower society SSS, in line with the results of Study 1, and lower school SSS over time. Because status can vary by context, participants reported SSS relative to the university peers and relative to people on their dorm floor.

Additionally, limited research has assessed how SSS and early life stress relate to health during the college transition. We therefore assessed the extent to which youth of lower society and school SSS—and youth of greater early life stress—report poorer health, as indexed by greater anxiety and depressive symptoms and poorer general health across the first year of college. We also explored whether these associations varied during the year. Youth who experienced greater early life stress and had lower society and school SSS were hypothesised to have poorer health, especially at the end of the year as their status stabilised.

Method

Participants and procedure

Participants were 94 first-year undergraduate students ($M_{\text{age}} = 18.20$, $SD = 0.50$, range 18–23; 29 men, 64 women, 1 gender queer) at a large public university in California. Most participants identified as either Asian American (41.30%) or Caucasian (38.04%), with a smaller proportion identifying as Latino (7.61%). Eligible participants lived in residence halls with assigned roommate(s), attended high school at least 100 miles away from the university, and did not participate in on-campus summer programs besides orientation. These inclusion criteria ensured that participants were entering a comparably unfamiliar environment. Because of other study measures, participants were excluded if they used medication that affected psychiatric or immune function. Participants completed a baseline questionnaire and monthly surveys assessing school SSS and mental and physical health. On average, participants completed baseline six weeks after move-in and remained in the study for up to 8 months ($M = 3.32$, $SD = 2.41$).

Measures

Participants completed the same society SSS and early life stress measures at baseline as in Study 1. The Risky Families Questionnaire had good reliability ($\alpha = .86$).

School SSS

Because participants were now in college and living with other students, participants reported two forms of school SSS: SSS relative to people at the university (university SSS), and SSS relative to people on their dorm floor (dorm SSS). The prompts were, 'At the top of the ladder are people at the university [on your dorm floor] who are most respected, esteemed, and admired. At the bottom of the ladder are those who are least respected, esteemed, and admired'. They marked the rung on each ladder that represented their standing relative to peers.

Mental health

Participants rated how much they experienced eight depressive symptoms (e.g. 'I felt hopeless', 'I felt sad') over the past week using the Patient-Reported Outcomes Measurement Information System (PROMIS) Depression Short-Form and eight anxiety symptoms (e.g. 'I felt uneasy', 'I felt anxious') over the past week using PROMIS Anxiety Short-Form, both on a scale from 1 (Never) to 5 (Always; Pilkonis et al., 2011). Internal consistency was high for depression ($\alpha = .96$) and anxiety measures ($\alpha = .95$) at baseline.

General health

Participants completed the general health subscale from the Medical Outcomes Study 36-item short-form health survey (Ware & Sherbourne, 1992). Participants rated four items regarding their health relative to others (e.g. 'I am as healthy as anybody I know') on a scale from 1 (Definitely false) to 5 (Definitely true) and one item assessing overall health (i.e. 'In general, would you say your health is') on a scale from 1 (Poor) to 5 (Excellent). Items were averaged and converted to a score from 0 (Worst health) to 100 (Best health).

Pre-college health

At baseline, participants rated two items from the Medical Outcomes Study 36-item short-form health survey using five-point Likert scales (Ware & Sherbourne, 1992). Participants rated their general health in childhood (1 = Poor, 5 = Excellent) and how their health compared to their health the previous year (1 = Much worse now than 1 year ago, 5 = Much better now than 1 year ago).

Income and parental education

Participants reported family income from 1 (\$15,000 or less) to 8 (\$150,001+). Maternal and paternal education were reported from 1 (High school diploma) to 7 (Doctorate), and an average of both parents was used when possible.

Data analytic plan

Attrition analyses were conducted to determine whether number of monthly surveys varied by demographics, SSS, or health. Next, analyses examined whether early life stress related to society SSS, university SSS, and dorm SSS. First, because society SSS was only reported at baseline, we examined whether early life stress was associated with society SSS using regression. Next, because university SSS and dorm SSS were assessed monthly, multilevel models examined whether early life stress was associated with university SSS and dorm SSS. In these models, time (coded by month; 0 = September, 9 = June) at Level 1 was nested within individuals at Level 2. Growth curve models examined linear and quadratic changes in university and dorm SSS across the academic year by focusing on the main effect of time at Level 1. To this base model, an Early Life Stress \times Time interaction were added to examine whether early life stress modulated how university and dorm SSS changed across the first year of college. See [Supplemental Table 1](#) for a summary of variable coding and level specification.

In the final phase of analyses, separate models assessed whether SSS and early life stress uniquely contributed to the health outcomes assessed: depressive symptoms, anxiety, and general health. First, models assessed whether Early Life Stress \times Time interactions predicted health to assess the extent to which early life stress was associated with changes in the health outcomes across the academic year. These models were followed by including both Early Life Stress \times Time and SSS \times Time interactions to assess whether forms of SSS related to health uniquely from early life stress as well as the extent to which these associations varied across the academic year. Separate models were estimated for each health outcome, and each form of SSS was tested as a predictor separately. Significant interactions were retained in the model and probed with simple slopes.

Early life stress and all forms of SSS were grand-mean centered. All analyses covaried for gender, age, and ethnicity. Gender (male = -1 , female = 1) and age were effect-coded (18 years old = -1 , over 18 years old = 1). Ethnicity was dummy-coded with Asian youth and youth of other ethnic backgrounds compared to White youth. Parental education and income were included as additional covariates and were grand mean-centered. Finally, reports of prior health status were included as covariates in significant models to assess robustness of results.

Results

Descriptive statistics

Means and associations between study variables are presented in [Table 1](#). White students reported higher society SSS ($M = 7.21$, $SD = 1.65$) than students of Asian American ($M = 6.08$, $SD = 1.64$) and other ethnic backgrounds ($M = 6.05$, $SD = 2.15$), $F(2, 87) = 4.40$, $p = .02$. There were no ethnic differences in dorm or university SSS, $F(2, 87) < 1.20$, $ps > .3$. Male students reported higher dorm SSS than female students, $t(87) = 2.55$, $p = .01$, and no gender differences emerged in society or university SSS, $ts(87) < 1.60$, $ps > .1$. Income and parental education were positively correlated with all three SSS measures and were negatively correlated with early life stress ([Table 1](#)).

Table 3. Society and school SSS as a function of early life stress (Study 2).

Variable	Society SSS			University SSS		Dorm SSS	
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Constant	6.01***	0.42	–	4.05***	0.60	5.91***	0.52
Early life stress	–0.23	0.22	–.08	0.13	0.30	–0.24	0.27
Asian background	–0.38	0.30	–.11	–0.24	0.40	–0.91*	0.36
Other ethnicity	–0.46	0.34	–.11	0.29	0.45	0.08	0.41
Gender	0.02	0.13	.01	–0.34	0.18	–0.41*	0.16
Age	0.30	0.18	.13	0.40	0.24	0.29	0.22
Income	0.54***	0.08	.58	0.16	0.12	0.16	0.10
Parental education	0.21**	0.08	.23	0.32**	0.11	0.25*	0.10
Time				0.24**	0.07	0.04	0.02
Time ²				–0.02*	0.01		
<i>F</i>	15.53						
<i>R</i> ²	.59						

Note. SSS = subjective social status; income was divided by 10⁴.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Number of monthly surveys completed was not related to any study variables aside from age, $t(87) = 2.26$, $p = .026$, $d = .62$, as 18-year-old students completed more monthly surveys ($M = 5.95$, $SD = 2.36$) than older students ($M = 4.44$, $SD = 3.01$). Dorm SSS increased over time ($B = 0.05$, $SE = 0.02$, $p = .025$, $f^2 = .15$), and university SSS increased until March and then plateaued; $B_{\text{quadratic}} = -0.02$, $SE = 0.01$, $f^2 = .015$, $p = .03$; $B_{\text{linear}} = 0.26$, $SE = 0.07$, $f^2 = .03$, $p < .001$.

SSS as a function of early life stress

Similar to the results obtained for Study 1, regression analyses revealed that participants with greater early life stress had lower society SSS ($B = -1.03$, $SE = 0.26$, $\beta = -.37$, $p < .001$), which was not significant after accounting for income and parental education (Table 3, column 1). Income and education increased the amount of variance in society SSS accounted for by the model from 27.86% to 58.54%.

Multilevel models revealed that early life stress was not related to university SSS ($B = -0.33$, $SE = 0.25$, $f^2 = .005$, $p = .19$) or dorm SSS ($B = -0.37$, $SE = 0.23$, $f^2 = .003$, $p = .11$), and associations remained nonsignificant over and above income and parental education ($ps > .4$). Rather, higher parental education predicted both higher university SSS and dorm SSS (Table 3, columns 2 and 3). Also, consistent with the results obtained from Study 1, females reported lower dorm SSS than males, and Asian American students had reported lower dorm SSS than their White peers. Next, interactions between early life stress and time tested whether links between early life stress and university or dorm SSS and social status changed throughout the academic year. These interactions were also nonsignificant, suggesting that early life stress did not become related to university or dorm SSS at any point in the academic year ($ps > .05$).

Health as a function of early life stress and SSS over time

Multilevel models assessed whether monthly depressive symptoms, anxiety symptoms, and general health were related to early life stress and society SSS, as reported at

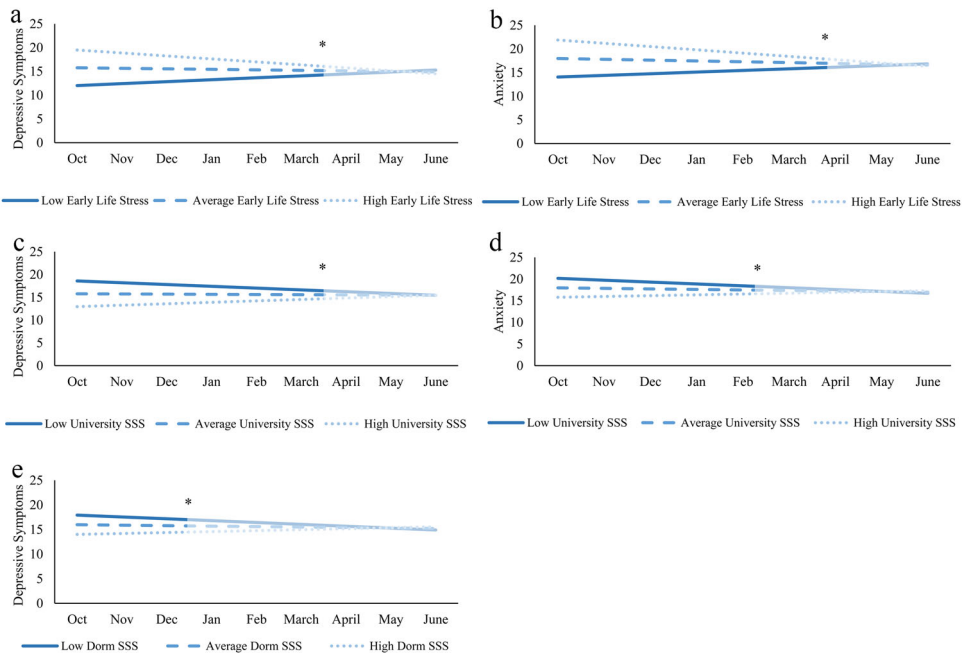


Figure 1. Depressive symptoms and anxiety as a function time and early life stress (a, b; top), University SSS (c, d; middle), and Dorm SSS (e; bottom). Note: There were significant differences in depressive symptoms and anxiety by levels of early adversity or SSS in months to the left of the asterisk (shaded) whereas these effects are not significant in months to the right of the asterisk (unshaded).

baseline, and monthly dorm SSS and university SSS. Time \times SSS and Time \times Early Life Stress interactions then assessed whether the strength of these associations changed across the academic year. In this sample, 29 participants reported mild (27.91%) or moderate levels of depression (5.81%), and 42 reported mild (27.91%), moderate (19.77%), or severe levels of anxiety (1.16%). Participants reported good general health ($M = 65.39$, $SD = 20.00$).

A similar pattern of results emerged for university SSS, dorm SSS, and early life stress, such that they were especially related to depressive and anxiety symptoms at the start of the academic year. Youth with more early life stress reported poorer mental health at the start of the academic year, and associations between early life stress and both depressive ($B = -0.77$, $SE = 0.26$, $r^2 = .02$, $p = .003$) and anxiety symptoms ($B = -0.78$, $SE = 0.26$, $r^2 = .02$, $p = .002$) weakened throughout the year and were no longer significant by March and April, respectively (Figure 1a,b). University and dorm SSS were uniquely related to both anxiety and depressive symptoms over and above the effects of early life stress. Youth with lower university SSS reported greater depressive symptoms and anxiety at the beginning of the year, and associations with depressive symptoms ($B = 0.17$, $SE = 0.07$, $r^2 = .03$, $p = .014$) and anxiety ($B = 0.15$, $SE = 0.07$, $r^2 = .02$, $p = .043$) weakened throughout the year and were no longer significant by March and February, respectively (Figure 1c,d). Similarly, youth with lower dorm SSS reported greater depressive symptoms at the start of the year, but associations weakened ($B = 0.15$, $SE = 0.08$, $r^2 = .02$, $p = .048$) and were nonsignificant by January

(Figure 1e). Dorm SSS was not related to anxiety ($B = 0.13$, $SE = 0.08$, $f^2 = .02$, $p = .09$). In contrast, society SSS was not related to anxiety or depressive symptoms at any point in the academic year after accounting for early life stress, suggesting that society SSS did not uniquely relate to health (all $ps > .3$).

Both early life stress and university SSS were also related to general health. Individuals exhibiting higher early life stress ($B = -6.55$, $SE = 2.24$, $f^2 = .002$, $p = .003$) and lower university SSS ($B = 1.37$, $SE = 0.47$, $f^2 = .008$, $p = .003$) reported poorer general health. However, only the association between university SSS and general health remained significant after controlling for income and parental education ($B = 1.39$, $SE = 0.49$, $f^2 = .01$, $p = .004$). Society SSS and dorm SSS were not related to general health ($ps > .5$), and no associations with general health varied across the academic year ($ps > .05$). All results remained unchanged when controlling for general health in childhood and health relative to the previous year in statistical models.

Discussion

The present two studies examined whether early life stress relates to society and school SSS and how these factors in turn relate to adolescent health over time. Consistent with prior research indicating that early life stress shapes one's overall evaluation of life in, well-being, and distress (Oshio et al., 2013; Schafer et al., 2011), in both studies greater early life stress related to lower society SSS. Further, in Study 1 this association was maintained over and above income and parental education. Although prior research suggests that children from risky families are prone to impaired social competence (Repetti et al., 2002), our results suggest they do not show differences in school SSS or development of school SSS during the transition from high school to college. Rather, the present findings suggest that early life stress may relate to school SSS later in development. Interestingly, low university SSS and dorm SSS and greater early life stress uniquely contributed to mental and physical health outcomes at the start of the academic year in the present research.

Early life stress uniquely relates to society SSS but not school SSS

SSS captures other facets relevant to one's upbringing beyond income and education, although there has been limited work to identify such non-economic indicators (Singh-Manoux et al., 2003). Early life adversity may shape one's perceived standing—a distinct aspect of status (Kraus et al., 2013)—which may partly explain how early life stress influences health. However, although early life stress contributed to lower society SSS over and above income and education in Study 1, this result was less robust in Study 2, in which society SSS was strongly related to income bracket. Participants reported early life stress occurring during childhood and current social status, which suggests that early life stress may influence society SSS. This notion is bolstered by the prospective associations between early life stress and society SSS 2 years later in Study 1. However, circumstances that lead to both lower social status and greater early life stress, such as dangerous home community, may partially explain this link.

In Study 2, university and dorm status were related to parental education rather than early life stress. The information about college that college-educated parents can transmit to their children may be helpful to adolescents as they navigate a college environment. Lower socioeconomic status may also lower capacity for gaining social status. For instance, in addition to academic and social stressors, college students of lower socioeconomic status experience unique stressors, such as financial hardship and alienation because of this hardship, and may have reduced capacity to cope with these stressors (Granfield, 1991; Johnson et al., 2011; Ostrove & Long, 2007). Interestingly, results from Study 1 suggest that early life stress may relate to lower school SSS later in college. Unfortunately, Study 2 was limited to the first academic year, and links between early life stress and school SSS may emerge as youth take more advanced coursework, create more lasting social relationships, and develop into young adults.

School SSS and early life stress predict health

Consistent with prior research (Lansford et al., 2002; Quon & McGrath, 2014), we found that university SSS and early life stress both uniquely predicted health in late adolescence, and that higher university SSS—but not early life stress—related to better self-rated health throughout the academic year. Social status and early life stress may shape health through different mechanisms. Whereas feeling of low social status can be deleterious for mental health (Hoebel & Lampert, 2020), early life stress may reduce self-regulation (Repetti et al., 2002; Slavich & Cole, 2013). University SSS—and to a lesser degree dorm SSS—and early life stress may uniquely shape health in part because of their differences in timing. Adolescents' SSS in school increased across the year. In contrast, early life is a period of critical development and stress experienced during this time can have long-lasting impacts on development. Taken together, both high early life stress and low university SSS may confer additive risk for poor health to youth experiencing both greater early life stress and lower university SSS. Contrary to prior evidence that lower society SSS is related to poorer mental health in adolescents (Quon & McGrath, 2014), society SSS was unrelated to measures of health. Our findings were limited by only measuring society SSS at baseline. However, youth may be more concerned with their status at school than in society during the first year of college, and society SSS may be more associated with health in years prior to and following this transition.

Associations between early life stress, university and dorm SSS, and mental health may have been most robust at the start of the year because adolescents were adjusting to the new social environment. Greater early life stress exposure could negatively impact one's ability to cope during this period until students feel more settled and develop a firm social network. Likewise, youth with low university and dorm SSS may struggle to adjust to the college environment. University SSS increased until the second half of the year, suggesting that youth are developing a sense of higher status as they transition. Adolescents may better understand or learn to cope with their status through the year, thereby reducing the impact of SSS on health over time.

The links between university SSS and early life stress with mental health at the start of the year could be an artifact of an initial elevation bias, as participants tend to

report poorer function during initial assessments in longitudinal studies (Shrout et al., 2018). However, associations were more extreme, but not necessarily elevated, at the start of the year, suggesting that results were not driven by this effect. At the start of the academic year, greater early life stress and lower university SSS were associated with poorer health, whereas lower early life stress and greater university SSS were associated with better health. Adolescents with lower early life stress and greater university SSS may be better able to adjust and consequently show better mental health, before showing levels of mental health comparable to youth with average early life stress and university SSS.

More broadly, associations between university SSS and health have implications for equity given demographic differences observed in school SSS. In Study 1, females and Latinos reported lower school SSS than males and European American youth, respectively. Similarly, females and Asian American youth reported lower dorm SSS in Study 2. Lower status groups experience setbacks, such as discrimination, which can contribute to feeling of lower status (e.g. Goldman, 2012; Hwang & Goto, 2008). The transition to college is associated with declines in SSS among low status groups (i.e. ethnic minority, low-income, and first-generation college students; Loeb & Hurd, 2019). Consequently, these youth may be at risk for poorer mental health during transitions, when youth are adjusting to increased academic and interpersonal stress.

Limitations

Although the present results were robust across two distinct samples, differences between the studies represent a limitation of this work. For example, whereas the prompt for school SSS from Study 1 referenced grades and respect from peers, the prompt for university and dorm SSS in Study 2 only related to respect. Hence, results from Study 2 did not account for how academic achievement could influence school status. Additionally, parental education and income were reported by caregivers in Study 1 and by the participants themselves in Study 2. Caregivers responded to an open-ended question and thereby provided a more fine-grained measure of income in Study 1, whereas participants selected income bracket from varied options in Study 2. Moreover, participants' recall of household income and parental education could be inaccurate, and biases in these reports may be reflected in reported society SSS. Differences in socioeconomic status measurement may explain why society SSS was so strongly related to income and education in Study 2 and the inconsistency in significance of the unique link between early life stress and society SSS between Study 1 and Study 2.

Furthermore, these results may be limited to college students. Students who attended college had higher income and parental education relative to students who did not attend college. Future research could assess whether similar associations between early life stress, health, and local SSS are present in other contexts, such as when individuals enter a new workplace. Study criteria also ensured participants were living under similar circumstances during the academic year. However, other factors may influence adolescents' perceptions of status and health (e.g. financial aid, scholarships, employment). Also, society SSS changes during late adolescence (Goodman

et al., 2001), so the association between society SSS and early life stress may also change over the first year of college. Because we lacked monthly assessments of society SSS, future research is needed to assess whether early life stress also relates to changes in society SSS over time.

Finally, both studies used the Risky Families Questionnaire to index early life stress. Adolescents in both studies reported low early life stress similar to levels reported in previous studies (e.g. Lehman et al., 2005; Miller & Chen, 2010; Taylor et al., 2006). However, self-reports of early life stress may not be accurate relative to more objective measures of parental neglect, abuse, or warmth, and the items on such self-report measures may not include the specificity needed to determine exactly what happened to a person (Slavich, 2019). In addition, associations between early life stress and SSS may be inflated because of recall bias, as people with lower SSS may more negatively appraise or recall situations. Despite these limitations, the present findings illustrate how one's own present assessment of early life stress is tied to one's perceived society SSS and not one's school SSS.

Conclusions

In conclusion, early life stress was related to society SSS but not school SSS in the present research. Higher early life stress and lower school SSS correspond to poorer mental health among first-year college students at the start of the year as youth are developing status. Neither early life stress nor SSS were related to health at the end of the academic year, when adolescents may have become more familiar with the university campus and developed a peer network. This work suggests that early life stress may contribute to the unique associations observed between society SSS and health, over and above socioeconomic status, in the extant literature. Moreover, early life stress does not appear to influence status in more proximal environments or to influence one's capacity for gaining social status in a novel environment. Future research should assess whether greater early life stress and lower local SSS predispose youth for poorer health when entering novel environments, and whether lower early life stress and greater local SSS can protect youth from poorer health specifically during these transitions. Given that social status can influence adolescent health in unique ways from other factors (i.e. socioeconomic status, early life stress), especially during the transition to college, further studies should investigate the factors that shape development of society and school SSS and the means by which youth gain status.

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