


SHORT COMMUNICATION

The impact of stress and coping strategies on life satisfaction in a national sample of adolescents: A structural equation modelling approach

Goran Milas¹ | Irena Martinović Klarić² | Ana Malnar³ | Vanja Saftić^{4,5} | Daniela Šupe-Domić^{6,7} | George M. Slavich⁸ 

¹Institute of Social Sciences 'Ivo Pilar', Zagreb, Croatia

²Institute for Social Research in Zagreb, Zagreb, Croatia

³Institute for Migration and Ethnic Studies, Zagreb, Croatia

⁴Child and Youth Protection Center of Zagreb, Zagreb, Croatia

⁵Croatian Catholic University, Zagreb, Croatia

⁶Department of Medical Laboratory Diagnostics, University Hospital Center Split, Split, Croatia

⁷Department of Health Studies, University of Split, Split, Croatia

⁸Cousins Center for Psychoneuroimmunology and Department of Psychiatry and Biobehavioral Sciences, University of California, Los Angeles, California, USA

Correspondence

George M. Slavich, Cousins Center for Psychoneuroimmunology, University of California, Los Angeles, UCLA Medical Plaza 300, Room 3156, Los Angeles, CA 90095-7076, USA.

Email: gslavich@mednet.ucla.edu

Funding information

National Institute of Mental Health, United States, Grant/Award Number: K08 MH103443; Brain and Behavior Research Foundation, United States, Grant/Award Number: 23958; Society in Science-Branco Weiss Fellowship; Croatian Science Foundation, Croatia, Grant/Award Number: 09.01/408

Abstract

Although stress strongly predicts life satisfaction, the psychosocial mechanisms underlying this association remain unclear. To investigate the possible mediating role of coping, we conducted a cross-sectional study that assessed youths' life stress levels, propensity to engage in three different coping styles (i.e., active coping, internal coping, & withdrawal), and life satisfaction in a probabilistic, two-stage stratified cluster sample of 1830 high school seniors (986 females; age range: 17–22 years old) from 26 schools in or around the four largest cities in Croatia. We used correlational analyses and structural equation modelling to test the hypothesis that coping mediates the relation between stress and life satisfaction. The tested model was marginally acceptable: $\chi^2 = 1613.85$, $df = 177$, $p < 0.001$, goodness-of-fit-index = 0.92, Comparative Fit Index = 0.91, Tucker-Lewis Index = 0.89, root mean square error of approximation = 0.067 (90% CI = 0.064 to 0.070), standardized root mean squared residual = 0.056. As hypothesized, stress was related to life satisfaction directly ($\beta_c' = -0.22$, $p < 0.01$) but also indirectly ($\beta_{ab} = -0.05$, $p < 0.01$) by affecting youths' likelihood of engaging in withdrawal behaviours, such as avoiding problems, distracting, or using anger, alcohol, or drugs. The proportion of the total effect mediated by withdrawal was 19.4%. In contrast, neither active nor internal coping were significant mediators. Based on these results, we conclude that preventive and educational programs for enhancing youth mental health may benefit from reducing adolescents' stress levels and stress-related withdrawal behaviour, and by encouraging youth to use active coping strategies instead.

KEYWORDS

coping, development, life stress, mental health, prevention, resilience, risk

1 | INTRODUCTION

Life stress is one of the strongest known predictors of poor health in adolescence (Seiffge-Krenke, 2019; Slavich, 2016, 2020; Stewart et al., 2019) and of youths' overall satisfaction with life (McKnight et al., 2002). This latter association may be particularly important, as life satisfaction, conceptualized as the cognitive component of subjective well-being that reflects the overall quality of one's life (Diener, 1984), has been related to a broad array of psychosocial and health outcomes (Huebner et al., 2006). These outcomes include a person's likelihood of engaging in helpful and harmful health behaviours (Friedman & Ryff, 2012; Grant et al., 2006; Valois et al., 2004), as well as their mental and physical health and longevity (Diener & Chan, 2011; Kansky et al., 2016; Kansky & Diener, 2017). Low life satisfaction also has been related to a variety of externalizing symptoms, including substance abuse (Zullig et al., 2001), binge drinking (Kuntsche & Gmel, 2004), violence and aggression (Valois et al., 2006), and sexual risk-taking behaviour (Valois et al., 2002). Moreover, life satisfaction is considered a comprehensive indicator of the current and future mental health of adolescents that goes beyond the presence or absence of psychopathology or illness (Antaramian, 2020). Despite existing work on this topic, however, it remains unclear how stress leads to changes in life satisfaction that increase risk for poor mental and physical health outcomes (Proctor et al. 2009).

Possible answers may be provided by the transactional theory of stress and coping (Lazarus & Folkman, 1984, 1987), which emphasizes the importance of coping in the development of psychopathology and poor health. From this perspective, stress is hypothesized to affect human health and functioning through two key processes: cognitive appraisal and coping. First, situations are cognitively appraised; then, based on a person's appraisal, coping behaviours that are necessary to meet the specific demands of the stressful situation are chosen. Although a relatively large literature exists relating stress and coping with various forms of psychopathology (e.g., Evans et al., 2014; Zimmer-Gembeck & Skinner, 2016), research linking stress, coping, and life satisfaction is limited, even though life satisfaction is a critical, robust predictor of human health, behaviour, and longevity.

A key prediction derived from Lazarus and Folkman's transactional theory is that individual differences in coping behaviour should mediate the link between experiences of stress and life satisfaction. Consistent with this prediction, an inability to adequately cope with stressful life events has long been identified as a risk factor for developing mental and physical health problems in adolescence and emerging adulthood (Compas et al., 2001, 2017; Grant et al., 2006). Coping has been most commonly defined as engaging in cognitive or behavioural efforts that are necessary to meet internal or external demands that exceed a person's available resources (Lazarus & Folkman, 1984). Coping has also been defined as a subset of broader self-regulatory processes that involve conscious efforts to regulate emotion, cognition, behaviour,

physiology, and the environment in response to stressful events (Compas et al., 2001). Although questions remain regarding the precise definition of coping and its higher-order organization (Skinner et al., 2003), a general distinction has been made between adaptive and maladaptive coping, with the latter including behaviours such as withdrawal and avoidance that have been found to predict higher levels of psychopathology in adolescence (Compas et al., 2017).

To date, a number of studies have examined coping in adolescence, linking it either to adjustment and psychopathology (Compas et al., 2017) or quality of life (Antaramian et al., 2016; MacCann et al., 2012; Mahmoud et al., 2012). However, research that simultaneously explores life stress, coping, and quality of life, which is crucial for addressing questions involving mediation, is rare and limited to specific groups of adolescents, such as those with existing health issues. Indeed, we are not aware of any studies in a general adolescent population that have assessed all three constructs (i.e., life stress, coping, and quality of life).

The studies that have been conducted have shown that acute and chronic stress predict poor life satisfaction and psychopathology in adolescents who cope poorly (Compas et al., 2017; Mahmoud et al., 2012). In addition, in a group of high-achieving American high school students, Suldo et al. (2008) found positive associations between positive appraisal coping and family communication and life satisfaction, and negative associations between avoidance and anger coping and life satisfaction. In a second study of American high school students, problem-focused coping predicted higher life satisfaction, whereas avoidance was unrelated to life satisfaction (MacCann et al., 2012). Finally, a study of adolescent Hindu students from India found differential associations between coping styles and life satisfaction, such that the approach behaviours of problem-solving and seeking social support were positively related to life satisfaction, whereas avoidance was negatively related to life satisfaction (Antaramian et al., 2016).

The purpose of the present study was to address the existing gaps in this literature by examining associations between life stress, coping, and life satisfaction in a national sample of high school seniors. We focused on high school seniors because this is when many teenagers need to make important life decisions, such as whether they should work, attend college, remain at home, or start living independently. Moreover, late adolescence/emerging adulthood is a developmental period that is well known to shape lifelong health (Arnett, 2000; Murphy et al., 2013). Based on the research summarized above, we hypothesized that greater life stress in adolescence would be associated with poorer life satisfaction. In addition, we hypothesized that this association between stress and life satisfaction would be at least partially mediated by youths' coping behaviour, with adaptive coping strategies weakening the association between greater stress exposure and poorer life satisfaction, and maladaptive coping strategies strengthening the association between greater stress exposure and poorer life satisfaction.

2 | METHOD

2.1 | Study design

Data for this cross-sectional study were drawn from the Croatian Late Adolescence Stress Study (CLASS), which sampled students enrolled in their final year of secondary education in Croatia (Šupe-Domić et al., 2016). Self-report data were collected in selected schools during a single class. After obtaining informed consent, we distributed the study questionnaires and assisted students who had questions while completing them. In addition to the scales administered (see below), we assessed a number of other variables related to students' socio-demographical characteristics and cultural values (Šupe Domić et al., 2016).

2.2 | Participants

Participants were selected using a probabilistic, two-stage stratified cluster sampling method that yielded a national sample of high school seniors living in the four largest cities in Croatia (i.e., Zagreb, Split, Rijeka, and Osijek), and in the surrounding suburbs and villages. We sampled students who were completing either vocational high school, which prepares students to enter the labour market, or typical high school (i.e., 'gymnasium'), which prepares students for tertiary education in universities, polytechnics, or colleges of applied sciences. In the first sampling stage, within each city and school type, schools were sampled with probabilities proportional to their size from a list of all public schools. In total, 26 out of 102 public secondary schools were randomly selected: two gymnasiums and three vocational schools from Split, two gymnasiums and three vocational schools from Rijeka, two gymnasiums and three vocational schools from Osijek, and five gymnasiums and six vocational schools from Zagreb. In the second stage, 2-to-3 classes were randomly selected from each school. All students from the selected classes who were present at school on the day that the study took place were invited to participate. All participants signed an informed consent form and minors had to have their forms co-signed by a parent or legal guardian. The final sample included 1830 students (844 males, 986 females) ranging in age from 17 to 22 years old (median age = 19).

Our recruitment goals were informed by power analyses for the main structural equation model (Moshagen & Erdfelder, 2016). Specifically, we determine the required sample size needed to achieve a power of 0.90, given an alpha of 0.05 and a root mean square error of approximation (RMSEA) of 0.05, which indicates a good fit of a hypothesized model (Browne & Cudeck, 1993). The minimum sample size required to achieve such power was shown to be 147. Afterward, we determined that the actual power achieved was greater than 0.999.

3 | MEASURES

3.1 | Stress

Perceptions of stress were assessed using the translated and culturally adapted revised version of the Problem Questionnaire (Seiffge-Krenke, 1995), which assesses perceptions of minor-to-moderate stressors across seven life domains: school, future, parents, peers, leisure time, romantic relationships, and self. Subscales composed of 7–11 items assessed stress experienced in each domain. Participants indicated the stressfulness of specific problems occurring in each domain on a 5-point scale, ranging from 1 (*not stressful at all*) to 5 (*highly stressful*), with higher scores thus indicating more stress. Arithmetic means were used for analyses (range: 1–5). Prior research has demonstrated high reliability and predictive validity for depression (Seiffge-Krenke, 1995). In this sample, high reliability was observed for all of the subscales ($\alpha = 0.82$ to 0.91) as well as for the whole scale ($\alpha = 0.97$; Milas et al., 2019).

3.2 | Coping

Participants' coping tendencies were measured using the Coping Across Situations Questionnaire (Seiffge-Krenke, 1995), which assesses coping strategies across the same seven domains as the Problem Questionnaire described above. In the original report, Seiffge-Krenke (1995) performed a factor analysis that revealed a three-factor structure: 'active coping', 'internal coping', and 'withdrawal'. Active coping involves seeking social support through various strategies, such as discussing the problem with others and finding information about the problem or getting help from institutions. Internal coping involves using cognitive strategies, such as perceiving the situation and solutions, thinking about the problem and finding different solutions, making compromises, and accepting personal limits. Finally, withdrawal involves retreating from the stressor and using emotional outlets and distraction strategies, such as listening to loud music, doing sports, not thinking about the problem, trying to forget about the problem using alcohol or drugs, or letting anger out by shouting, crying, or slamming doors. Active and internal coping strategies are considered to be adaptive, whereas withdrawal is regarded as maladaptive (Seiffge-Krenke, 2000).

Participants went through each of the seven domains and identified the coping strategies they typically use when a problem arises in each domain, using a scale from 0 (*strategy is not used*) to 1 (*strategy is used*). Arithmetic means were used for analyses, and given that the scores indicate the proportion of coping strategies used, the possible range for each strategy was 0–1, with higher scores indicating a greater probability of using a particular strategy. Prior research has shown that the scale has high internal reliability and that withdrawal predicts depression (Seiffge-Krenke, 1995). In this sample, high reliability was observed for each of the coping strategy subscales ($\alpha = 0.82$ to 0.88).

3.3 | Life satisfaction

Consistent with prior epidemiological research, life satisfaction was assessed using a single-item measure that read, 'All things considered, how satisfied are you with your life as a whole?' Participants responded to this question using a five-point scale that included 1 (*not satisfied at all*), 2 (*little satisfied*), 3 (*I do not know*), 4 (*satisfied*), and 5 (*very satisfied*). Arithmetic means were used for analyses (range: 1–5), with higher scores indicating greater life satisfaction. Cheung and Lucas (2014) found that this item demonstrates high criterion validity and is correlated with other health-related outcomes in a manner similar to the full Satisfaction with Life Scale (Diener et al., 1985). Additionally, a prior nationally representative panel study showed that the test-retest reliability of this measure is adequate ($\alpha = 0.74$; Lucas & Donnellan, 2012).

4 | DATA ANALYSES

Analyses were performed using SPSS v.23 (IBM Corp.) and AMOS 23 (Arbuckle, 2015). We conducted data analyses in three successive stages: (a) preparatory phase, (b) measurement model testing, and (c) testing the full structural model. In the preparatory phase, we analysed the frequency and nature of missing responses, checked for outliers, and tested multivariate normality of distribution to determine if the prerequisites for conducting structural modelling were met (Arbuckle, 2015; Byrne, 2016; Kline, 2016) and to decide what steps needed to be taken in the event of a violation of these assumptions.

In the next phase, we performed confirmatory factor analysis (CFA) to test the factorial validity of the measurement instruments used and thus establish the adequacy of the measurement model. Several criteria grouped into two categories were used to evaluate the factorial validity—namely, (a) the factor loadings magnitude and (b) goodness-of-fit statistics, including the χ^2 goodness-of-fit statistic defined as the magnitude of discrepancy between sample and fitted covariance matrices, standardized root mean squared residual (SRMR), goodness-of-fit-index (GFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), and RMSEA. Considering the sample size, a fit was regarded as good if: GFI, TLI, and CFI were close to 0.95, the SRMR value was close to 0.08, and RMSEA was close to 0.06 (Hu & Bentler, 1999; Sivo et al., 2006).

Finally, we used Amos (Arbuckle, 2015) to test the structural model that assumed a direct effect of life stress on life satisfaction and an indirect effect through coping behaviour. SEM provides several advantages over the mediational analysis based on zero-order and partial correlation (Baron & Kenny, 1986; Hayes, 2018) as well as over the hierarchical regression approach (Cheung & Lau, 2008). We used the bias-corrected percentile method (Arbuckle, 2015) to estimate the entire sampling distribution and to define the confidence intervals of the mediation effects, drawing 10,000 bootstrapping samples and computing 95% confidence intervals. The adequacy of the full latent variable model was evaluated

using the same criteria and indices that were used for examining the measurement model (i.e., SRMR, GFI, TLI, CFI, and RMSEA).

5 | RESULTS

5.1 | Descriptive statistics of study variables

Our preliminary analysis found that less than 1% of data were missing due to participants not responding to a question. Given that missing responses were unrelated to students' stress, coping, or life satisfaction scores, we used full information maximum likelihood estimation (Graham, 2012) to handle missing observations. The computation of the squared Mahalanobis distance for each respondent provided no evidence for the existence of multivariate outliers.

Descriptive statistics for the key study variables are presented in Table 1. Females reported higher levels of perceived stress ($M = 2.36$, $SD = 0.73$) than males ($M = 2.22$, $SD = 0.73$), $t(1828) = 7.48$, $p < 0.001$. In addition, females used all coping strategies significantly more frequently than males. However, whereas the gender difference in using active coping ($M_f = 0.24$, $SD_f = 0.14$, $M_m = 0.19$, $SD_m = 0.13$; $t(1828) = 7.05$, $p < 0.001$) and internal coping ($M_f = 0.22$, $SD_f = 0.14$, $M_m = 0.19$, $SD_m = 0.14$; $t(1828) = 3.96$, $p < 0.001$) was substantial, the gender differences for withdrawal was negligible ($M_f = 0.15$, $SD_f = 0.11$, $M_m = 0.14$, $SD_m = 0.11$; $t(1828) = 2.20$, $p = 0.028$). A two-way ANOVA was conducted to examine the effect of gender and type of coping on frequency of using different coping behaviours. Main effects analysis showed that females employed all types of coping slightly more frequently than males, $F(1,1828) = 27.12$, $p < 0.001$, $\eta_p^2 = 0.02$, and that active and internal coping were preferred over withdrawal, $F(2,1844) = 416.23$, $p < 0.001$, $\eta_p^2 = 0.19$. Finally, we found that males ($M = 4.20$, $SD = 0.90$) were slightly more satisfied with their life than females ($M = 4.08$, $SD = 0.87$), $t(1828) = 2.75$, $p < 0.01$, $d = 0.13$.

Prior to analyses, we checked the multivariate normality of the included variables as one of the fundamental assumptions of SEM (Arbuckle, 2015; Byrne, 2016). Most of the variables were approximately normally distributed. Based on the criteria stated by Kline (2016), however, two variables were severely kurtotic (>10.00), with one also being extremely skewed (>3.00). These items both referred to coping behaviours that were used by very few respondents: (a) withdrawing and (b) using alcohol and drugs to forget the problem. In addition, the value of Mardia's normalized estimate indicated the presence of multivariate non-normality. We addressed this issue using the maximum-likelihood (ML) nonparametric bootstrap procedures to minimize possible bias (Byrne, 2016).

6 | MEASUREMENT MODEL

CFA of the seven life stress subscales revealed that stress occurring across the various life domains was reasonably well-represented by a single latent dimension with the following fit indices: $\chi^2 = 325.79$,

Study variables	Total sample (N = 1830)			Males (n = 844)		Females (n = 986)		Gender difference		
	M	SD	α	M	SD	M	SD	t	p	d
Stress ^a	2.36	0.73	0.97	2.22	0.73	2.48	0.71	-7.84	<0.001	-0.37
Active coping	0.22	0.14	0.87	0.19	0.13	0.24	0.14	-7.05	<0.001	-0.33
Internal coping	0.21	0.14	0.88	0.19	0.14	0.22	0.14	-3.96	<0.001	-0.19
Withdrawal coping	0.15	0.11	0.82	0.14	0.11	0.15	0.11	-2.20	0.028	-0.10
Life satisfaction	4.14	0.88		4.20	0.90	4.08	0.87	2.75	0.006	0.13

^aThis result was previously reported by Milas et al., 2019.

TABLE 2 Zero-order correlations between the main study variables

	1	2	3	4
1) Stress	-	0.01	0.19**	-0.29**
2) Active and Internal coping	0.07	-	0.59**	0.10**
3) Withdrawal coping	0.18**	0.61**	-	-0.11**
4) Life satisfaction	-0.23**	0.00	-0.12**	-

Notes: Zero-order coefficients for females ($n = 986$) are presented above the main diagonal and those for males ($n = 844$) are presented below the diagonal.

** $p < 0.01$.

$df = 13$, $p < 0.001$, GFI = 0.96, CFI = 0.96, TLI = 0.93, RMSEA = 0.115 (90% CI = 0.104 to 0.126), SRMR = 0.037 (see Figure S1). Verification of the measurement model of the coping subscales showed that the theoretically expected model with three latent dimensions was marginally acceptable with the following fit indices: $\chi^2 = 813.58$, $df = 56$, $p < 0.001$, GFI = 0.93, CFI = 0.90, TLI = 0.86, RMSEA = 0.086 (90% CI = 0.081 to 0.091), SRMR = 0.066 (see Figure S2). However, the magnitude of the correlation between the two theoretically different latent dimensions (i.e., internal and active coping) was close to unity (0.97), indicating that a two-dimensional model was more appropriate. When the two-dimensional model was tested, almost identical fit indices were obtained, $\chi^2 = 823.19$, $df = 59$, $p < 0.001$, GFI = 0.93, CFI = 0.90, TLI = 0.86, RMSEA = 0.084 (90% CI = 0.079 to 0.089), SRMR = 0.066 (see Figure S2). We therefore included the more parsimonious solution in the full structural model.

Zero-order correlations of the observed variables revealed that greater life stress was significantly associated with more withdrawal coping ($r_m = 0.18$; $r_f = 0.19$, $p < 0.01$) and less life satisfaction ($r_m = -0.23$; $r_f = -0.29$, $p < 0.01$) (see Table 2 and Table S1). The correlations were almost identical for males and females. Greater life stress for both groups was related to using withdrawal coping more frequently, but not with using active and internal coping. As expected, greater life stress was also associated with less life satisfaction. The use of adaptive (i.e., active & internal) and maladaptive (i.e., withdrawal) coping was strongly correlated ($r_m = 0.61$; $r_f = 0.59$, $p < 0.01$). However, these two coping strategies were differently related to life satisfaction in the expected direction: whereas

TABLE 1 Average stress exposure, proportion of coping strategies, and life satisfaction in the full sample and gender subsamples

withdrawal was negatively associated with life satisfaction ($r_m = -0.12$; $r_f = -0.11$, $p < 0.01$), active/internal coping was positively related to life satisfaction but only for females ($r_f = 0.10$, $p < 0.01$).

6.1 | Structural model

After seeing that the measurement model was acceptable, we proceeded to test the hypothesized structural model, which posited that coping behaviour mediates the effects of stress on life satisfaction. The initial model hypothesized that life stress causes the use of particular coping behaviours, which in turn affect life satisfaction. To test these potential mediational effects, we used the bootstrap method for latent variables (Cheung & Lau, 2008), which enabled us to estimate direct and indirect effects as well as their confidence intervals and significance. The first model, which assumed that stress levels affect the frequency of using both coping strategies, was rejected because it was found that stress was not associated with, and thus cannot affect, active and internal coping. In the second model displayed in Figure 1, this regression path was thus omitted.

The resulting fit indices suggested that the model was marginally adequate: $\chi^2 = 1613.85$, $df = 177$, $p < 0.001$, GFI = 0.92, CFI = 0.91, TLI = 0.89, RMSEA = 0.067 (90% CI = 0.064 to 0.070), SRMR = 0.056. The model implies that the total effect of stress on life satisfaction (standardized regression coefficient $\beta_c = -0.27$, 95% CI -0.32 to -0.23 , $p < 0.01$) can be decomposed into a direct effect ($\beta_c' = -0.22$, 95% CI -0.27 to -0.16 , $p < 0.01$) as well as an indirect effect ($\beta_{ab} = -0.05$, 95% CI -0.09 to -0.03 , $p < 0.01$) that is mediated by withdrawal. The proportion of the total effect that is mediated (β_{ab}/β_c) is 19.4%. The model thus suggests that the impact of stress on life satisfaction is partially mediated by withdrawal coping.

Withdrawal was related to participants' stress and life satisfaction levels, such that the greater their life stress exposure, the more likely it was that youth employed withdrawal coping; and the more withdrawal behaviours they used, the less satisfied they were in their lives. Therefore, the model implies that life stress affects life satisfaction both directly and indirectly through withdrawal behaviours. Unlike withdrawal, internal/active coping was not related to greater stress exposure (see Figure 1). The results thus indicate that internal/

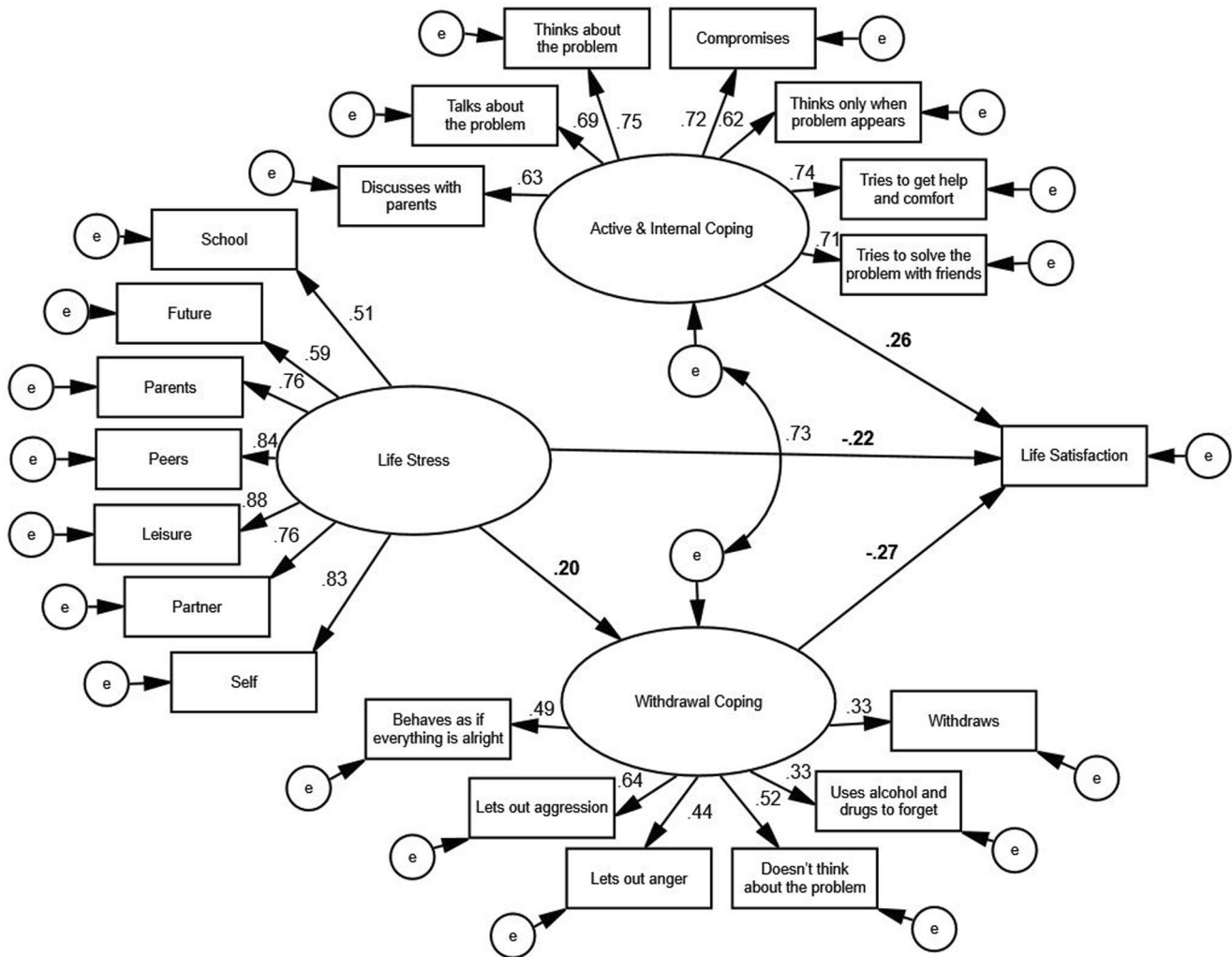


FIGURE 1 Structural equation model depicting associations between stress, different types of coping, and life satisfaction. Factor loadings, standardized path coefficients between latent constructs, and correlations between their residuals are presented. The model revealed that stress influences life satisfaction directly but also indirectly through withdrawal coping as a mediator (standardized indirect effect: -0.05^{**}). Model fit: $\chi^2_{(177)} = 1613.85^{**}$, goodness-of-fit-index = 0.92, Comparative Fit Index = 0.91, Tucker-Lewis Index = 0.89, root mean square error of approximation = 0.067 (90% CI = 0.064 to 0.070), standardized root mean squared residual = 0.056; $N = 1830$; $*p < 0.05$, $**p < 0.01$

active coping does not mediate the relation between stress and life satisfaction, despite being positively associated with life satisfaction ($\beta = 0.26$, $p < 0.01$). Figure 1 also shows that although distinct, these two coping strategies were strongly correlated. The correlation of residuals indicates that the two strategies share more than 50% of common variance, suggesting that a person who is likely to use internal coping is also likely to use active coping and vice versa.

7 | DISCUSSION

Existing research has shown that stress is strongly associated with both poor health and worse life satisfaction in adolescents (Cazassa et al., 2020; McKnight et al., 2002; Slavich, 2016; Slavich & Irwin, 2014; Slavich & Shields, 2018; Slavich et al., 2019, 2020). To shed light on mechanisms that may underlie these associations, we examined the extent to which youths' coping behaviours mediate the

relation between experiences of stress and life satisfaction. Specifically, we tested a model relating life stress, adaptive and maladaptive coping, and life satisfaction in a national sample of adolescents.

As compared to prior research (e.g., Gelhaar et al., 2007; Proctor et al., 2009; Seiffge-Krenke et al., 2012), the high school seniors who participated in this study exhibited relatively typical functioning. Females reported higher levels of stress and were more likely to use coping strategies than males, whereas both males and females used active and internal coping more often than withdrawal. In addition to these findings, the main model that we tested linking stress, coping, and life satisfaction revealed that stress directly and negatively affected life satisfaction insofar as youth reporting greater levels of stress were less satisfied with their lives. This finding is consistent with prior research indicating an inverse association between stress and life satisfaction (e.g., Anders et al., 2012; Buser & Kearney, 2017; Hamarat et al., 2001; Mahmoud et al., 2012; Matheny et al., 2002, 2008). Furthermore,

though, our data revealed that stress was significantly associated with withdrawal but not active/internal coping. Both types of coping strategies were associated with life satisfaction, but in opposite directions: whereas internal and active coping were related to greater life satisfaction, withdrawal was associated with less life satisfaction. However, only withdrawal mediated the association between greater stress and worse life satisfaction. Therefore, more life stress exposure was associated with a greater likelihood of withdrawing from stressors, and greater withdrawing was in turn related to being less satisfied with life.

In contrast, greater use of internal and active coping was positively associated with life satisfaction. Based on these cross-sectional data, it is not possible to deduce why the use of these strategies was unrelated to stress given that people typically engage in coping only after experiencing stress. One possible explanation for this result is that active ways of coping, as opposed to withdrawal, contribute to the more effective resolution of stressful situations, thereby simultaneously reducing the association with stress and increasing the relation with life satisfaction. This possibility is also consistent with other research that has yielded similar results (e.g., Buser & Kearney, 2017; Mahmoud et al., 2012).

Relations between stress, coping, and life satisfaction have been previously reported, but the findings have been mixed. For example, perceived stress and coping resources were found to be significantly associated with life satisfaction in two cross-cultural comparisons of American and Turkish college students (Matheny et al., 2002), and American and Mexican college students (Matheny et al., 2008). An indirect effect of coping on promoting life satisfaction through lowering perceived stress was found in each country and both genders, with social support buffering the negative effects of stressful events (Matheny et al., 2002, 2008). In addition, consistent with the present results, maladaptive coping (e.g., denial, self-blaming, substance use) and life satisfaction have been found to be significantly associated in American college students, whereas this was not the case for active coping (e.g., acceptance, planning, positive reframing; Mahmoud et al., 2012). On the other hand, plan coping (e.g., individuals' plans to take action, brainstorm problem solving ideas, determining the most helpful plan of action) has been found to predict life satisfaction in American college students who reported having a friend or family member with eating disorder problems (Buser & Kearney, 2017).

7.1 | Strengths and limitations

Several strengths of this study should be noted. In particular, we examined interrelations between several factors known to be associated with health in adolescents (McKnight et al., 2002; Seiffge-Krenke, 2019; Slavich, 2016, 2020), and derived *a priori* hypotheses regarding their relation from the extensive stress and coping literature (Lazarus & Folkman, 1984; Mahmoud et al., 2012). To test the hypothesized model, we employed a sophisticated modelling strategy based on data obtained from a nationwide, probabilistic sample of

high school seniors. However, this study also has several limitations. First, this is a cross-sectional study based on self-report measures. Therefore, future research should examine longitudinal associations between the study variables and use alternative methods for assessing the main constructs. Second, because this study was conducted with adolescents in Croatia, additional research is needed to examine the generalizability of these results to other cultures and age groups. Finally, because the present findings are correlational, causation cannot be assumed and additional research using longitudinal and experimental methods is required to test the proposed model.

8 | CONCLUSION

Notwithstanding these limitations, the present data suggest that stress plays a key role in shaping life satisfaction. The model with the best fit suggests that stress affects adolescents' life satisfaction directly but also indirectly by influencing youths' likelihood of engaging in withdrawal behaviours such as avoiding problems or using negative emotions or substances—strategies that do not reduce stress but exacerbate it. The present study thus contributes to our understanding of how stress may shape life satisfaction in adolescence and emerging adulthood. Consequently, psychosocial interventions aimed at enhancing youth mental health may benefit specifically from reducing stress levels and engagement in stress-related withdrawal behaviours.

ACKNOWLEDGEMENTS

This study was supported by a Croatian Science Foundation grant titled 'Modernity Stress, Youth and Modernization' (09.01/408) to IMK. GMS was supported by a Society in Science-Branco Weiss Fellowship, NARSAD Young Investigator Grant #23958 from the Brain & Behavior Research Foundation, and National Institutes of Health grant K08 MH103443.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

AUTHORS' CONTRIBUTION STATEMENT

Irena Martinović Klarić conceived, planned, and carried out the research, and helped draft and revise the article. Goran Milas contributed to the conception of the study, analysed and interpreted the data, and helped draft and revise the manuscript. Ana Malnar, Vanja Saftić, and Daniela Šupe Domić contributed to the conception of the study and acquisition of the data. George M. Slavich contributed to the conception of the study and played a major role in writing and revising the manuscript. All authors read and approved the final manuscript for publication.

DATA AVAILABILITY STATEMENT

The data that support these findings are available from the first author upon reasonable request.

ORCID

George M. Slavich  <https://orcid.org/0000-0001-5710-3818>

REFERENCES

- Anders, S. L., Frazier, P. A., & Shallcross, S. L. (2012). Prevalence and effects of life event exposure among undergraduate and community college students. *Journal of Counseling Psychology, 59*, 449–457. <https://doi.org/10.1037/a0027753>
- Antaramian, S., Kamble, S. V., & Huebner, E. S. (2016). Life satisfaction and coping in Hindu adolescents in India. *Journal of Happiness Studies, 17*, 1703–1717. <https://doi.org/10.1007/s10902-015-9666-0>
- Antaramian, S. P. (2020). Life satisfaction. In S. Hupp, & J. Jewell (Eds.), *The encyclopedia of child and adolescent development*. John Wiley & Sons. <https://doi.org/10.1002/9781119171492.wecad346>
- Arbuckle, J. L. (2015). *IBM SPSS Amos 23 user's guide*. IBM corp
- Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*, 469–480. <http://doi.org/10.1037/0003-066X.55.5.469>
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182. <https://doi.org/10.1037/0022-3514.51.6.1173>
- Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Sage
- Buser, J. K., & Kearney, A. (2017). Stress, adaptive coping, and life satisfaction. *Journal of College Counseling, 20*, 224–236. <https://doi.org/10.1002/jocc.12071>
- Byrne, B. M. (2016). *Structural equation modeling with Amos: Basic concepts, applications, and programming* (3rd ed.). Routledge. <https://doi.org/10.4324/9781315757421>
- Cazassa, M. J., Oliveira, M. D. S., Spahr, C. M., Shields, G. S., & Slavich, G. M. (2020). The Stress and Adversity Inventory for Adults (Adult STRAIN) in Brazilian Portuguese: Initial validation and links with executive function, sleep, and mental and physical health. *Frontiers in Psychology, 10*, 3083. <http://doi.org/10.3389/fpsyg.2019.03083>
- Cheung, F., & Lucas, R. E. (2014). Assessing the validity of single-item life satisfaction measures: Results from three large samples. *Quality of Life Research, 23*, 2809–2818. <http://doi.org/10.1007/s11136-014-0726-4>
- Cheung, G. W., & Lau, R. S. (2008). Testing mediation and suppression effects of latent variables. *Organizational Research Methods, 11*, 296–325. <https://doi.org/10.1177/1094428107300343>
- Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. E. (2001). Coping with stress during childhood and adolescence: Problems, progress, and potential in theory and research. *Psychological Bulletin, 127*, 87–127. <http://doi.org/10.1037/0033-2909.127.1.87>
- Compas, B., Jaser, S., Bettis, A., Watson, K. H., Gruhn, M. A., Dunbar, J. P., Williams, E., & Thigpen, J. C. (2017). Coping, emotion regulation, and psychopathology in childhood and adolescence: A meta-analysis and narrative review. *Psychological Bulletin, 143*, 939–991. <http://doi.org/10.1037/bul0000110>
- Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95*, 542–575. https://doi.org/10.1207/s15327752jpa4901_13
- Diener, E., & Chan, M. Y. (2011). Happy people live longer: Subjective well-being contributes to health and longevity. *Applied Psychology: Health and Well-Being, 3*, 1–43. <http://doi.org/10.1111/j.1758-0854.2010.01045.x>
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*, 71–75. https://doi.org/10.1207/s15327752jpa4901_13
- Evans, L. D., Kouros, C., Frankel, S. A., McCauley, E., Diamond, G. S., Schloretd, K. A., & Garber, J. (2014). Longitudinal relations between stress and depressive symptoms in youth: Coping as a mediator. *Journal of Abnormal Child Psychology, 43*, 355–368. <http://doi.org/10.1007/s10802-014-9906-5>
- Friedman, E. M., & Ryff, C. D. (2012). Living well with medical comorbidities: A biopsychosocial perspective. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 67*, 535–544. <https://doi.org/10.1093/geronb/gbr152>
- Gelhaar, T., Seiffge-Krenke, I., Borge, A., Cicognani, E., Cunha, M., Loncaric, D., Macek, P., Steinhausen, H.-C., Metzke, C. W. (2007). Adolescent coping with everyday stressors: A seven-nation study of youth from central, eastern, southern, and northern Europe. *European Journal of Developmental Psychology, 4*, 129–156. <https://doi.org/10.1080/17405620600831564>
- Graham, J. W. (2012). *Missing data: Analysis and design*. Springer
- Grant, K. E., Compas, B. E., Thurm, A. E., McMahon, S. D., Gipson, P. Y., Campbell, A. J., Krochoc, K., Westerholm, R. I. (2006). Stressors and child and adolescent psychopathology: Evidence of moderating and mediating effects. *Clinical Psychology Review, 26*, 257–283. <http://doi.org/10.1016/j.cpr.2005.06.011>
- Hamarat, E., Thompson, D., Zabucky, K. M., Steele, D., Matheny, K. B., & Aysan, F. (2001). Perceived stress and coping resource availability as predictors of life satisfaction in young, middle-aged, and older adults. *Experimental Aging Research, 27*, 181–196. <https://doi.org/10.1080/036107301750074051>
- Hayes, A. F. (2018). *Introduction to mediation, moderation and conditional process analysis: A regression-based approach* (2nd ed.). Guilford Press
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*, 1–55. <http://doi.org/10.1080/10705519909540118>
- Huebner, E. S., Suldo, S. M., & Gilman, R. (2006). Life satisfaction. In G. G. Bear & K. M. Minke (Eds.), *Children's needs III: Development, prevention, and intervention* (pp. 357–368). National Association of School Psychologists
- Kansky, J., Allen, J. P., & Diener, E. (2016). Early adolescent affect predicts later life outcomes. *Applied Psychological Health Well-Being, 8*, 192–212. <http://doi.org/10.1111/aphw.12068>
- Kansky, J., & Diener, E. (2017). Benefits of well-being: Health, social relationships, work, and resilience. *Journal of Positive Psychology and Wellbeing, 1*, 129–169
- Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press
- Kuntsche, E. N., & Gmel, G. (2004). Emotional wellbeing and violence among social and solitary risky single occasion drinkers in adolescence. *Addiction, 99*, 331–339. <https://doi.org/10.1111/j.1360-0443.2004.00653.x>
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal and coping*. Springer
- Lazarus, R. S., & Folkman, S. (1987). Transactional theory and research on emotions and coping. *European Journal of Personality, 1*, 141–169. <https://doi.org/10.1002/per.2410010304>
- Lucas, R. E., & Donnellan, M. B. (2012). Estimating the reliability of single-item life satisfaction measures: Results from four national panel studies. *Social Indicators Research, 105*, 323–331. <https://doi.org/10.1007/s11205-011-9783-z>
- MacCann, C., Lipnevich, A. A., Burrus, J., & Roberts, R. D. (2012). The best years of our lives? Coping with stress predicts school grades, life satisfaction, and feelings about high school. *Learning and Individual Differences, 22*, 235–241. <https://doi.org/10.1016/j.lindif.2011.08.004>
- Mahmoud, J. S. R., Staten, R. T., Hall, L. A., & Lennie, T. A. (2012). The relationship among young adult college students' depression, anxiety, stress, demographics, life satisfaction, and coping styles. *Issues in*

- Mental Health Nursing*, 33, 149–156. <http://doi.org/10.3109/01612840.2011.632708>
- Matheny, K. B., Curlette, W. L., Aysan, F., Herrington, A., Gfroerer, C. A., Thompson, D., & Hamarat, E. (2002). Coping resources, perceived stress, and life satisfaction among Turkish and American university students. *International Journal of Stress Management*, 9, 81–97. <https://doi.org/10.1023/A:1014902719664>
- Matheny, K. B., Roque-Tovar, B. E., & Curlette, W. L. (2008). Perceived stress, coping resources, and life satisfaction among U.S. and Mexican college students: A cross-cultural study. *Anales de Psicología*, 24, 49–57
- McKnight, C. G., Huebner, E. S., & Suldo, S. (2002). Relationships among stressful life events, temperament, problem behavior, and global life satisfaction in adolescents. *Psychology in the Schools*, 39, 677–687. <https://doi.org/10.1002/pits.10062>
- Milas, G., Klarić, I. M., Malnar, A., Šupe-Domić, D., & Slavich, G. M. (2019). Socioeconomic status, social-cultural values, life stress, and health behaviors in a national sample of adolescents. *Stress and Health*, 35, 217–224. <https://doi.org/10.1002/smi.2854>
- Moshagen, M., & Erdfelder, E. (2016). A new strategy for testing structural equation models. *Structural Equation Modeling: A Multidisciplinary Journal*, 23, 54–60. <https://doi.org/10.1080/10705511.2014.950896>
- Murphy, M. L. M., Slavich, G. M., Rohleder, N., & Miller, G. E. (2013). Targeted rejection triggers differential pro- and anti-inflammatory gene expression in adolescents as a function of social status. *Clinical Psychological Science*, 1, 30–40. <https://doi.org/10.1177/2167702612455743>
- Proctor, C. L., Linley, P. A., & Maltby, J. (2009). Youth life satisfaction: A review of the literature. *Journal of Happiness Studies*, 10, 583–630. <https://doi.org/10.1007/s10902-008-9110-9>
- Seiffge-Krenke, I. (1995). *Stress, coping, and relationships in adolescence*. Lawrence Erlbaum. <http://doi.org/10.4324/9780203773123>
- Seiffge-Krenke, I. (2000). Causal links between stressful events, coping style, and adolescent symptomatology. *Journal of Adolescence*, 23(6), 675–691. <https://doi.org/10.1006/jado.2000.0352>
- Seiffge-Krenke, I. (2019). *Adolescents' health: A developmental perspective*. Psychology Press. <https://doi.org/10.4324/9781315784267>
- Seiffge-Krenke, I., Persike, M., Chau, C., Hendry, L. B., Klopp, M., Terzini-Hollar, M., Tam, V., Naranjo, C. R., Herrera, D., Menna, P., Rohail, I., Veisson, M., Hoareau, E., Luwe, M., Loncaric, D., Han, H., Regusch, L. (2012). Differences in agency? How adolescents from 18 countries perceive and cope with their futures. *International Journal of Behavioral Development*, 36, 258–270. <http://doi.org/10.1177/0165025412444643>
- Sivo, S. A., Fan, X., Witta, E. L., & Willse, J. T. (2006). The search for “optimal” cutoff properties: Fit index criteria in structural equation modeling. *The Journal of Experimental Education*, 74, 267–288. <http://doi.org/10.3200/JEXE.74.3.267-288>
- Skinner, E. A., Edge, K., Altman, J., & Sherwood, H. (2003). Searching for the structure of coping: A review and critique of category systems for classifying ways of coping. *Psychological Bulletin*, 129, 216–269. <https://doi.org/10.1037/0033-2909.129.2.216>
- Slavich, G. M. (2016). Life stress and health. *Teaching of Psychology*, 43, 346–355. <http://doi.org/10.1177/0098628316662768>
- Slavich, G. M. (2020). Social safety theory: A biologically based evolutionary perspective on life stress, health, and behavior. *Annual Review of Clinical Psychology*, 16, 265–295. <http://doi.org/10.1146/annurev-clinpsy-032816-045159>
- Slavich, G. M., Giletta, M., Helms, S. W., Hastings, P. D., Rudolph, K. D., Nock, M. K., & Prinstein, M. J. (2020). Interpersonal life stress, inflammation, and depression in adolescence: Testing social signal transduction theory of depression. *Depression and Anxiety*, 37, 179–193. <http://doi.org/10.1002/da.22987>
- Slavich, G. M., & Irwin, M. R. (2014). From stress to inflammation and major depressive disorder: A social signal transduction theory of depression. *Psychological Bulletin*, 140, 774–815. <http://doi.org/10.1037/a0035302>
- Slavich, G. M., & Shields, G. S. (2018). Assessing lifetime stress exposure using the Stress and Adversity Inventory for Adults (Adult STRAIN): An overview and initial validation. *Psychosomatic Medicine*, 80, 17–27. <http://doi.org/10.1097/PSY.0000000000000534>
- Slavich, G. M., Stewart, J. G., Esposito, E. C., Shields, G. S., & Auerbach, R. P. (2019). The Stress and Adversity Inventory for adolescents (adolescent STRAIN): Associations with mental and physical health, risky behaviors, and psychiatric diagnoses in youth seeking treatment. *Journal of Child Psychology and Psychiatry*, 60, 998–1009. <http://doi.org/10.1111/jcpp.13038>
- Stewart, J. G., Shields, G. S., Esposito, E. C., Cosby, E. A., Allen, N. B., Slavich, G. M., & Auerbach, R. P. (2019). Life stress and suicide in adolescents. *Journal of Abnormal Child Psychology*, 47, 1707–1722. <http://doi.org/10.1007/s10802-019-00534-5>
- Suldo, S. M., Shaunessy, E., & Hardesty, R. (2008). Relationships among stress, coping, and mental health in high-achieving high school students. *Psychology in the Schools*, 45, 273–290. <http://doi.org/10.1002/pits.20300>
- Šupe-Domić, D., Milas, G., Drmić Hofman, I., Rumora, L., & Martinović Klarić, I. (2016). Daily salivary cortisol profile: Insights from Croatian late adolescence stress study (CLASS). *Biochemia Medica*, 26, 408–420. <https://doi.org/10.11613/BM.2016.043>
- Valois, R. F., Paxton, R. J., Zullig, K. J., & Huebner, E. S. (2006). Life satisfaction and violent behaviors among middle school students. *Journal of Child and Family Studies*, 15, 695–707. <https://doi.org/10.1007/s10826-006-9043-z>
- Valois, R. F., Zullig, K. J., Huebner, E. S., & Drane, J. W. (2004). Physical activity behaviors and perceived life satisfaction among public high school adolescents. *Journal of School Health*, 74, 59–65. <http://doi.org/10.1111/j.1746-1561.2004.tb04201.x>
- Valois, R. F., Zullig, K. J., Huebner, E. S., Kammermann, S. K., & Drane, J. W. (2002). Association between life satisfaction and sexual risk-taking behaviors among adolescents. *Journal of Child and Family Studies*, 11, 427–440. <https://doi.org/10.1023/A:1020931324426>
- Zimmer-Gembeck, M. J., & Skinner, E. A. (2016). The development of coping: Implications for psychopathology and resilience. In D. Cicchetti (Ed.), *Developmental psychopathology* (pp. 1–61). Wiley. <https://doi.org/10.1002/9781119125556.devpsy410>
- Zullig, K. J., Valois, R. F., Huebner, E. S., Oeltmann, J. E., & Drane, J. W. (2001). Relationship between perceived life satisfaction and adolescents' substance abuse. *Journal of Adolescent Health*, 29, 279–288. [https://doi.org/10.1016/S1054-139X\(01\)00269-5](https://doi.org/10.1016/S1054-139X(01)00269-5)

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

How to cite this article: Milas, G., Martinović Klarić, I., Malnar, A., Saftić, V., Šupe-Domić, D., & Slavich, G. M. (2021). The impact of stress and coping strategies on life satisfaction in a national sample of adolescents: A structural equation modelling approach. *Stress and Health*, 37(5), 1026–1034. <https://doi.org/10.1002/smi.3050>