Current Psychology
https://doi.org/10.1007/s12144-025-08088-0

Adolescents' health-related quality of life during COVID-19: the role of dispositional mindfulness, emotion regulation, and psychological distress

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Accepted: 9 June 2025

Abstract
The COVID-19 pandemic has strongly interfered with young people's health-related quality of life (HRQoL), increasing the vulnerability of this population. As a result, researchers have been emphasizing the necessity to ascertain the protective factors against the pandemic impact. Still, little is known about these factors in adolescence. Pre-pandemic studies showed that dispositional mindfulness and emotion regulation could protect mental health and well-being. Thus, this cross-sectional study explored the relationships between dispositional mindfulness, emotion regulation, psychological distress, and HRQoL during COVID-19. The measures used to evaluate these variables were administered to 1,343 Portuguese-speaking students from Grade 5 to 12. Structural equation modelling analyses showed that adolescents' dispositional mindfulness was related to higher HRQoL directly and indirectly through a greater employment of cognitive reappraisal and fewer employment of expressive suppression, which, in turn, was associated with fewer symptoms of anxiety and depression. These findings emphasize the importance of promoting adolescents' dispositional mindfulness and emotion regulation to foster their mental health and, in turn, their HRQoL in difficult times.

Keywords Dispositional mindfulness · Emotion regulation · Psychological distress · Health related quality of life (HRQoL) · COVID-19

Adolescents' health-related quality of life during the pandemic: the role of dispositional mindfulness, emotion regulation, and psychological distress

The coronavirus disease 2019 (COVID-19) pandemic led to fast and unprecedented changes worldwide, which interfered with young people's life, health, and education, as well as with their ability to reach their full potential (The Lancet Child Adolescent Health, 2020). To understand how this challenging period may have affected the world inside youngsters' heads, there has been a growing interest in studying their mental health and health-related quality of life (HRQoL) during the pandemic (UNICEF, 2021). Recent systematic reviews showed that the COVID-19 pandemic negatively impacted the mental health of young people (Loades et al., 2020) and their HRQoL (Nobari et al., 2021). However, as noted by the authors of these reviews, the studies in the field are scarce and typically restrict the assessment of mental health to measures of psychological distress (e.g., anxiety and depression), while neglecting other relevant indicators that may act as protective factors for psychological health and HRQoL. Pre-pandemic studies proposed that dispositional mindfulness and emotion regulation, besides being related to quality of life (Tomlinson et al., 2018), were key protective factors against adolescents'

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Published online: 18 July 2025

psychological distress (Brown et al., 2007; Pepping et al., 2013). Still, no evidence has yet supported the links between dispositional mindfulness, emotion regulation, psychological distress, and HRQoL in a time of pandemic. To move the field forward, we conducted the present study to explore the relationships between these variables during COVID-19 in a sample of 10-to-18-year-olds.

Health-Related quality of life (HRQoL)

Defining HRQoL has proven challenging because it crafts how individuals perceives their own life in different domains and in a specific time, which is influenced by culture, values, goals, and expectations (WHO, 1995). Consequently, HRQoL is a subjective, multidimensional, and dynamic concept (Hays & Reeve, 2008). HRQoL usually reflects people's everyday functioning (i.e., individuals' ability to execute pre-defined actions, such as bathing, walking, or interacting with friends) and self-perceptions of well-being (i.e., individuals' subjective feelings about their life) in physical, mental, and social domains (Hays & Reeve, 2008). It is important to experience high levels of HRQoL from early on in life. Young people with higher HRQoL are more likely to show typical development and turn into healthy adults (Riley et al., 2006). Measuring adolescents' HRQoL is therefore critical to understand how they function and perceive their current life, as well as to promote their later health (Solans et al., 2008).

Adolescence is a complex and vulnerable period filled with countless developmental changes, including an imbalance in physiological processes that may compromise HRQoL (WHO, 2007). Dealing with an ongoing pandemic on top of this can be extremely challenging and cause HRQoL disruptions (The Lancet Child Adolescent Health, 2020). It has been hypothesized that the pandemic-related circumstances, especially the social and relational restrictions, may have compromised young people's developmental tasks, such as improving verbal skills, establishing emotional and psychological independence from parents, and developing stable peer relationships (Orben et al., 2020). As young people seem very susceptible to COVID-19 harmful consequences, scholars have emphasized the need for empirical research examining their HRQoL during this period (Nobari et al., 2021).

Our understanding about the impact of the pandemic on adolescents' HRQoL is still limited, given the reduced number of research targeting it (Nobari et al., 2021). So far, a handful of studies showed that the COVID-19 pandemic impaired adolescents' HRQoL (de Matos et al., 2020; Riiser et al., 2020; Tal-Saban & Zaguri-Vittenberg, 2022). Although a recent systematic review reached a similar conclusion, some inconsistent findings were reported (Nobari et al., 2021). Indeed, Abawi et al. (2020) and Vallejo-Slocker et al. (2020) found no differences between pre-pandemic and pandemic times in children and adolescents' HRQoL. These inconsistencies may be related to the measurement of HRQoL in young people, which is a relatively new field with room for improvement (Ravens-Sieberer et al., 2014). For example, many of these studies relied on parents' perceptions, which may provide unreliable data given the subjective nature of the construct (Dey et al., 2012). In addition, extant research mainly investigated the link between physical disorders and HRQoL, leaving aside other psychological predictors that may deepen our knowledge about adolescents' HRQoL during the pandemic (Dey et al., 2012).

Psychological distress

Deemed an indicator of mental health, psychological distress refers to a condition of emotional suffering, including symptoms of stress (e.g., not being able to cope with stressful events), anxiety (e.g., feeling tense or impatient), and depression (e.g., losing interest or feeling unhappy; Mirowsky & Ross, 2002). In 2007, The World Health Organization (WHO) estimated that 10–20% of young people suffered from some difficulty in terms of mental health, such as psychological distress and behavioral disorders. After the two years of the pandemic, research showed significant damage on youngsters' psychological health and wellbeing (Branquinho et al., 2022; Pizarro-Ruiz & Ordóñez-Camblor, 2021; Viner et al., 2022). The breakout of routines and education activities along with concerns about family income and health left many young people fearful, angry, and worried about the future (UNICEF, 2021). Moreover, several weeks of isolation increased their risk of depression and possibly anxiety (Loades et al., 2020). A recent meta-analysis indicated that 25% and 21% of children and adolescents worldwide were experiencing clinically elevated depression and anxiety symptoms, respectively (Racine et al., 2021). These pooled estimates increased over time, being almost twice larger than pre-pandemic ones (Racine et al., 2021). Another meta-analysis reported that the pooled prevalence of posttraumatic stress symptoms during the pandemic was 48% (Ma et al., 2021).

The great amount of young people with high psychological distress is worrying because anxiety, depression, and stress have undesirable repercussions on adolescents' development, involving reduced school achievement, compromised social relationships, and enhanced risk of drug abuse, psychological problems, and suicide (Copeland et al., 2014; Hetrick et al., 2016). High levels of psychological distress were also found to undermine adolescents' HRQoL (Freire & Ferreira, 2016). Ravens-Sieberer et al. (2008) observed that, in comparison to their healthy peers,

European youngsters facing mental health issues felt worse about their lives. Due to the link between mental health problems and compromised HRQoL (Sharpe et al., 2016), Ma and Fan (2019) highlighted the need to investigate the protective factors associated with reduced psychological distress and enhanced HRQoL in adolescence. This seems even more important in current times, given findings proposing that the COVID-19 pandemic may represent a risk factor for mental ill-being and life dissatisfaction (Holmes et al., 2020).

Dispositional mindfulness

Based on its known associations with psychological distress and HRQoL, dispositional mindfulness is deemed a prominent protective factor of mental health (Brown et al., 2007; Ma & Fan, 2019). Dispositional mindfulness is a psychological trait (Goodall et al., 2012) reflecting people's tendency to pay purposeful, nonjudgmental, and non-reactive attention moment by moment with an openness and acceptance attitude (Brown & Ryan, 2003). In adolescents, dispositional mindfulness has been related to decrease depression, anxiety, and stress, as well as to higher psychological well-being and life satisfaction (Bränström et al., 2011; Ma & Fan, 2019; Tomlinson et al., 2018). The advantages of dispositional mindfulness may be explained by how individuals manage their well-being. Those with higher mindfulness traits not only believe that emotions, thoughts, and experiences are temporary, but also live and accept these events as they occur (Shapiro et al., 2006).

Despite being a trait, dispositional mindfulness may be enhanced through meditation (Brown et al., 2007), or diminished due to stressful situations (An et al., 2018), such as a pandemic. In a study including Spanish adolescents, Royuela-Colomer et al. (2022) showed that a higher exposure to COVID-19 (i.e., being infected or living with someone who was) was associated with lower dispositional mindfulness and higher psychological distress. Moreover, authors found that contact with COVID-19 was related to higher depression by reducing dispositional mindfulness. These findings support the claim of An et al. (2018) suggesting that, in stressful situations, adolescents are less conscientious of the here and now, which limits their capacity to handle those situations and engage in adaptative coping strategies, increasing the risk of depressive symptoms (see also Royuela-Colomer et al., 2022). It has been empirically shown that mindfulness traits may buffer against the negative influence of stressful events by increasing positive appraisals and reducing emotional reactivity to these (Creswell & Lindsay, 2014). This evidence suggests that a likely mechanism through which dispositional mindfulness protects psychological distress is emotion regulation (Ma & Fan, 2019; McDonald et al., 2016).

Emotion regulation

Emotion regulation is the mechanism through which people influence their emotional experiences (Gross, 2015), by using strategies focused on the antecedents (i.e., before the fully activated emotion) or on the response (i.e., when the emotion is already ongoing). Cognitive reappraisal and expressive suppression are the most frequently used strategies in daily life (John & Gross, 2004). Cognitive reappraisal is an antecedent-focused strategy, through which people minimize the emotional impact of an experience by consciously modifying the meaning of emotional events (e.g., looking for the positives in the job when feeling frustrated at work; Gross & John, 2003). Expressive suppression is a response-focused strategy, through which individuals repress the behavior related to the experienced emotion by using top-down conscious control (e.g., inhibiting crying when experiencing sadness). Different lines of research have proposed that the use of these strategies *is influenced by* mindfulness traits and *have an influence on* psychological distress.

On the one hand, previous studies showed dispositional mindfulness to be related to the employment of more cognitive reappraisal (Hanley & Garland, 2014; Chahar Mahali et al., 2021) and less expressive suppression (Baer et al., 2006; Ma & Fan, 2019). By enabling people to maintain attention on the immediate internal and external experiences (Brown & Ryan, 2003), mindfulness traits may help individuals to see reality from different perspectives as well as to identify and replace negative automatic thoughts with positive ones (Gross, 2014). Moreover, by favoring compassionate and non-judgmental attitudes (Brown & Ryan, 2003), high dispositional mindfulness may reduce the likelihood to suppress emotions (Gross, 2014).

On the other hand, the employment of these strategies seem differently associated with psychological distress. Cognitive reappraisal is deemed an adaptative strategy, associated with lower negative affect and higher positive affect, mental health, and well-being (Aldao et al., 2010; Gross & John, 2003; Hu et al., 2014). It seems that seeing negative emotional events from a positive stance may mitigate their harmful consequences, thereby reducing psychological suffering (Asghar et al., 2020). Conversely, expressive suppression is considered a maladaptive strategy that may increase the risk for psychological distress and decrease quality of life (Aldao et al., 2010; Phillips & Power, 2007). The effort needed to control the expression of emotions may cause a "rebound effect" that not only broadens their frequency and intensity but also prompts dysfunctional reactions (e.g.,

aggressive behavior, blame, regret), related to psychological distress (Petkus et al., 2012). These links between emotion regulation strategies and psychological distress were replicated during the pandemic, where adolescents who used limited adaptive strategies were twice as probable to experience psychological distress than individuals who did not use them (Weissman et al., 2021).

Recognizing the links between mindfulness traits, emotion regulation, and psychological distress, some studies investigated whether the following mediating chain would be in place: dispositional mindfulness → emotion regulation strategies (i.e., cognitive reappraisal and expressive suppression) → psychological distress. Though found in adults (Desrosiers et al., 2013; Parmentier et al., 2019), this mediating effect received partial support in youngsters. Pepping et al. (2016) observed that lower mindfulness was related to heightened expressive suppression, which in turn was related to depression, anxiety, and stress symptoms. Ma and Fan (2019) found similar findings only for depression. However, these pre-pandemic studies neither showed the mediating role of cognitive reappraisal observed in adults (Parmentier et al., 2019), nor included HRQoL as the ultimate outcome of these relationships. As far as we know, no research tested a mediating chain from mindfulness to HRQoL via emotion regulation strategies and psychological distress during COVID-19. Analyzing this never-before-tested mediation model, relating core psychological-related constructs during COVID-19, seems important to inform on the processes underlying adolescents' HRQoL in stressful life circumstances. This information may bring insights into ways of overcoming the impact of those circumstances and promoting youth positive development. Ultimately, this knowledge may be used to create promotion and prevention programs aimed at fostering mental health and quality of life in the youth population.

Current study

Altogether, pre-pandemic empirical studies with adolescents provided support for three claims. First, high levels of dispositional mindfulness seem associated with enhanced use of cognitive reappraisal and reduced use of expressive suppression (Hanley & Garland, 2014; Ma & Fan, 2019). Second, a more frequent use of cognitive reappraisal and less frequent use of expressive suppression has been associated with lower symptoms of depression, anxiety, and stress (Pepping et al., 2016). Finally, reduced levels of psychological distress seem related to better HRQoL (Freire & Ferreira, 2016). Although a few studies examined some of these claims together– for example, confirming a mediating chain from mindfulness to depression via suppression (Pepping et al., 2016; Ma & Fan, 2019)– no study tested if dispositional mindfulness was positively associated with HRQoL, by enhancing cognitive reappraisal and reducing expressive suppression, and, in turn, decreasing psychological distress. Testing this mediating chain was the overall goal of the current cross-sectional study. This was conducted during the COVID-19 pandemic and included a sample of 1,343 10-to-18-year-old Portuguese adolescents. The model displayed in Fig. 1 was tested via structural equation modeling (SEM). Based on the literature review, we hypothesized an indirect link between mindfulness and HRQoL, via emotion regulation strategies and psychological distress. Two sets of paths were further added to this model, as described below.

First, given the mixed and scarce findings regarding the relationship between these variables, it would be premature to assume full mediation. Thus, based on evidence

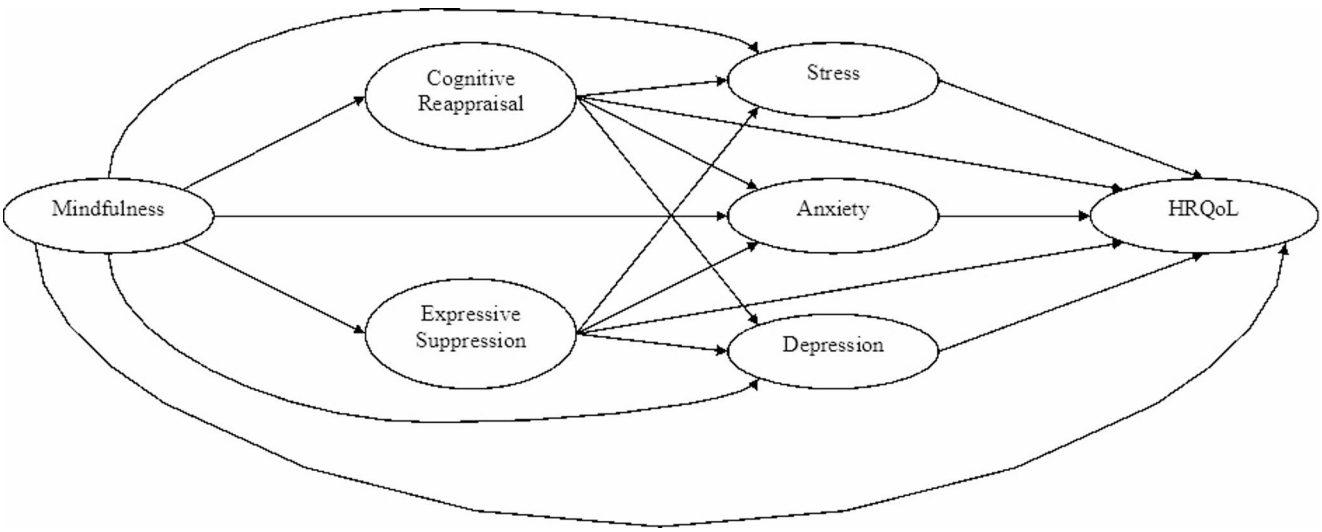

Fig. 1 Mediation Model Tested to Examine the Effects of Mindfulness on HRQoL, via Emotion Regulation Strategies and Psychological Distress, while Controlling for Gender and Age. Note. For clarity, gender and age were not included in the figure

suggesting that mindfulness (Calvete et al., 2020) and emotional regulation strategies predict quality of life (Phillips & Power, 2007), our SEM model included direct paths from dispositional mindfulness, cognitive reappraisal, and expressive suppression to HRQoL. Second, stemming from evidence relating gender and age with mindfulness (Thirumaran et al., 2020), emotion regulation (Sanchis-Sanchis et al., 2020), psychological distress (Conversano et al., 2020), and HRQoL (Michel et al., 2009), these participants' characteristics were controlled in our model. For that, we added direct paths from gender and age to all constructs.

Method

Participants

Participants were 1,343 Portuguese-speaking students from Grade 5 to 12 (M_{age} = 14.5 years, SD = 2.34; 52% girls), who were attending school at the day of data collection and agreed to participate in the study. Only adolescents without special education needs and authorized by their legal guardians to participated via written consent were included in the sample. We used the educational level of participants' mother as a proxy to their socioeconomic level, which was as follows: 0.4% did not complete Grade 4, 8.20% completed Grade 4, 21.5% completed Grade 6, 23.8% completed Grade 9, 26.9% completed high-school, 15.2% were graduated, 3.4% had a master's degree, and 0.5% had a doctoral degree. Table 1 presents age, gender, and mother's educational level by school grade. The current study was approved by the Ethics Committee of the first author's University.

Procedure

This study was conducted in Portugal at the end of May 2021. Data was collected in school facilities right after Europe's third COVID-19 wave and respective lockdown, when the Portuguese Government introduced a gradual easing of restriction measures in public spaces (e.g., opening hours, capacity). Participants completed four self-report questionnaires in classroom groups of 20 to 25 students assessing dispositional mindfulness, emotion regulation, psychological distress, and HRQoL. After explaining the overall procedure, the researcher read aloud each item at a time and asked students to mark their answers individually.

Measures

Dispositional mindfulness

We used the Child and Adolescent Mindfulness Measure (CAMM) (Greco et al., 2011). A recent 8-item Portuguese version proposed by Limpo et al. (2022) was administered. Responses to items are given in a 5-point scale ranging from 0 (*never*) to 4 (*always*). For convenience of interpretation, the responses were reversed, with greater scores demonstrating more mindfulness traits. Here, confirmatory factor analyses (CFA) showed that this 8-item CAMM had an excellent model fit, χ^2 (20, N = 1343) = 83.70, p < .001; CFI = 0.99; RMSEA = 0.05, RMSEA 90% CI [0.04, 0.06], p = .56; SRMR = 0.04 (factor loadings > 0.41, all ps < 0.001) and good reliability (McDonald's ω = 0.84).

Emotion regulation

We used the Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA) (Gullone & Taffe, 2012) validated to Portuguese by Teixeira et al. (2014). This is

Table 1 Participants' sociodemographic information by grade

Variables	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Gender								
Boy	59 (47.2%)	75 (55.6%)	71 (52.6%)	73 (51.8%)	79 (46.2%)	125 (45.8%)	99 (50.0%)	62 (38.8%)
Girl	66 (52.8%)	60 (44.4%)	64 (47.4%)	68 (48.2%)	92 (53.8%)	148 (54.2%)	99 (50.0%)	98 (61.3%)
Age (in years)								
M (*SD*)	10.5 (0.55)	11.5 (0.63)	12.7 (0.90)	13.5 (0.63)	14.8 (0.81)	15.7 (0.77)	16.6 (0.72)	17.6 (0.66)
Range	10–12	11–14	11–18	10–15	14–17	15–18	16–20	17–20
Mother's educational level (%)								
Bellow Grade 4	1.70	0.00	0.00	0.00	0.00	0.70	0.50	0.00
Grade 4	5.00	6.00	5.30	5.20	7.90	11.7	11.3	8.20
Grade 6	14.9	14.9	22.9	20.0	24.2	24.8	19.5	25.8
Grade 9	24.8	21.6	21.4	29.6	18.2	26.6	26.2	20.1
High school	28.9	26.1	28.2	25.9	27.3	24.8	26.2	30.2
Graduation degree	21.5	21.6	16.0	17.0	17.6	9.90	12.8	12.6
Master's degree	2.50	9.70	3.80	1.50	4.80	1.50	3.10	2.50
Doctoral degree	0.80	0.00	2.30	0.70	0.00	0.00	0.50	0.60

a 10-item scale covering the emotion regulation strategies of cognitive reappraisal and expressive suppression. Responses are provided in a 5-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher values corresponding to greater strategy use. Here, CFA showed that the two-factor structure fitted the data well, χ^2 (34, N= 1343) =187.88, p<.001; CFI =0.93; RMSEA =0.06, RMSEA 90% CI [0.05, 0.07], p=.05; SRMR =0.06 (factor loadings >0.40, all ps <0.001) and both factors showed good reliability (McDonald's ω= 0.72 and 0.68 for reappraisal and suppression, respectively).

Psychological distress

We used the Depression Anxiety Stress Scale (DASS-21) (Lovibond & Lovibond, 1995) validated to Portuguese by Leal et al. (2009). This 21-item scale targets three dimensions: stress, anxiety, and depression. Responses are given in a 4-point Likert scale representing the degree to which students experienced each symptom during the last week, ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). Higher scores represent more negative states. This 3-factor structure fitted our data well, χ^2 (149, N= 1343) =206.02, p=.001; CFI =1.00; RMSEA =0.02, RMSEA 90% CI [0.01, 0.02], p= 1.00; SRMR =0.03 (factor loadings >0.40, all ps <0.001). Stress, anxiety, and depression factors were strongly correlated (0.76 <rs <0.89, ps <0.001) and showed good reliability (McDonald's ω= 0.83, 0.83, and 0.87 for stress, anxiety, and depression, respectively).

HRQoL

We relied on the Pediatric Quality of Life Inventory 4.0 (PedsQL) (Varni et al., 2001) validated to Portuguese by Lima et al. (2009). This is a 23-item scale covering four dimensions: physical, emotional, social, and school. Responses are given in a 5-point Likert scale ranging from 1 (*never a problem*) to 5 (*almost always a problem*). To facilitate interpretation, responses were reversed, thus higher scores indicate better HRQoL. This scale provides two sub-cores (viz., physical health and psychosocial health) as well as a global score (Varni et al., 2001; Lima et al., 2009). Given the complexity of our model (cf. Figure 1), this latter was used, after confirming its adequacy. For that, we tested a second-order model of psychological distress comprising the four dimensions. This model fitted the data well, χ^2 (226, N= 1343) =595.84, p<.001; CFI =0.98; RMSEA =0.04, RMSEA 90% CI [0.03, 0.04], p= 1.00; SRMR =0.05, but items 5, 22 and 23 had low factor loadings (0.21, 0.27, and 0.17, respectively). After removing these items, we achieved an excellent model fit, χ^2 (166, N= 1343) =435.51, p<.001; CFI =0.99; RMSEA =0.04, RMSEA 90% CI [0.03, 0.04], p= 1.00; SRMR =0.05 (factor loadings >0.39, all ps <0.001). The global scale (McDonald's ω= 0.81) as well as each factor (McDonald's ω= 0.77, 0.81, 0.80, and 0.76 for physical, emotional, social, and school functioning, respectively) showed good reliability.

Data analyses

Using IBM SPSS Statistics 26, we first examined the descriptive statistics for all latent variables as well as the correlations between them. Skewness and kurtosis values above|3| and|10| were deemed indicative of considerable deviations from the normal distribution (Kline, 2016). Variables with correlations near 0.20, 0.50, and 0.80 were considered weakly, moderated, and strongly associated, respectively (Cohen, 1988).

Then, we conducted SEM analyses in the R system for statistical computing using the lavaan.survey package using the diagonally weighted least square estimator (Oberski, 2014; R Development Core Team, 2005). This estimator was proposed as the most adequate to handle metric measures with ordered-categorical indicators (Li, 2016). We tested a mediation model that included seven latent variables, whose variance was fixed to 1.0: dispositional mindfulness, cognitive reappraisal, expressive suppression, stress, anxiety, depression, and HRQoL. For mindfulness, we used CAMM's items as indicators. For cognitive reappraisal and expressive suppression, we used the ERQ-CA's respective items. For stress, anxiety, and depression, we used the EADS-C's respective items. For HRQoL, to reduce model complexity and based on the excellent fit of the second-order CFA and high levels of reliability, instead of the items, the scores for each PedsQL's dimension were used as indicators.

As depicted in Fig. 1, the tested mediation model included direct paths (a) from mindfulness to cognitive reappraisal, expressive suppression, stress, anxiety, depression, and HRQoL; (b) from cognitive reappraisal as well as expressive suppression to stress, anxiety, depression, and HRQoL; and (c) from stress, anxiety, and depression to HRQoL. Gender and age were included as control variables, through the specification of paths from them to all latent variables. In a prior version of this model, we additionally included a composite score targeting COVID-19 exposure as a control variable. Yet, because there was no effect of COVID-19 exposure (ps >0.13) and for the sake of parsimony, this variable was excluded from our model.

Based on Kline (2016), model fit was evaluated through chi square statistic (χ^2), confirmatory fit index (CFI), root-mean-square error of approximation (RMSEA), and standardized root mean residual (SRMR). χ^2/df values <2 and 3,

CFI values > 0.95 and 0.90, RMSEA values < 0.06 and 0.10, and SRMR values < 0.06 and 0.09 are considered good and acceptable model fits, respectively (Hu & Bentler, 1999).

Results

The analysis of the descriptive statistics showed no distributional problems, since skewness and kurtosis were below|1.48| and|1.02|, respectively. Complete results are displayed in Table 2 along with the bivariate correlations between variables, which revealed four main results. First, cognitive reappraisal was not correlated with expressive suppression (r=.01), but stress, anxiety, and depression were moderately-to-strongly correlated with each other (0.65 < rs < 0.75). Second, though not correlated with cognitive reappraisal (r=.04), mindfulness was weakly negatively associated with expressive suppression (r= −.30). Moreover, mindfulness was moderately related to both psychological distress symptoms (−0.69 < rs < − 0.60), and HRQoL (r=.72). Third, expressive suppression was weakly positively correlated with stress, anxiety, and depression (0.21 < rs < 0.33), and weakly negatively correlated with HRQoL (r= −.30). The opposing pattern, albeit of a small magnitude, was found for cognitive reappraisal. Finally, psychological distress symptoms were moderately negatively associated with HRQoL (−0.71 < rs < − 0.66).

SEM analyses showed that the mediation model fitted the data very well, χ^2 (870, N= 1336) = 2467.33, p<.001; CFI = 0.98; RMSEA = 0.04, RMSEA 90% CI [0.04, 0.04], p= 1.00; SRMR = 0.05. Findings confirmed that both gender and age were related to most variables (cf. Table 3). After controlling for these associations, we found positive paths from mindfulness to cognitive reappraisal (b = 0.09, p<.001) and HRQoL (b= 0.50, p<.001), along with negative paths from mindfulness to expressive suppression (b= −0.43, p<.001) and psychological distress symptoms (−0.77 < bs < − 0.65, ps < 0.001). Results also showed that cognitive reappraisal was negatively associated with stress, anxiety, and depression (−0.08 < bs < − 0.07, ps < 0.001) and positively associated with HRQoL (b= 0.06, p=.01), whereas expressive suppression was only negatively related to anxiety and depression (0.07 < bs < 0.13, ps < 0.001). Moreover, there were negative paths from anxiety and depression to HRQoL (−0.30 < bs < − 0.27, ps < 0.01).

Concerning indirect effects, four results are worth noting. First, whereas the link between mindfulness and stress was only mediated by cognitive reappraisal (b = −0.01, p<.001), the links between mindfulness and anxiety and depression were mediated by both cognitive reappraisal and expressive suppression (−0.03 < bs < 0.06, ps < 0.001). Second, whilst the association between reappraisal and HRQoL was

Table 2 Descriptive statistics and bivariate correlations between all latent variables

	Descriptive statistics						Bivariate correlations					
	Min.	*Max.*	*M*	*SD*	*Sk*	*Ku*	1.	2.	3.	4.	5.	6.
1. Mindfulness	8.00	39.0	19.2	6.64	0.31	−0.63						
2. Cognitive reappraisal	6.00	30.0	20.8	3.66	−0.61	0.66	0.04					
3. Expressive suppression	4.00	20.0	12.2	3.02	−0.16	−0.27	-0.30*	0.01				
4. Stress	6.00	24.0	11.5	3.99	0.67	−0.06	-0.68*	− 0.08*	0.21*			
5. Anxiety	7.00	27.0	10.7	3.93	1.48	1.02	-0.60*	− 0.07*	0.26*	0.75*		
6. Depression	7.00	28.0	13.2	4.95	0.83	−0.03	-0.69*	− 0.15*	0.33*	0.72*	0.65*	
7. HRQoL	20.0	83.0	38.9	11.4	0.77	0.57	0.72*	0.12*	-0.30*	-0.68*	-0.66*	-0.71*

* p<.01

mediated by anxiety and depression, the association between suppression and HRQoL was only mediated by depression ($0.02 < bs < 0.05$, $ps < 0.03$). Third, the association between mindfulness and HRQoL was mediated by reappraisal, anxiety, and depression ($0.01 < bs < 0.20$, $p = .01$), but neither by suppression nor by stress ($ps > 0.61$). Lastly, we found the following mediation chains: mindfulness → cognitive reappraisal and expressive suppression → anxiety and depression ◊ HRQoL ($0.002 < bs < 0.02$, $ps < 0.05$). In other words, more mindfulness was associated with more cognitive reappraisal and less expressive suppression, which was related to less anxiety and depression and, in turn, to more HRQoL. Complete results appear in Table 3.

Discussion

This study sought to explore the associations between dispositional mindfulness and HRQoL in a 10-to-18-year-old population living in the stressful period of the COVID-19. Our goal was to determine whether this relationship was mediated by the emotion regulation strategies of cognitive reappraisal and expressive suppression as well as by the psychological distress symptoms of anxiety, depression, and stress. After controlling for age and gender, results revealed that dispositional mindfulness was associated with higher HRQoL directly and indirectly through a greater use of cognitive reappraisal and fewer use of expressive suppression, which were related to less anxiety and depression symptoms.

The gathering of evidence corroborating our hypothesized mediation chain (mindfulness → cognitive reappraisal and expressive suppression → anxiety and depression → HRQoL) was a critical achievement of the present research. Despite the cross-sectional nature of our study, this finding extends prior research (Calvete et al., 2020; Ma & Fan, 2019; Pepping et al., 2016), suggesting possible processes that may be related to mindful individuals' tendency to experience better HRQoL. We found two sets of relevant and interrelated processes: use of emotion regulation strategies and signs of psychological distress.

In line with past findings, we observed that adolescents with high dispositional mindfulness were more prone to deal with emotion-eliciting situations by actively reappraising their thoughts (Desrosiers et al., 2013). This may be due to the tendency of mindful individual to consciously approach their experiences with openness and acceptance, which allows them to re-interpret the situations and decrease their emotional impact (Garland et al., 2015). Confirming the adaptative nature of cognitive reappraisal (Gross & John, 2003) and replicating prior research (Aldao et al., 2010; Gross & John, 2003; Hu et al., 2014), our findings also showed that the more adolescents attempted to modify the meaning of emotion-eliciting situations, the better they felt about their lives. This link might be associated with a reduction in the experience of negative emotions arising from cognitive reappraisal strategies (Gross & John, 2003), that may diminish psychological suffering and, in turn, nurture HRQoL. As found here, the use of this emotion regulation strategy was related to HRQoL not only directly, but also indirectly, by reducing symptoms of depression and anxiety.

Though found here during COVID-19, the indirect link between mindfulness and HRQoL via cognitive reappraisal and psychological distress was not found in pre-pandemic studies (Ma & Fan, 2019; Pepping et al., 2016). The context-dependent adaptive nature of reappraisal (Westphal et al., 2010) may explain this discrepancy. Troy et al. (2013) showed that when stressors are uncontrollable (i.e., individuals cannot change them, as in a pandemic), cognitive reappraisal seems a useful strategy linked to reduced distress. Conversely, when stressors are under individuals' control (i.e., they can act upon and change them), this strategy may not be useful to manage psychological health. In this case, it seems more adaptive to use strategies for modifying the circumstance (e.g., problem-focused coping) rather than changing the perspective (Lazarus, 1993). Future research is needed to inspect these patterns of results, considering the role of cognitive reappraisal in different contexts.

Contrary to the positive role of cognitive reappraisal in our model, the employment of expressive suppression was negatively related to indicators of mental health and well-being, confirming the well-established maladaptive nature of this strategy (Aldao et al., 2010; Phillips & Power, 2007). Replicating prior findings (Pepping et al., 2016), we showed that less mindful individuals (i.e., who frequently judge and hide their feelings) tend to suppress their emotions. This tendency was then related to greater signs of anxiety and depression, and, predictably, lower levels of HRQoL. Past research already showed that suppressing upsetting emotions or thoughts was associated with the maintenance of depression and anxiety (Tull et al., 2004). By attempting to conceal or repress emotion-expressive behaviors, individuals may be intensifying the negative emotion and enhancing their psychological distress. As observed before, this distress only manifested on depression and anxiety symptoms, but not on stress (Pepping et al., 2016; Ma & Fan, 2019).

The result that stress mediated no link between dispositional mindfulness, emotion regulation strategies, and HRQoL deserves a short comment. The concept of stress diverges from the other symptoms of psychological distress. Anxiety and depression represent more stable patterns across time and contexts, influencing all domains of individuals' lives (Kleinman, 1991); stress arises in response to a specific stimulus and disappears either when it is absent

Table 3 Standardized path coefficients of the mediation model

Paths	b	SE	*p*
Direct paths from gender and age			
Gender"mindfulness	− 0.37	0.04	< 0.001
Gender"cognitive reappraisal	0.05	0.05	0.03
Gender"expressive suppression	− 0.05	0.06	0.09
Gender"stress	0.12	0.08	< 0.001
Gender"anxiety	0.11	0.07	< 0.001
Gender"depression	0.02	0.08	0.43
Gender"HRQoL	0.001	0.13	0.98
Age"mindfulness	− 0.18	0.01	< 0.001
Age"cognitive reappraisal	− 0.12	0.01	< 0.001
Age"expressive suppression	0.01	0.01	0.73
Age"stress	− 0.06	0.02	0.01
Age"anxiety	− 0.09	0.01	< 0.001
Age"depression	− 0.06	0.02	0.003
Age"HRQoL	0.04	0.03	0.14
Direct paths			
Mindfulness"cognitive reappraisal	0.09	0.02	< 0.001
Mindfulness"expressive suppression	− 0.43	0.02	< 0.001
Mindfulness"stress	− 0.77	0.07	< 0.001
Mindfulness"anxiety	− 0.65	0.04	< 0.001
Mindfulness"depression	− 0.74	0.06	< 0.001
Mindfulness"HRQoL	0.50	0.21	< 0.001
Cognitive reappraisal"stress	− 0.08	0.03	< 0.001
Cognitive reappraisal"anxiety	− 0.08	0.02	< 0.001
Cognitive reappraisal"depression	− 0.17	0.03	< 0.001
Cognitive reappraisal"HRQoL	0.06	0.06	0.01
Expressive suppression"stress	− 0.02	0.04	0.41
Expressive suppression"anxiety	0.07	0.03	0.001
Expressive suppression"depression	0.13	0.03	< 0.001
Expressive suppression"HRQoL	− 0.001	0.07	0.96
Stress"HRQoL	0.08	0.22	0.61
Anxiety"HRQoL	− 0.30	0.21	0.01
Depression"HRQoL	− 0.27	0.11	0.001
Indirect paths from mindfulness to psychological distress			
Mindfulness"cognitive reappraisal"stress	− 0.01	0.003	<. 001
Mindfulness"cognitive reappraisal"anxiety	− 0.01	0.002	< 0.001
Mindfulness"cognitive reappraisal"depression	− 0.01	0.004	< 0.001
Mindfulness"expressive suppression"stress	0.01	0.02	0.42
Mindfulness"expressive suppression"anxiety	− 0.03	0.01	< 0.001
Mindfulness"expressive suppression"depression	− 0.06	0.01	< 0.001
Indirect paths from mindfulness to HRQoL			
Mindfulness"cognitive reappraisal"HRQoL	0.01	0.004	0.01
Mindfulness"expressive suppression"HRQoL	0.001	0.03	0.96
Mindfulness"stress"HRQoL	− 0.06	0.27	0.61
Mindfulness"anxiety"HRQoL	0.19	0.18	0.01
Mindfulness"depression"HRQoL	0.20	0.13	0.001
Mindfulness"cognitive reappraisal"stress"HRQoL	− 0.001	0.003	0.61
Mindfulness"cognitive reappraisal"anxiety"HRQoL	0.002	0.002	0.03
Mindfulness"cognitive reappraisal"depression"HRQoL	0.004	0.003	0.004
Mindfulness"expressive suppression"stress"HRQoL	0.001	0.003	0.68
Mindfulness"expressive suppression"anxiety"HRQoL	0.01	0.01	0.05
Mindfulness"expressive suppression"depression"HRQoL	0.02	0.01	0.003
Indirect paths from emotion regulation strategies to HRQoL			
Cognitive reappraisal"stress"HRQoL	− 0.01	0.03	0.61
Cognitive reappraisal"anxiety"HRQoL	0.02	0.03	0.03

Table 3 (continued)

Paths	b	SE	*p*
Cognitive reappraisal"depression"HRQoL	0.04	0.03	0.001
Expressive suppression"stress"HRQoL	− 0.001	0.008	0.68
Expressive suppression"anxiety"HRQoL	− 0.02	0.03	0.051
Expressive suppression"depression"HRQoL	− 0.04	0.03	0.003

or when individuals learn to deal with it (Horwitz, 2007). Given the volatile nature of stress, it seems plausible that our participants, facing the second year of the COVID-19 pandemic, were more able to deal with these adverse circumstances, thereby reducing the role of stress (but not anxiety and depression) in our model. This pattern of findings involving stress not only supports scholars' doubts about considering stress as an indicator of psychological distress but also reinforce the need to study psychological distress through multidimensional measures (Drapeau et al., 2012).

In addition to the previously discussed indirect links between dispositional mindfulness and HRQoL, we also found a direct association between these variables. This finding suggests that other mechanisms beyond cognitive reappraisal, emotion suppression, and psychological distress may also mediate the mindfulness-HRQoL link. A likely mediator not explored here is self-compassion, which refers to a healthy attitude towards oneself during difficult times (Souza & Hutz, 2016). Mindful individuals typically present self-compassionate traits (Neff, 2003). By facing difficult times with positive and self-accepting stances, they may be more likely to perceive their own life more favorably (Sirois et al., 2015). Different emotion regulation strategies from those here study (e.g., rumination) may also be plausible candidates to further explain the association between mindfulness and HRQoL. Rumination is a maladaptive strategy that involves responding to distress passively with repetitive thinking about feelings and thoughts (Nolen-Hoeksema et al., 2008). A ruminative pattern of thinking looks inconsistent with the awareness and acceptance features of mindfulness (Chambers et al., 2015) and a source of diminished HRQoL (Isaacs et al., 2021). More research investigating these relationships seems needed to raise knowledge about the differential mechanisms explaining why mindful adolescents tend to feel better about their lives.

Given the detrimental psychological and physical consequences of the COVID-19 pandemic on adolescents (Loades et al., 2020), our results have relevant practical implications. Overall, the current study highlighted the processes underlying adolescents' HRQoL that should be targeted by programs and interventions to curb the negative impact of stressful situations. As we showed, dispositional mindfulness and emotion regulation strategies seem to be protective factors against adolescents' psychological distress and poor HRQoL. Mindfulness-based practices have been more and more known for their efficacy in enhancing dispositional mindfulness, emotion regulation and HRQoL, as well as in reducing psychological distress (Roeser et al., 2020). These practices may support adolescents in dealing with the difficult circumstances caused by the pandemic, as already showed in the literature (Yeun & Kim, 2022). Even so, more research is needed to explore which mindfulness interventions are more appropriate for youngsters of different age groups and with varying mental health status.

Limitations and future research

A minimum of five limitations should be considered when interpreting this study's findings. First, no causal inferences can be made as the current study is cross-sectional and correlational. Future longitudinal and experimental studies examining the causal relationships among the studied variables may be needed. Second, dispositional mindfulness was assessed unidimensionally. Although CAMM is a well-established instrument (Calvete & Royuela-Colomer, 2016), mindfulness encompasses distinct dimensions that may be differentially associated with mental health and well-being (Baer et al., 2006). In the future, it would be worthwhile to explore these specific links. Third, we only targeted the emotion regulation strategies of cognitive reappraisal and expressive suppression. Though often used in daily life (John & Gross, 2004), and thus of great applied interest, as discussed above, other emotion regulation strategies, such as rumination, may mediate the link between adolescents' mindfulness and psychological distress. To deepen our knowledge about this link, future studies should rely on comprehensive measures of emotion regulation strategies (e.g., the Cognitive Emotion Regulation Questionnaire tapping nine strategies; Garnefski et al., 2001). Fourth, although the HRQoL measure provides two subscores, we only used the global one. Thus, we cannot tell whether distinct HRQoL dimensions are differently related to mindfulness, emotion regulation and psychological distress, which should be targeted in the future. Fifth, we used a convenience sample of Portuguese youngsters. The replication of this study using random sampling and involving participants from other countries seems warranted to determine findings' generalization.

Despite these limitations, this work contributed to extend our understanding of the processes underlying adolescents'

HRQoL in stressful circumstances. This could bring insights into ways of overcoming the impact of those situations and promoting youth positive development. Based on our findings and in line with past research (Calvete et al., 2020; Ma & Fan, 2019; Pepping et al., 2016), we believe that enrolling young people in activities aimed at enhancing mindfulness traits and adaptative emotion regulation may protect them against the negative mental health effects of difficult circumstances, like the pandemic or even the current exposure to war news. These activities are likely to help youngsters to achieve greater levels of mental well-being and cultivate positive appraisals of their lives.

Funding Open access funding provided by FCT|FCCN (b-on). This research was supported by the FCT grants 2020.05816.BD attributed to SM and UIDB/00050/2020 attributed to CPUP.

Data availability The data that supports the findings of this study is available from the corresponding author, S. M., upon reasonable request.

Declarations

Informed consent All participants were authorized by their legal guardians and agreed to participate in the study, which was approved by the Ethics Committee of the first author' institution.

Conflict of interests The authors declare that they have no conflicts of interest.

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