



Social support and cognitive reappraisal in adolescent females: The moderating role of lifetime stressor exposure

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ABSTRACT

Although social support is known to shape how individuals use emotion regulation strategies such as cognitive reappraisal, little is known about the specific dimensions of social support that facilitate such use and whether this use is moderated by lifetime stressor exposure. To investigate, we harnessed data from 47 adolescent females who participated in the Psychobiology of Stress and Adolescent Depression (PSY SAD) study to examine how six dimensions of social support related to youths' use of cognitive reappraisal. In addition, we investigated whether lifetime stressor exposure moderated the association between social support and cognitive reappraisal use in this sample. Results revealed that lifetime stressor exposure moderated the association between social support and cognitive reappraisal. Contrary to hypotheses, however, overall social support and the reassurance of worth dimension of social support were positively associated with reappraisal use, but only for youth exposed to fewer lifetime stressors. Marginally significant associations were also found for the reliable alliance dimension and attachment. In contrast, neither overall social support nor any sub-dimension of social support alone was significantly associated with habitual reappraisal use. Together, these findings highlight the potential importance of fostering social support in youth and in considering youths' lifetime stressor exposure when studying risk and resilience processes in adolescent females.

Introduction

Emotion regulation, or the process by which individuals modulate their emotions, their frequency of occurrence, and how people express them (Gross, 1998), is an essential part of managing stressors in everyday life. Studies have shown that deficits in emotion regulation are associated with psychopathology, including anxiety and mood disorders (Aldao et al., 2010), as well as with poorer social functioning (Gross & John, 2003). One of the most adaptive emotion regulation strategies—particularly in uncontrollable situations—is cognitive reappraisal, which involves reframing the meaning of a situation to alter the emotional response it elicits (Gross, 1998). Meta-analyses indicate that individuals who frequently use cognitive reappraisal exhibit less physiological and emotional arousal when exposed to negative stimuli, and experience greater positive emotions and fewer negative emotions (Augustine & Hemenover, 2009; Gross, 2013). The well-established effects of cognitive reappraisal on both mental and physical health suggest that taking an upstream approach and assessing factors that promote its

habitual use may provide valuable insight into key factors underlying resilience. However, research exploring this topic remains sparse, and little is known about which factors promote cognitive reappraisal, especially in females during a sensitive developmental period.

Social support, cognitive reappraisal, and depression

Theoretical and empirical research suggests that social support (i.e., a person's belief that they are cared for, respected, and part of a greater community; Cobb, 1976) plays an important role in shaping the use of adaptive emotion regulation strategies. Notably, studies have found that social support in adolescence is associated with better mental health (Scardera et al., 2020), which may be due, in part, to its ability to promote adaptive emotion regulation. Theories of adolescent emotion regulation development also point toward social relationships, particularly between children and their parents, as a factor influencing emotion regulation skills (Cassidy, 1994; Eisenberg et al., 2010; Morris et al., 2007). Looking at cognitive reappraisal specifically, perceived social

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support has been associated with viewing challenges as less daunting due to individuals' capacity to reappraise the challenge when thinking of their social support system (Schnall et al., 2008). More broadly, several studies have found a positive association between perception of social support and cognitive reappraisal use (Manne & Zautra, 1989; Valentiner et al., 1994).

Despite this work, we know of no studies that have investigated potential associations between social support and the use of adaptive emotion regulation strategies, such as cognitive reappraisal, either inside or outside the context of a vulnerable population. To address this gap, we examined how different dimensions of social support are related to cognitive reappraisal use in female adolescents. Understanding resilience-promoting factors in girls in this age group is of vital importance; adolescence is a formative period in the development of emotion regulation strategies (Zimmer-Gembeck & Skinner, 2011), and adolescent females are more likely than males to become depressed when faced with negative life circumstances (Cyranowski et al., 2000).

Dimensions of social support and cognitive reappraisal

According to Weiss' model of social provisions, social support can be divided into six different dimensions: attachment (feelings of security), social integration (sense of belonging to a group with similar values and interests), nurturance (a sense of being a source of support for others), reassurance of worth (assurance of an individual's competence and value), reliable alliance (tangible support), and guidance (advice or information) (Weiss & Rubin, 1974). These different dimensions of social support may have unique mechanisms by which they foster the use of cognitive reappraisal. For example, perceived belongingness and security in relationships may facilitate emotional honesty and vulnerability, both of which are factors that may help individuals to engage in successful reappraisal. In contrast, when an individual provides reassurance of worth to another, they may essentially be reframing a personally threatening event to mitigate its effect on the recipient's self-worth. Repeatedly receiving this support may lead to the recipient learning how to reassure themselves of their own worth, as suggested by Marroquín who described how interpersonal social relationships influence emotion regulation (Marroquín, 2011). According to Marroquín, guidance, or emotional support availability, may work in a similar manner to promote reappraisal. When an individual receives emotional support from another, they may be provided with positive alternate interpretations for a particularly impactful event. Repeated facilitation of such reappraisal may result in the recipient learning to engage in this cognitive work independent of their social support system. Finally, reliable alliance, or tangible support, may work in a different manner to foster cognitive reappraisal usage: when individuals are provided with the support needed to fulfill their needs (e.g., financial, housing), they have more mental resources available to put towards other concerns, such as managing their emotions in a productive and healthy manner.

It is particularly important to understand links between social support and the development of adaptive emotion regulation strategy use in adolescence. Adolescence is considered a pivotal development period during which individuals are especially influenced by their peers and social networks (Bronfenbrenner, 1994; Smith et al., 2014; Somerville et al., 2013). It is also a key period in the development of emotion regulation skills (Silvers, 2022). For example, several studies have demonstrated that the use of emotion regulation strategies and techniques shift significantly as one progresses through adolescence (Garnefski & Kraaij, 2006; Sanchis-Sanchis et al., 2020; Zimmermann, & Iwanski, 2014), highlighting adolescence as a key period during which time youth develop and refine their emotion regulation skills. Furthermore, adolescent females are at a much higher risk of developing depression than adolescent males (Cyranowski et al., 2000; Seedat et al., 2009). Given the potential for reappraisal to protect mental and physical health (Reed et al., 2023; Roos & Bennett, 2022), it is of particular importance to understand factors associated with reappraisal use in

adolescent females.

Social support and emotion regulation during stress

Finally, given the established buffering effects of social support on mental health when individuals encounter stressors (e.g., Cohen & Wills, 1985; Drogomyretska et al., 2020) and the substantial amount of research documenting the negative health impacts of psychosocial adversity (Slavich, 2016; Slavich & Auerbach, 2018), it is important to understand how stressor exposure occurring across the life course may impact the association between social support and reappraisal use. The existing literature on social support and emotion regulation has primarily focused on particular types of stressors. For example, in a study of sociopolitical refugees, researchers found that individuals with greater perceived social support were more likely to use cognitive reappraisal (Okumura et al., 2021). One possible explanation for these results is that individuals turn to their social support systems for guidance more frequently when in crisis as opposed to when not in crisis. As a result, individuals who are exposed to more lifetime stressors are more frequently subjected to the various social support mechanisms that guide the utilization of reappraisal, thus leading to greater usage of this strategy. However, as there was no comparison group, we cannot be sure of whether being a refugee made a significant difference in the extent to which social support and reappraisal use were linked. Indeed, no studies to date have examined how exposure to stressors over the life course affects the relation between social support and reappraisal usage, despite the importance of investigating adaptive regulatory strategies that can protect against stress-related mental and cognitive health degradation. Ultimately, how lifetime stressor exposure impacts the association between perceived social support and reappraisal use is unclear.

Present study

To address these gaps in knowledge, we examined how social support related to cognitive reappraisal use in adolescent females, as well as whether this association was moderated by lifetime stressor exposure. Based on existing research (e.g., Manne & Zautra, 1989; Okumura et al., 2021; Valentiner et al., 1994) that suggests an association between social support and reappraisal usage in various populations, we hypothesized that more social support would be associated with greater use of cognitive reappraisal. Further, based on research highlighting the need for social support under high levels of stress and the potential for social support to improve adaptive emotion regulation related to stress (e.g., Okumura et al., 2021), we hypothesized that this association would be moderated by lifetime stressor exposure, such that the association between social support and reappraisal use would be stronger for girls with greater lifetime stressor exposure. We also explored associations between various dimensions of social support and reappraisal use to gain more fine-grained insight into the potential effectiveness of specific aspects of social support in facilitating reappraisal use. Lastly, we assessed whether lifetime stressor exposure moderated the association between levels of the six dimensions of social support assessed and cognitive reappraisal use.

Method

Participants and procedure

This investigation was conducted using data from the Psychobiology of Stress and Adolescent Depression (PSY SAD) Study, which investigated stress-related neural and immunological mechanisms involved in risk for adolescent depression (for the full protocol, see Sichko et al., 2021; for prior articles, see Gray et al., 2022; Murphy et al., 2023; Shields et al., 2024). Due to the particular study aims of the parent study, adolescent cis-gender girls were eligible if they did not meet diagnostic

criteria or have a lifetime history of any affective or psychotic disorders, mania, general anxiety disorder, panic disorder, or eating disorders, and participants were split into groups based on their maternal history of depression. Although these criteria and groupings are not relevant for the aims of present investigation, we describe them here and test for the potential effects of maternal depression on outcomes to provide full transparency. Complete eligibility criteria are described in [Sichko et al. \(2021\)](#). In brief, 47 females who were 12–16 years old at baseline ($M_{\text{age}} = 14.9$, $SD = 1.3$) were recruited from the community. Descriptive statistics, along with zero-order correlations between the variables investigated here, are provided in [Table 1](#).

After completing a diagnostic interview to assess eligibility and providing informed assent, participants completed the psychosocial measures described below. For the purposes of this study, only data from the baseline assessment of the PSY SAD study were used. All study procedures were approved by the UCLA Institutional Review Board.

Measures

Perceived social support

Perceived social support was assessed using the Social Provisions Scale ([Cutrona & Russell, 1987](#); [Perera, 2016](#)), a 24-item self-report scale that assesses six social support dimensions (i.e., attachment, social integration, reassurance of worth, reliable alliance, guidance, and nurturance), also known as social provisions. Participants were asked how much they agree with each statement on a 4-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). Internal reliability is reported in [Table 1](#).

Reappraisal

Habitual reappraisal usage was assessed using the six-item cognitive reappraisal subscale of the 10-item Emotion Regulation Questionnaire (ERQ; [Gross & John, 2003](#)). Respondents indicate how strongly they agree with each statement from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores indicate greater habitual reappraisal use. Internal reliability is reported in [Table 1](#).

Lifetime stressor exposure

Lifetime stressor exposure was assessed using the Stress and Adversity Inventory for Adolescents (Adolescent STRAIN; [Slavich et al. 2019](#)), an online, interview-based system that assesses the severity, frequency, exposure timing, and duration of 33 acute life events and 42 chronic difficulties that impact mental and physical health in adolescents (see <https://www.strainsetup.com>). Because both social support and emotion regulation can affect perceived severity of stressors, this investigation focused on the total number of stressors reported over the life course for a more objective measure of stressor exposure. The Adolescent STRAIN has excellent psychometric properties and has been shown to predict a number of clinical and behavioral outcomes (e.g., [Ojha et al., 2023](#); [Burani et al., 2022, 2023](#); [Murphy et al., 2023](#)). In this study, participants experienced 0–47 lifetime stressors ($M = 21.5$, $SD = 11.1$). There was no evidence of non-normality or clustering in the data (skewness = 0.15, $SE = 0.35$; kurtosis = -0.42 , $SE = 0.68$); therefore, we kept stressor count a continuous variable for analyses.

Data analysis

Analyses were conducted using IBM SPSS Statistics Version 27, with two-tailed significance levels set at $\alpha = 0.05$ and marginal significance set at $\alpha = 0.10$. We used multiple regression analyses to assess the association between perceived social support (overall and by dimension) and habitual reappraisal use. We then used PROCESS Macro ([Hayes, 2013](#)) model 1 to examine the extent to which lifetime stressor exposure moderated the association between perceived social support (overall and by dimension) and habitual reappraisal use. We report statistics for the model as it was run with continuous variables, as well as simple

slopes for significant interactions. Simple slopes, which detect at what level of lifetime stressor exposure significantly affected the model, are presented at the average lifetime stressor exposure for participants, as well as at one standard deviation (SD) above and below the mean to aid interpretation. In addition to significance testing, we report multiple effect size metrics including R^2 , ΔR^2 , and Cohen's f^2 ([Cohen, 1988](#)), where f^2 values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively. We also used the Johnson-Neyman technique to identify the precise points along the continuum of lifetime stressor exposure where the association between social support and reappraisal transitioned from significant to non-significant ([Hayes, 2013](#)). To control for multiple comparisons when examining the different dimensions of social support, we applied the Benjamini-Hochberg correction with a false discovery rate of 0.05 ([Benjamini & Hochberg, 1995](#)). This procedure helps control for Type I error while maintaining reasonable statistical power when conducting multiple related tests.

We examined potential confounds for inclusion as covariates using Pearson's correlations and included them as covariates if the variables were significantly associated with the predictor variable (i.e., social support, lifetime stressor exposure), and the outcome variable, habitual reappraisal use ([VanderWheele, 2019](#)). Specifically, we examined (a) maternal history of depressions, due to the nature of the parent study; and (b) age, due to the developmental process of emotion regulation in adolescence (e.g., [McRae et al., 2012](#)). Neither variable met criteria to be included as a covariate.¹ All other data analysis and variable inclusion decisions were made *a priori*. Zero-order correlations among study variables and the Cronbach alphas representing internal consistency are shown in [Table 1](#).

Results

As shown in [Fig. 1](#), perceived social support was not by itself significantly associated with habitual reappraisal use, either when assessed overall ($p = .506$) or by dimension ($ps > 0.10$) in this sample of adolescent females. As hypothesized, however, there was a significant interaction between perceived overall social support and lifetime stressor exposure for reappraisal use ($\Delta R^2 = 0.08$, $F(1,43) = 4.04$, $p = .050$, 95 % CI $[-0.58, 0.00]$). The overall model explained 11 % of the variance in reappraisal use ($R^2 = 0.11$), with the interaction term representing a small-to-medium effect ($f^2 = 0.090$). Specifically, overall perceived social support was significantly associated with cognitive reappraisal use only for youth exposed to fewer lifetime stressors (i.e., one SD below the mean = 10.3) ($\beta = 0.45$, $p = .051$, 95 % CI $[0.00, 0.90]$). In contrast, the interaction between social support and lifetime stressor exposure was not significantly associated with reappraisal use for youth with average (i.e., $M = 21.5$) ($p = .277$, 95 % CI $[-0.13, 0.46]$) or higher (i.e., one SD above the mean = 32.6) ($p = .500$, 95 % CI $[-0.50, 0.25]$) lifetime stressor exposure (see [Fig. 2](#)). Johnson-Neyman analyses revealed that the association between social support and reappraisal was significant at $p < .05$ when lifetime stressors were below 9.9 (14.9 % of the sample), but not significant at or above this threshold. In addition, Johnson-Neyman analyses revealed that the association between social support and reappraisal was significant at $p < .05$ when lifetime stressors were below 9.9 (14.9 % of the sample), but not significant at or above this threshold.

We observed the same pattern for the “reassurance of worth” dimension of perceived social support. There was a significant interaction between the social support subscale of reassurance of worth, lifetime stressor exposure, and cognitive reappraisal usage reappraisal ($\Delta R^2 = 0.08$, $F(1,43) = 4.15$, $p = .048$, 95 % CI $[-0.60, -0.00]$) such that adolescent females who reported higher levels of “reassurance of worth” used significantly more cognitive reappraisal if they had been exposed to

¹ Analyses were also conducted with these variables included as covariates. However, the findings did not differ from those reported herein.

Table 1
Internal consistency and zero-order correlations among study variables.

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Age	–										
2. Depression Risk Group	-.12	–									
3. Lifetime Stressor Count	.41**	.28	–								
4. Reappraisal	.13	.02	.11	(0.87)							
5. Social Provisions – Total	.16	–0.01	–0.05	.10	(0.81)						
6. Social Provisions – Attachment Subscale	.02	–0.19	–0.32*	.13	.79**	(0.48)					
7. Social Provisions – Guidance Subscale	.06	–0.04	–0.19	.23	.65**	.51**	(0.73)				
8. Social Provisions – Reassurance of Worth Subscale	.18	–0.06	–0.04	.12	.78**	.59**	.62**	(0.50)			
9. Social Provisions – Social Integration Subscale	.24	–0.21	–0.13	.01	.76**	.55**	.45**	.54**	(0.79)		
10. Social Provisions – Nurturance Subscale	.00	.37*	.43**	–0.16	.27	–0.06	–0.21	–0.04	–0.02	(0.56)	
11. Social Provisions – Reliable Alliance Subscale	.12	–0.02	–0.06	.11	.71**	.66**	.21	.34*	.53**	.20	(0.52)

Note: $N = 47$

* $p < .05$

** $p < .01$

Cronbach alphas are presented in bold across the diagonal.

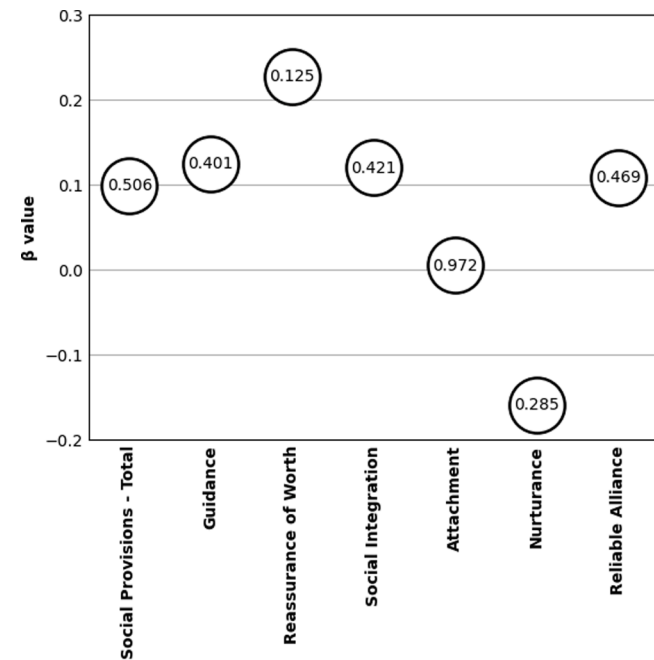


Fig. 1. Multiple linear regression models examining the associations between social support as a whole and the six dimensions of social support, and the use of cognitive reappraisal. Significance values for each association are shown inside the circles. As can be seen, perceived social support was not significantly associated with habitual reappraisal use, either when assessed overall ($p = .506$) or by dimension ($ps > 0.10$) in this sample of adolescent females.

fewer lifetime stressors (i.e., one SD below the mean = 10.34) ($\beta = 0.54$, $p = .010$, 95 % CI [0.14, 0.93]). As with overall perceived social support, this pattern was not seen for girls at average ($M = 21.5$) ($p = .111$, 95 % CI [–0.06, 0.52]) or high (one SD above the mean = 32.6) ($p = .751$, 95 % CI [–0.50, 0.36]) levels of lifetime stressor exposure. The overall model explained 16 % of the variance in reappraisal use ($R^2 = 0.16$), with the interaction representing a small-to-medium effect ($f^2 = 0.095$).

The interaction for the “reliable alliance” dimension of social support was marginally significant ($\Delta R^2 = 0.08$, $F(1,43) = 3.86$, $p = .056$, 95 % CI [–0.54, 0.01]) and reflected the same pattern as overall social support and the reassurance of worth dimension of social support. That is to say, the association between the reliable alliance subscale and use of cognitive reappraisal was marginally significant for people exposed to fewer lifetime stressors (i.e., one SD below the mean = 10.3) ($\beta = 0.43$, $p = .053$, 95 % CI [–0.00, 0.86]) but not average ($M = 21.5$) ($p = .270$, 95

% CI [–0.13, 0.46]) or higher (i.e., one SD above the mean = 32.6) levels of lifetime stressor exposure ($p = .583$, 95 % CI [–0.47, 0.27]). The overall model explained 11 % of the variance in reappraisal use ($R^2 = 0.11$), with the interaction representing a small-to-medium effect ($f^2 = 0.090$). A similar pattern emerged in the Johnson-Neyman analyses for the reassurance of worth and reliable alliance dimensions, with the associations between these types of social support and reappraisal being significant only when lifetime stressors were below 19.4 (42.6 % of the sample) and 9.3 (14.9 % of the sample), respectively.

The interaction for the “attachment” dimension of social support was also marginally significant ($\Delta R^2 = 0.07$, $F(1,43) = 3.18$, $p = .08$, 95 % CI [–0.55, 0.03]), but the simple slopes were not significant ($ps > 0.10$) regardless of the level of stressor exposure. The interactions for the guidance ($p = .146$, 95 % CI [–0.54, 0.08]), social integration ($p = .375$, 95 % CI [–0.44, 0.17]), and nurturance subscales were not statistically significant ($p = .475$, 95 % CI [–0.14, 0.07]). When controlling for multiple comparisons using the Benjamini-Hochberg procedure, the interactions between lifetime stressor exposure and social support (both overall and by dimension) were no longer statistically significant at $p < .05$. However, given our modest sample size and the consistent pattern of findings across analyses, we report the uncorrected results while noting they should be interpreted with caution.

Discussion

Although research has shown that cognitive reappraisal is an adaptive emotion regulation strategy (e.g., Aldao et al., 2010; Roos & Bennett, 2022), little is known about factors that may promote its habitual use, such as social support. As an initial step toward understanding whether social support might encourage cognitive reappraisal use, we investigated whether social support as a whole—as well as specific dimensions of social support—were associated with use of cognitive reappraisal use in adolescent girls. Furthermore, given the importance of social support and the increased need for regulating emotions in times of stress, we examined whether lifetime stressor exposure moderated the association between social support and cognitive reappraisal use in this group.

Contrary to hypotheses, social support was not related to cognitive reappraisal use, either when examined as a global construct or when considering its six specific sub-types. However, when lifetime stressor exposure was included in the model, significant associations emerged such that social support was related to cognitive appraisal for girls exposed to fewer stressors over the life course. Although the directionality of the influence of stressor exposure was unexpected, as we hypothesized this association to be present at higher levels of stressor exposure, several theoretical frameworks and empirical findings help explain these patterns. For example, Resource Conservation Theory suggests that individuals possess finite psychological resources that can

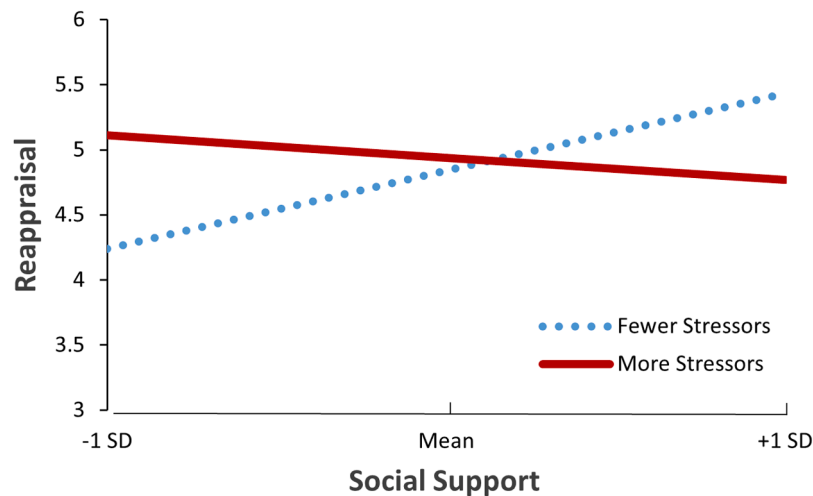


Fig. 2. Simple slopes showing a two-way interaction between lifetime stressor exposure and social support for reappraisal use. The two lines representing 'More Stressors' and 'Fewer Stressors' were defined by $-1\ SD$ (10.3) and $+1\ SD$ (32.6) compared to the mean (21.5). The association between social support and reappraisal use was only significant for adolescents who had been exposed to relatively fewer lifetime stressors. ($N = 47$) $*p < .05$.

become depleted through stress exposure (Hobfoll, 1989). When these resources are depleted, individuals may have less capacity for learning and implementing new emotion regulation strategies, even when social support is available. This depletion may help explain why adolescents with higher lifetime stress exposure showed weaker associations between social support and reappraisal use.

In addition, the human brain is fundamentally adapted to expect and rely on social relationships for optimal functioning, a principle known as Social Baseline Theory (Beckes & Coan, 2011). Through this lens, chronic stressor exposure may disrupt these baseline social processes, making it more difficult for adolescents to effectively utilize their support systems for developing adaptive emotion regulation strategies. For instance, having lower emotional awareness and ability to regulate emotions effectively may contribute to both less reappraisal use and increased experiences of interpersonal conflict. This pattern can create a cyclical effect whereby stress leads to interpersonal difficulties, which in turn generate additional stressors—a process described by the Stress Generation Hypothesis (Hammen, 1991).

Additionally, exposure to stressors in childhood may contribute to disruptions in cognitive functioning and reductions in the availability of cognitive resources for regulating emotions, as well as greater allostatic load, all of which can impair healthy emotion regulation (e.g., Arnsten, 2009; Raio et al., 2013). Experiencing more stressors over the lifetime can also increase the likelihood of impaired interpersonal and relationship functioning (Beck et al., 2009; Eisenberger & Cole, 2012), which may hinder social support from having as positive of an effect as it might otherwise have. Conversely, having lower exposure to stressors may preserve the ability to effectively learn from socially supportive experiences and integrate a socially supportive friend or family member's reframing into our own emotion regulation toolbox. We are not aware of any studies that have investigated this association specifically, and the findings highlight the need for more research on this topic to elucidate other factors that may be contributing to the results reported here.

Our findings notably contrast with prior work by Okumura et al. (2021), who found that Venezuelan refugees with greater perceived social support were more likely to use cognitive reappraisal during sociopolitical crisis. These divergent findings may reflect important differences between populations and stress contexts. Whereas Okumura and colleagues studied adults experiencing acute sociopolitical trauma with clear external causes, we examined adolescent females' cumulative exposure to various types of stressors across their lifetime. Additionally, refugee populations may develop unique patterns of social support use

that differ from general populations, particularly given cultural differences and the specific challenges of forced migration. These contrasting findings highlight the importance of examining how different types of stressors, developmental stages, and cultural contexts may affect the relation between social support and emotion regulation. When examining specific dimensions of social support, interactions between the dimensions of social support with lifetime stressor exposure on reappraisal use were significant for the (a) reassurance of worth and (b) reliable alliance dimensions. The patterns for these associations reflected the same as observed with overall social support. We found a marginally significant interaction for the attachment dimension; however, simple slopes for the attachment subscale were not significant at any level of lifetime stressor exposure. We therefore regard those findings as inconclusive.

Although not originally hypothesized, we suspect that the pattern observed for social support broadly being the same for reassurance of worth and reliable alliance—in terms of the association being significant only at lower levels of lifetime stressor exposure—is due to the same factors explained above. The specific mechanism by which reassurance of worth influences emotion regulation is unknown; however, repeated reassurance of worth by a member of one's social support system may result in an individual learning how to reframe impactful events to mitigate their impact on self-worth and reassure themselves of their own worth (Marroquín, 2011). Prior research that has tested the cognitive-emotional theory of esteem support messages (CETESM) support this supposition; for example, when people were given reassurance of their worth as a type of social support—referred to as "esteem support" in the theory (wherein participants were given social support specifically to enhance how they felt about themselves and their attributes, abilities, and accomplishments)—they report greater individual cognitive reappraisal and reattribution, which mediates the pathway between esteem support and self-esteem (Holmstrom & Burleson, 2011; Holstrom & Sang-Yeon, 2015).

We also found a significant interaction between stressor exposure and the reliable alliance—or tangible support—dimension of social support for reappraisal use. The potential reasons for this association are less clear, although tangible support may work by increasing one's confidence in the availability of their social support system and by helping people take care of tangible needs, thus freeing up cognitive resources to put towards healthy emotion regulation. Why we did not find similar effects for other areas of social support, however, is unclear.

Specifically, we did not find significant interactions between the social support dimensions of attachment, nurturance, and guidance, and

lifetime stressor exposure. As such, it appears that the reliable alliance and reassurance of worth subscales may be driving the effect of social support on reappraisal use. Reliable alliance and reassurance of worth seem to have a more direct impact in facilitating adaptive emotion regulation strategy usage by increasing one's confidence in themselves and their support systems. On the contrary, the other dimensions of social support likely provide benefits to the recipient that are indirectly related to emotion regulation strategy usage.

It is worth noting that prior research has not demonstrated conclusive findings regarding the effects of life stressors on reappraisal use. Broadly speaking, studies have established that reappraisal is protective against the deleterious effects of traumatic and chronic stressors (e.g., Jenness et al., 2016; Troy et al., 2010), and that both acute and chronic stressor exposure are associated with lower levels of executive control under stress and impaired reappraisal ability (Lynch & Lachman, 2020; Quinn & Joorman, 2020; Quinn et al., 2020). Future studies are needed to clarify the specific role that stressor exposure plays in the association between social support and reappraisal use. Ultimately, our results suggest that the positive influence of social support may depend on lifetime stressor exposure.

Although our findings did not survive correction for multiple comparisons, likely due to the limited sample size, the consistent pattern across analyses suggests an important phenomenon worthy of further investigation. Specifically, the observation that social support's association with reappraisal appears to vary by stressor exposure—with the strongest associations appearing at lower levels of lifetime stressor exposure—challenges existing assumptions and raises important questions about how we conceptualize resilience processes in adolescence.

Several study limitations are worth noting. First, as alluded to above, the sample size was limited, which affected our statistical power, particularly when controlling for multiple comparisons. Although the Benjamini-Hochberg correction indicated that the individual findings should be interpreted with caution, the consistency of the pattern across analyses—showing that social support's association with reappraisal varies by lifetime stressor exposure—suggests a meaningful phenomenon worth further investigation. The observation that this pattern emerged across multiple dimensions of social support, even with our modest sample size, highlights the importance of examining specific aspects of social support in future research. Larger-scale studies are needed to confirm these preliminary findings and further explore the complex interplay between social support, stress exposure, and emotion regulation during adolescence.

Second, the study design was cross-sectional, which prevents us from drawing inferences of directionality or causality. Third, this study relied on self-report measures of perceived social support, cognitive reappraisal use, and lifetime stressor exposure. Although the STRAIN has been shown to be insensitive to social desirability and mood biases (Slavich & Shields, 2018)—and that perceived social support and cognitive reappraisal use are perhaps best assessed using self-report—these biases nevertheless need to be taken into account. Fourth, diversity in gender and racial identities, as well as mental and physical health, were limited in this study, and future research is needed to examine how unique stressors faced by minority populations (Hoy-Ellis, 2023; Slavich et al., 2023) may impact the results observed.

Despite these limitations, the present data add important insight into how emotion regulation, social support, and lifetime stressor exposure are related in adolescent females. Adaptive emotion regulation strategies are widely established to be protective against negative health outcomes (Aldao et al., 2010); yet, little research has examined factors that promote adaptive emotion regulation. To better understand the impact that stressor exposure has on social support and adaptive emotion regulation, future research should aim to replicate this study and explore these effects in different populations. In addition, studies that compare the chronicity of stressor occurrence and the developmental stage at which stressors occur would enable us to better elucidate which aspects of stressor exposure affect emotion regulation and shape

mental health and well-being across the life course.

Declaration of competing interest

The authors declare no conflicts of interest with respect to this work.

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