



Peer relationships and stress: Indirect associations of dispositional mindfulness with depression, anxiety and loneliness via ways of coping

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ABSTRACT

Introduction: Adolescents higher in the trait of dispositional mindfulness report fewer socioemotional problems. Focusing on the domain of peer stressors, we tested a model of adolescents' mindfulness as a resource that undergirds more constructive stress coping responses, in turn resulting in fewer socioemotional problems.

Method: The participants were 361 Australian secondary school students (40% boys; ages 11 to 18; $M = 14.9$ years; $SD = 1.4$). Each completed a questionnaire to report four facets of dispositional mindfulness; engagement and disengagement coping and involuntary stress responses to recent peer interpersonal stressful events; and socioemotional problems of loneliness, social anxiety, and depression.

Results: Adolescents who reported more dispositional mindfulness, including facets of awareness, describing, non-judgement and non-reactivity, were lower in involuntary peer stress responses, disengagement coping, loneliness, social anxiety, and depression; associations of mindfulness facets with engagement coping were mixed. Mediation path models showed that almost all the significant negative associations of dispositional mindfulness with loneliness, social anxiety and depression were fully indirect via peer stress coping responses. Further, an alternative model, which tested whether loneliness, social anxiety and depression were the instigators of stress coping responses via mindfulness, had an adequate but poorer fit.

Conclusion: As hypothesized, the benefit of adolescents' dispositional mindfulness for reducing loneliness, social anxiety and depression seems to be indirect, with positive peer stress coping responses key mediators in these indirect pathways. It is less likely that the alternative occurs, whereby adolescents' socioemotional problems are the foundation for mindfulness and peer stress coping responses.

1. Peer relationships and stress: Indirect associations of dispositional mindfulness with depression, anxiety and loneliness via ways of coping

Spending time with classmates and other peers are some of the highlights of many adolescents' daily experiences, but they can also be a source of distress. For example, being bullied, victimized or excluded by peers are common adolescent experiences, with approximately 17%–25% reporting some form of bullying once a week or more (e.g., [Craig et al., 2009](#); [Harel-Fisch et al., 2011](#)). As

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described in Self-Determination Theory (SDT; Deci & Ryan, 2000) and extensions on this theory (e.g., Schoch et al., 2015; Vansteenkiste & Ryan, 2013), such experiences can be psychologically detrimental and socially isolating (Reijntjes et al., 2010; Zimmer-Gembeck et al., 2016). SDT argues that acceptance by others, interpersonal support and intimacy, reliable companionship, and feelings of belongingness are essential experiences that serve to fulfil the basic psychological human need for relatedness (sometimes called belonging or belongingness; see Baumeister & Leary, 1995; Lambert et al., 2013). When the need for relatedness is not met, it is akin to a stressful experience and the associated distress from this unmet need can yield loneliness, social anxiety, and depressed mood (*socioemotional problems*; Chango et al., 2014; Deci & Ryan, 2000; Nangle et al., 2003; Stillman et al., 2009). Importantly, when the focus is on adolescents, problems in peer relationships are argued to be some of the most direct experiences that thwart the need for relatedness and bring about loneliness, social anxiety, and depression (Nesi et al., 2018; Seiffge-Krenke, 2011; Zimmer-Gembeck, 2016).

Because peer relationship problems, such as victimization, rejection or conflict, are stressful events (*peer stressors*) that can impinge on adolescents' well-being, they call upon coping responses to manage the associated distress, to solve the problem or both (Casper et al., 2020; Duncan et al., 2021; Zimmer-Gembeck, 2015, 2016). Thus, adolescents' ways of coping with peer stressors can influence their concurrent or subsequent well-being because it involves managing stress, solving or reappraising problems, or engaging in other positive or negative behaviors, cognitions and emotions (Sandstrom, 2004; Santiago et al., 2016; Sugimura et al., 2014). As described in multiple theories of stress and coping processes, individual traits can be foundational to these stress coping processes, with traits associated with reactivity to stressful experiences and ways of coping in response to stress (Compas et al., 2017; Lazarus & Folkman, 1984, 1987; Taylor & Stanton, 2007; Zimmer-Gembeck et al., 2018; Zimmer-Gembeck, 2021). One such trait level factor is dispositional mindfulness. Dispositional mindfulness has been described as the self-regulation of sustained attention to thoughts, feelings, and sensations in the present moment in a way characterized by curiosity, openness, and acceptance (Bishop et al., 2004). Multiple stress and coping theories (Compas et al., 2001; Seiffge-Krenke, 1995; Skinner & Zimmer-Gembeck, 2016) and neurodevelopmental perspectives (e.g., Sanger & Dorjee, 2015) identify these aspects of regulation as parts of the process of successfully attending, responding, and adapting to stressful experiences.

Drawing together stress coping theory (Lazarus & Folkman, 1984) with past research on dispositional mindfulness and stress in young people (e.g., Calvete et al., 2019), our aim in this study was to test whether adolescents' peer stress coping responses would play a mediational role, resulting in only indirect associations between trait level dispositional mindfulness and socioemotional problems. More specifically, the aim of this study was to test whether voluntary peer stress coping responses, as well as adolescents' involuntary emotional responses to peer stressors, provide the bridge linking multiple facets of dispositional mindfulness with fewer socioemotional problems (i.e., less loneliness, social anxiety, and depression). Our overarching purpose was to address 1) what and why aspects of mindfulness may aid mental health and reduce social disconnection and 2) extend the identification of individual skills that are useful to boost adaptive responses to stressful events and help adolescents to withstand the many personal and social transitions they will encounter during the teenage years and early 20s.

1.1. Multiple facets of dispositional mindfulness and socioemotional well-being

Dispositional (or trait level) mindfulness is a personal resource associated with less perceived stress, more positive mental health, and enhanced feelings of social connection (e.g., Bluth & Blanton, 2014; Calvete et al., 2019; Clear et al., 2020; Galla et al., 2020; Zimmaro et al., 2016). In general, across these studies, adults and adolescents who report higher dispositional mindfulness have been found to report better well-being and less emotional distress, often measured as negative affect, depressed mood or anxiety.

Multiple measures of dispositional mindfulness exist (e.g., Mindful Attention Awareness Scale [MAAS], Brown & Ryan, 2003; the Cognitive and Affective Mindfulness Scale- Revised [CAMS-R], Feldman et al., 2007; the Mindful Attention Awareness Scale-Adolescent [MAAS-A], Brown et al., 2011; see Tomlinson et al., 2018 for a review). However, one dispositional mindfulness measure, the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006), has been useful because it purposely measures multiple facets of mindfulness, with these facets found to differ in the significance or strength of association with adolescents' socioemotional problems (Abujaradeh et al., 2020; Clear et al., 2020). The measured facets of mindfulness on the FFMQ include observing experience, describing/labelling experience with words, acting with awareness, non-judging of experience, and non-reactivity to inner experience (Baer et al., 2006). A greater capacity for each facet is expected to activate internal mechanisms, including cognitive, emotional, and behavioral flexibility, which facilitate adaptive emotion and behavioral regulation (Shapiro et al., 2006). Such views suggest that each of the facets of dispositional mindfulness should facilitate less emotional reactivity to stressful events, better emotion regulation, more constructive stress coping responses, and fewer socioemotional problems or better well-being. For example, in one study, Australian year 10 students who scored higher on a measure of mindful acting with awareness (as well as emotional awareness and experiential acceptance) reported more prosocial tendencies, had greater increases in psychological well-being across a year, and experienced less sadness and more positive affect relative to other adolescents (Ciarrochi et al., 2011). However, in this study, observing experience, as a facet of mindfulness, was not associated with changes in well-being over the following year.

1.2. Stress coping responses linking trait mindfulness to well-being

Coping: Definitions and a model of involuntary and voluntary coping. Coping has been defined as "... volitional efforts to regulate emotion, cognition, behavior, physiology, and the environment in response to stressful events or circumstances" (Compas et al., 2001, p. 89). Coping with stress has a long theoretical and research history, and coping has been conceptualized in numerous ways. Much of this research proposes that coping and stress responses can be organised into higher order families of categories which

are linked to adaptive processes based on function (e.g., Skinner et al., 2003; Skinner & Zimmer-Gembeck, 2007). Other research has proposed a model of coping based on involuntary and voluntary responses to stress highlighting conscious control or the lack thereof, and engagement and disengagement or the tendency to approach or withdraw from the stress response (e.g., Compas et al., 1997, 1999).

Although all coping models have strengths, five aspects of involuntary and voluntary coping responses were measured in the current study following the model of Compas et al. (1997, 1999), given it has been used to measure coping with interpersonal (e.g., peer) stressors and that it can differentiate involuntary emotional responses from voluntary coping responses. Involuntary responses to stress include intrusive thoughts, emotional arousal, physiological arousal, and impulsive action. Voluntary coping responses include both primary approach responses (e.g., problem solving, self-reliance, emotional expression, and emotion modulation), as well as secondary approach responses (e.g., accommodation, positive thinking, and cognitive restructuring). In addition, disengagement coping responses were also measured (e.g., avoidance, denial, and wishful thinking). This allowed us to investigate whether individuals higher in dispositional mindfulness report more constructive and adaptive stress responding, including reporting less intensive involuntarily reactivity to stress, more reliance on engagement coping responses, and less reliance on disengagement coping responses. It was not clear how the different facets of dispositional mindfulness would be associated with this range of stress coping responses. However, we tested multiple facets of dispositional mindfulness to identify whether some were more strongly linked to coping and socioemotional problems among adolescents than were others.

Stress Coping Responses as Mediators. Adolescents' involuntary stress responses and voluntary coping responses to peer stressors could also account for the positive socioemotional benefits of dispositional mindfulness. Such a theoretical model was proposed by Dvořáková et al. (2019), whereby they argued that stress and coping theory can be productively integrated with emerging views on mindfulness skills and, more precisely, mindfulness skills should promote a healthier set of stress coping responses among young people. In their model, mindfulness should have far-reaching effects on a range of stress appraisal and coping processes including greater preparedness for coping when stressors will eventually occur, more productive appraisals of stressors as challenges rather than threats, and more skillful use of coping responses when needed. In support of this conceptual model, dispositional mindfulness has been found to correlate with stress reduction (e.g., Hicks et al., 2020), less perceived stress (Finkelstein-Fox et al., 2019; Zimmaro et al., 2016), lower overall mean diurnal cortisol (Zimmaro et al., 2016), more use of positive reappraisal to cope with negative events (Hanley & Garland, 2014; Sagui-Henson et al., 2018), and more approach, more acceptance, more adaptive, and less avoidant coping (Donald & Atkins, 2016; Finkelstein-Fox et al., 2019; Keng et al., 2018; Weinstein et al., 2009). Some of these studies also found that stress appraisals or coping responses were partial or full mediators of the association between mindfulness (sometimes multiple facets of mindfulness) with greater well-being or fewer socioemotional problems (e.g., Finkelstein-Fox et al., 2019; Weinstein et al., 2009; Zimmaro et al., 2016) or health behavior (Sagui-Henson et al., 2018). For example, in one series of studies that involved collecting data in the laboratory and using longitudinal and diary study designs, Weinstein et al. (2009) investigated mindful acting with awareness (measured with the MAAS, Brown & Ryan, 2003), stress appraisals, avoidant and approach coping, and well-being. Individuals who reported more mindful acting with awareness were higher in well-being and approach coping. Moreover, summarizing across the four studies, the positive association between mindful acting with awareness and well-being measures was fully or partly mediated by ways of coping with stress.

Most studies of stress, coping, and well-being among adolescents or university students have tended to rely on measures of mindful acting with awareness only (e.g., MAAS) or other measures that provide a single composite measure of mindfulness (e.g., CAMS-R). Yet, there have been a handful of studies using the FFMQ to consider associations of specific mindfulness facets with stress appraisals or coping responses. For example, in one study of university students, awareness and non-judgement facets of mindfulness were measured and each was associated with less engagement and disengagement coping (Moeller et al., 2020). However, when tested in a multivariate regression model, both facets and both coping measures were associated uniquely with loneliness and self-esteem; mindfulness and engagement coping were associated with lower loneliness and higher self-esteem, whereas disengagement coping was associated with higher loneliness and lower self-esteem. In another study of university students using the five FFMQ facets, only two facets – awareness and non-reactivity – were associated with more cognitive appraisal to mitigate negative emotion (Stevenson et al., 2019).

1.3. The current study

In summary, despite theory (e.g., Dvořáková et al., 2019) and evidence (e.g., Finkelstein-Fox et al., 2018; Weinstein et al., 2009) that mindfulness supports more adaptive reactions to and better ways of coping with stressful events, such associations have not been tested among adolescents and have not considered the specific domain of peer stressors. Here, we test a multidimensional model to consider if facets of adolescents' trait level dispositional mindfulness are resources that undergird more constructive peer stress coping responses, in turn resulting in fewer socioemotional problems. Socioemotional problems included loneliness, depression, and social anxiety symptoms. Focusing on coping with peer stressors was particularly important, given the prevalence of these events and their known detrimental effects on adolescents' emotional well-being. Although multiple facets of mindfulness have not often been examined in previous research on peer stress, coping and socioemotional problems or well-being, we hypothesized based on theory (Dvořáková et al., 2019) that 1) all measured facets of dispositional mindfulness would be associated with fewer socioemotional problems (i.e., less loneliness and lower levels of depressive and social anxiety symptoms), and 2) considering involuntary responses to stress and voluntary coping responses as mediators would reveal indirect associations between all facets of dispositional mindfulness and adolescents' socioemotional problems, via peer stress coping responses.

2. Method

2.1. Participants

The participants were 361 students (40% boys, eight who identified as other or were missing gender), enrolled in Grades 7 to 12 (98% of participants were aged 12 to 17; $M = 14.9$ years; $SD = 1.4$, with one participant 11-years-old and six participants 18-years-old). All attended a single public school in an urban area of Australia. Another 40 students attended the survey session but were not maintained for analyses because they did not complete most of the survey or patterned responses were found. Fifty percent of the student body was randomly selected to participate by the school and, overall, the participation rate was 45% of all students. Most participants (79%) identified as being white/Caucasian, with 5.3% Asian, 2.8% Australian First People or Pacific Islander, 5.5% other, and the remaining 7.4% missing sociocultural items. Of all participants, 41% reported some experience with mindfulness or meditation, 17% engaged in religious or prayer activities, and 1% reported some engagement in other similar wellbeing activities (e.g., yoga). Dispositional mindfulness did not differ between adolescents who did or did not report practice of mindfulness and/or meditation, $t(356) = -0.77$, $p = .44$.

2.2. Measures

Depressive symptoms. Depressive symptoms were measured with the 13-item Short Mood and Feelings Questionnaire (Angold et al., 1995; e.g., “I felt I was no good anymore”). As has been done in previous research with adolescents (Webb et al., 2021), students were prompted to report their feelings within the past 2 weeks. Item responses ranged from 1 (*not true*) to 5 (*very true*). Responses were averaged so that higher scores reflected more depressive symptoms. Cronbach’s $\alpha = 0.95$.

Social anxiety symptoms. The 18-item Social Anxiety Scale for Adolescents (SAS-A; La Greca & Lopez, 1998) measured social anxiety symptoms. The measure contains descriptive self-statements (e.g., “I worry about doing something new in front of others”). Item responses ranged from 1 (*not true*) to 5 (*very true*). Responses were averaged so that higher scores reflected more social anxiety symptoms. Cronbach’s $\alpha = 0.95$.

Loneliness. Participants completed the Loneliness and Social Dissatisfaction Scale (Asher et al., 1984; Asher & Wheeler, 1985) to measure subjective feelings of loneliness and social dissatisfaction. The scale contained 16 items (e.g., “I don’t have any friends in class”). Item responses ranged from 1 (*not true*) to 5 (*very true*). After reversing some items, responses were averaged so that higher scores reflected more loneliness. Cronbach’s $\alpha = 0.90$.

Dispositional mindfulness. Items drawn from the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) measured dispositional mindfulness describing (8 items, “I am good at finding the words to describe my feelings”), acting with awareness (8 items, “I do jobs or tasks automatically, without being aware of what I’m doing”), non-judging (8 items, “I tell myself I shouldn’t be thinking the way I’m thinking”), and non-reactivity (7 items, “I perceive my feelings and emotions without having to react to them”). Items from the observing subscale were not administered given previous evidence that this subscale is relevant for participants who practice meditation, but this subscale may perform differently for nonmeditators (Baer et al., 2006; Goodall et al., 2012) and has also been found to perform differently in adolescents (Abujaradeh et al., 2019; Hambour et al., 2018). For example, research has shown that the observing subscale has only small (and sometimes negative) associations with other dispositional mindfulness subscales and observing has been found to have positive associations with symptoms of emotional problems (e.g., Hambour et al., 2018). Item responses ranged from 1 (*not true*) to 5 (*very true*). Responses were averaged so that higher scores reflected more dispositional mindfulness. Cronbach’s α for items on the four subscales ranged from 0.72 for the non-reactivity subscale to 0.84 for the acting with awareness subscale.

Engagement and disengagement coping responses. Adolescents completed the Responses to Stress Questionnaire – Social Stress (RSQ; Connor-Smith et al., 2000) to measure engagement and disengagement coping responses. We tailored the measure to be specific to the domain of peer relationship stress, such as conflict, ostracism, victimization or bullying by asking participants to respond to an initial set of questions on the frequency of their experiences with specific peer stressful events before completing 57 items to report their stress coping responses to these events. The measure was designed to tap 19 lower order coping and stress responses (e.g., problem solving, avoidance, impulsive action) linked to three coping dimensions (higher order categories): voluntary vs. involuntary, engagement vs. disengagement, and primary vs. secondary. Engagement coping encompassed 3 lower order primary ways of coping (problem solving, emotional expression, and emotional regulation; 21 items, e.g., I try to think of different ways to change or fix things) and 4 lower order secondary ways of coping (cognitive restructuring, positive thinking, acceptance, and distraction; 12 items; e.g., I tell myself that I can get through this, or that I will be okay or do better next time). Disengagement coping encompassed 3 lower order categories (denial, avoidance, and minimization; 9 items; e.g., I try not to feel anything; I wish that someone would just come and take all the stress away). Additional items measured 9 lower order categories of involuntary responses (e.g., rumination, intrusive thoughts; 27 items; e.g., I can’t stop thinking about how I am feeling; I don’t feel anything at all, it’s like I have no feelings). Response options for each stress coping response item ranged from 1 (*Not at all*) to 4 (*A lot*). For the present study, we focused on the two higher order coping dimensions of engagement vs. disengagement, which was supported in the confirmatory factor analysis of Connor-Smith et al. (2000). For the measure of involuntary stress responses, we combined all lower order responses measured into a single total score, given the high correlation between involuntary engagement and involuntary disengagement responses (0.90) reported in Connor-Smith et al., Cronbach’s α were 0.86, 0.78, and 0.94 for engagement coping, disengagement coping, and involuntary stress coping response items, respectively. Items were averaged to form three raw total scores for each participant, with higher scores indicating more engagement coping, more disengagement coping, and more involuntary responses to peer relationship stressors, respectively.

2.3. Procedure

Because the data were collected as part of a school-led research project, the school gave consent for all selected students to participate, but students had an option to not take part. Randomly selected students completed paper questionnaires under the supervision of a teacher in a designated room on school grounds during class time. The questionnaire took approximately 40 min to complete. University Human Research Ethics Committee approval was received to access and analyze the deidentified data for research purposes.

2.4. Overview of the data analyses

Ms, SDs, and zero-order correlations between all measures and with age were examined in preliminary analyses. In addition, *t*-tests were used to compare study variables between boys and girls. For the primary analyses, we estimated all direct and indirect paths using AMOS v.26. In the hypothesized model, the focus was on estimating the paths from the four subscales of dispositional mindfulness (the independent variables) to the three stress coping response composite variables, and paths from the stress coping responses to the three indicators adolescents' socioemotional problems (the dependent variables of loneliness, social anxiety, and depression). We report the overall findings in a final model after trimming nonsignificant paths and report indirect effects from dispositional mindfulness to fewer socioemotional problems via coping responses using 10,000 bootstrapped samples for estimation. Finally, we also tested an alternative model, whereby adolescents' socioemotional problems of loneliness, social anxiety and depression were tested as correlates of peer stress coping responses as mediated via facets of dispositional mindfulness.

3. Results

3.1. Missing values and data distributions

There were 58 participants missing responses to one item, and 26 participants missing between 2 and 6 items (no participant missed more than 6 items). Because missing data were minimal and were at random, scores were formed based on the completed items to maintain all participants in the data analyses. Social anxiety, depression, and loneliness scores displayed some positive skew and the distribution of each variable significantly diverged from the assumption of normality. Scores on these three variables were transformed by taking the square root, which improved the skew substantially. Bivariate correlations were examined before and after a square root transformation of these variables. Given that there was minimal difference in the correlations for transformed compared to untransformed scores, the untransformed variables were maintained for all analyses. No highly influential univariate or multivariate outliers were identified.

3.2. Correlations between measures, descriptive statistics, and gender comparisons

Ms, SDs, and Pearson correlations between the study variables are shown in Table 1. As expected, individuals higher in dispositional mindfulness reported fewer socioemotional problems (i.e., less loneliness and fewer symptoms of social anxiety and depression). Also, more engagement coping in response to peer stress was associated with fewer socioemotional problems and more dispositional mindful awareness, describing, and non-reactivity. A more elevated involuntary emotional response to peer stressors was associated with more socioemotional problems, and with less dispositional mindfulness across all facets. Disengagement coping and age were not significantly associated with socioemotional problem measures or with dispositional mindfulness facets. As can be seen in Table 2, girls, relative to boys, reported more social anxiety and depressive symptoms, and more engagement, disengagement, and involuntary

Table 1
Descriptive statistics and bivariate correlations between all study variables (N = 361).

	1	2	3	4	5	6	7	8	9	10
1. Loneliness	–									
2. Social anxiety	.60***	–								
3. Depression	.62***	.64***	–							
4. DM awareness	-.24***	-.28***	-.30***	–						
5. DM describing	-.30***	-.31***	-.27***	.30***	–					
6. DM non-judging	-.29***	-.47***	-.40***	.28***	.25***	–				
7. DM non-reactivity	-.23***	-.24***	-.25***	.12*	.35***	.12*	–			
8. Engagement coping	-.13*	.09	-.02	.02	.21***	-.15**	.21***	–		
9. Disengagement coping	.43***	.59***	.51***	-.27***	-.25***	-.46***	-.20***	.33***	–	
10. Inv stress response	.51***	.68***	.60**	-.36***	-.28***	-.53***	-.24***	.28***	.79***	–
11. Age	.07	-.02	.03	-.02	-.03	-.09	-.08	-.06	-.04	.02
Mean	2.28	2.47	2.13	3.06	3.13	3.29	2.96	2.42	2.20	2.06
SD	0.75	0.94	1.03	0.76	0.70	0.75	0.65	0.51	0.62	0.63

p* < .05. *p* < .01. ****p* < .001.

Note. DM = Dispositional Mindfulness. Inv = Involuntary. Variables 1 to 7 had a possible range from 1 to 5. Variables 8 to 10 had a possible range of 1–4.

stress coping responses to peer stressors. Gender was included as a covariate to account for its significant associations with stress coping responses, social anxiety, and depressive symptoms in the following multivariate path models.

3.3. Dispositional mindfulness and socioemotional problems: indirect associations via peer stress coping responses

The first model tested indirect pathways from dispositional mindfulness to socioemotional problem measures by freeing only the direct paths from 1) the four dispositional mindfulness facets to the three coping and involuntary stress response composites, and 2) the coping and involuntary stress response composites to loneliness, social anxiety, and depressive symptoms. We freed all covariances between dispositional mindfulness facets (r ranged from 0.12 to 0.35, all $p < .05$), between coping and involuntary stress responses (r ranged from 0.31 to 0.70, all $p < .001$), and between measures of socioemotional problems (r ranged from 0.36 to 0.42, all $p < .001$). This model had a good fit to the data, $\chi^2(17) = 30.54$, $\chi^2/df = 1.80$; $p = .023$; CFI = 0.99; RMSEA = 0.047 (90% CI 0.017 - 0.073), $p = .537$ (see Fig. 1). The model accounted for 35% of the variance in loneliness, 49% of the variance in social anxiety, and 41% of the variance in depressive symptoms. Each dispositional mindfulness facet was significantly associated with at least one composite coping or involuntary stress response composite. The significant direct effects included mindful awareness to less disengagement coping and involuntary emotional responses to peer stress; mindful description to more engagement coping; mindful non-judgement to all three stress coping measures (usually but not always in the expected direction), and mindful non-reactivity to more engagement coping and fewer involuntary stress responses. In turn, significant direct effects of peer stress coping responses to socioemotional problems were also found; engagement coping was associated with less loneliness and fewer symptoms, and disengagement and involuntary responses to stress were associated with more loneliness and symptoms.

To build on this model to also test direct associations of dispositional mindfulness with socioemotional problems, we freed all direct effects from mindfulness facets to loneliness, social anxiety, and depressive symptoms. After trimming all nonsignificant paths, this final model had a good fit to the data, $\chi^2(18) = 22.55$, $\chi^2/df = 1.25$, $p = .209$; CFI = 1.00; RMSEA = 0.026 (90% CI 0.000 - 0.057), $p = .888$ (see Fig. 2). Two direct associations involving mindful non-judgement were significant; mindful non-judgement was directly significantly associated with lower social anxiety and depressive symptoms. Bootstrapped estimates of indirect effects showed that all four facets of dispositional mindfulness had indirect effects on socioemotional problems via peer stress coping responses (see Table 3). The indirect effects on socioemotional problems were smallest for mindful describing and largest for non-judgement. In most cases, the total effect (direct effect + indirect effect) of each mindfulness facet on each measure of socioemotional problems was 0% direct and 100% indirect via peer stress coping responses.

3.4. Alternative model: socioemotional problems and peer stress coping responses with dispositional mindfulness as the mediator

Given the cross-sectional study design, there could be reverse causal pathways, with elevated symptoms of socioemotional problems interfering with dispositional mindfulness, and, in turn, (as in the main model) mindfulness facets would still be a foundation for peer stress coping responses. Thus, we tested such an alternative model (see Fig. 3). Following the same modeling procedure as for the final model above, the final alternative model had an adequate fit to the data, $\chi^2(20) = 47.00$, $p < .001$; $\chi^2/df = 2.35$; CFI = 0.98; RMSEA = 0.061 (90% CI 0.039 - 0.084), $p = .190$. In this model, each measure of socioemotional problems had a significant direct effect on one (or more) facet of mindfulness. Also, each measure of socioemotional problems and each facet of mindfulness had a significant direct effect on one or more peer stress coping responses. In addition, all facets of mindfulness, as the mediators, had significant direct effects on one or more stress coping response. However, relative to the hypothesized model, indices suggested a poorer fit of this alternative model. Furthermore, measures of socioemotional problems had small indirect effects relative to direct effects on stress coping responses via mindfulness, with indirect effect estimates usually making up less than 20% of any total effect (see Table 4). The only exception was the fully indirect (small) effect of depression on engagement coping.

Table 2
Means and SDs for all students and for boys and girls, and tests of gender differences.

Measure	Boys, <i>M</i> (<i>SD</i>) <i>n</i> = 144	Girls, <i>M</i> (<i>SD</i>) <i>n</i> = 209	Gender comparison <i>t</i> (1,352)	<i>p</i> -value	Effect size, η^2
Loneliness	2.27 (0.74)	2.29 (0.75)	-0.22	.732	.00
Social anxiety	2.28 (0.96)	2.61 (0.91)	-3.26**	.001	.03
Depression	1.91 (0.96)	2.28 (1.05)	-3.36**	.001	.03
DM awareness	3.08 (0.77)	3.05 (0.74)	0.37	.751	.00
DM describing	3.08 (0.68)	3.16 (0.72)	-1.08	.430	.00
DM non-judgement	3.35 (0.76)	3.25 (0.76)	1.19	.159	.01
DM non-reactivity	3.05 (0.68)	2.90 (0.63)	2.11*	.027	.01
Engagement coping	2.27 (0.54)	2.53 (0.46)	-4.82***	<.001	.06
Disengagement coping	2.08 (0.63)	2.30 (0.59)	-3.37**	.001	.03
Involuntary stress response	1.92 (0.61)	2.17 (0.63)	-3.67***	<.001	.04

* $p < .05$. ** $p < .01$. *** $p < .001$.

Note. DM = Dispositional Mindfulness.

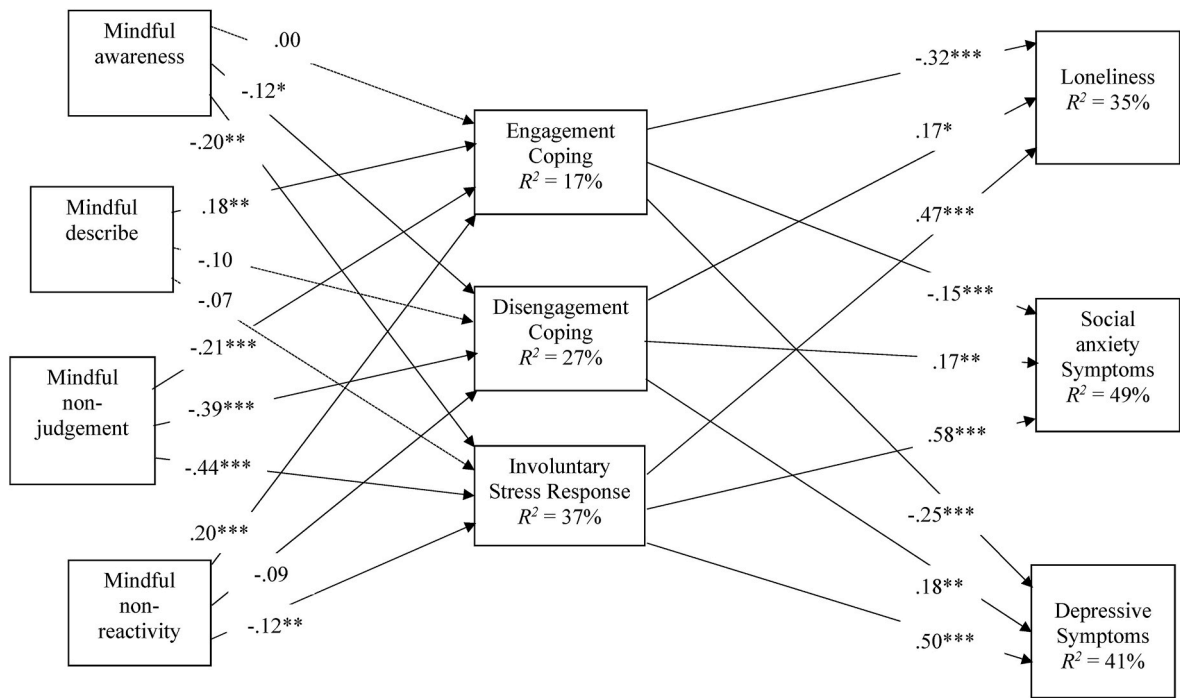


Fig. 1. Results of the initial hypothesized model testing associations of adolescents’ dispositional mindfulness with peer stress coping responses, and in turn, socioemotional problems of loneliness, social anxiety, and depression. Note. $\chi^2(17) = 30.54, p = .023$; CFI = 0.99; RMSEA = 0.047 (90% CI 0.017 - 0.073), $p = .537$. Participant gender was included as a control variable freeing all significant associations identified in Table 2.

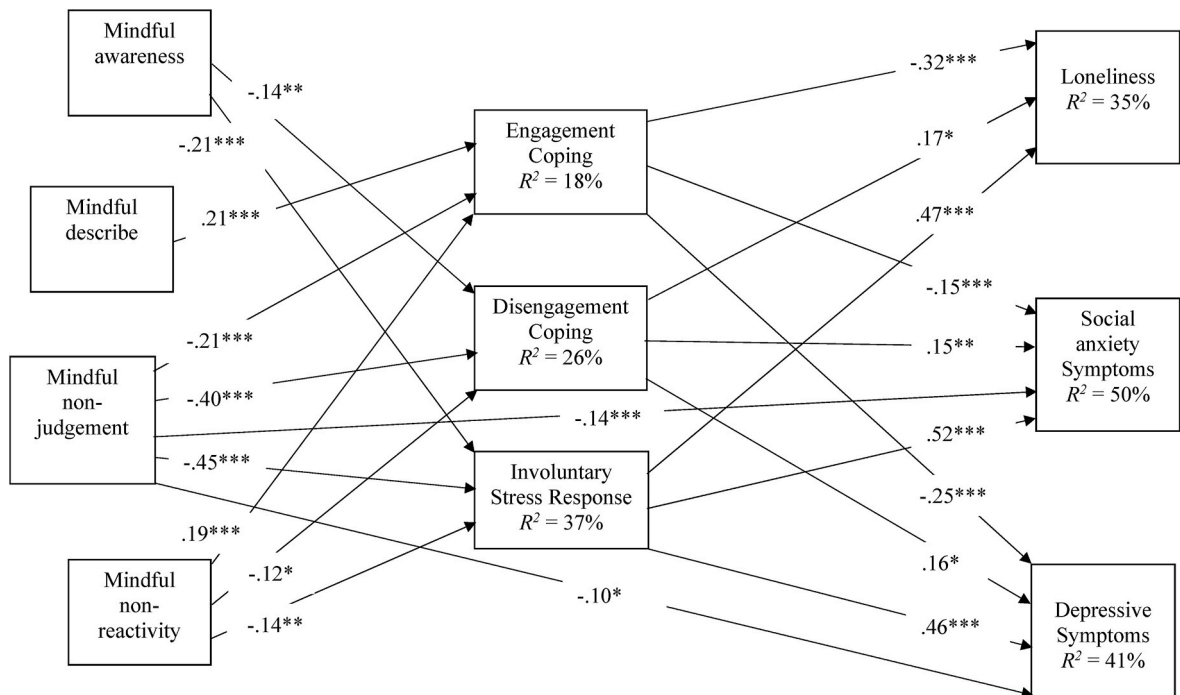


Fig. 2. Results of the final trimmed hypothesized model of adolescents’ dispositional mindfulness, peer stress coping responses, and socioemotional problems of loneliness, social anxiety, and depression. Note. $\chi^2(18) = 22.55, p = .209$; CFI = 1.00; RMSEA = 0.026 (90% CI 0.000 - 0.057), $p = .888$. Participant gender was included as a control variable freeing all significant associations identified in Table 2.

Table 3
Standardized Direct, Indirect (via stress coping responses) and Total Associations (effects) of Dispositional Mindfulness Facets with Loneliness, Social Anxiety, and Depression (N = 361).

Path	Direct Effect	Indirect Effect	Total Effect	Proportion Indirect
Awareness → Loneliness	.00	-.12**	-.12	100%
Awareness → Social anxiety	.00	-.13**	-.13	100%
Awareness → Depression	.00	-.12**	-.12	100%
Describe → Loneliness	.00	-.07**	-.07	100%
Describe → Social anxiety	.00	-.03**	-.03	100%
Describe → Depression	.00	-.05**	-.05	100%
Non-judgement → Loneliness	.00	-.21**	-.21	100%
Non-judgement → Social anxiety	-.14**	-.26**	-.40	65%
Non-judgement → Depression	-.10*	-.22**	-.32	69%
Non-reactivity → Loneliness	.00	-.15**	-.15	100%
Non-reactivity → Social anxiety	.00	-.12**	-.12	100%
Non-reactivity → Depression	.00	-.13**	-.13	100%

* $p < .05$. ** $p < .01$.

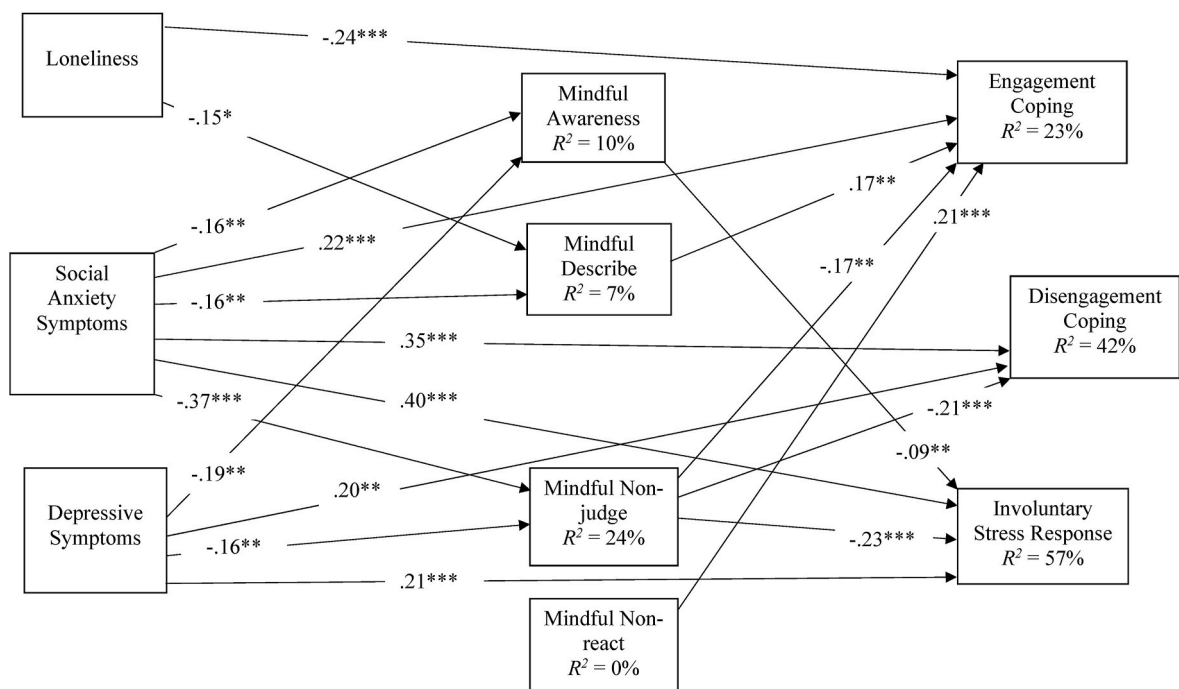


Fig. 3. Results of the final trimmed alternative model of adolescents’ socioemotional problems (loneliness, social anxiety, and depression), dispositional mindfulness, and peer stress coping responses.
Note. $\chi^2(20) = 47.00, p < .001; \chi^2/df = 2.35; CFI = 0.98; RMSEA = 0.061$ (90% CI 0.039 - 0.084), $p = .190$. Participant gender was included as a control variable freeing all significant associations identified in Table 2.

4. Discussion

Managing distress and responding to stressful events with peers is a common complication of adolescent life (Bukowski et al., 2019; Seiffge-Krenke, 2011; Seiffge-Krenke et al., 2013). Drawing from SDT (Deci & Ryan, 2000), we have argued that peer stressors are important because they threaten one of the core psychological needs - relatedness. Further, integrating SDT with stress coping theories (Compas et al., 2001) highlights how the threat for relatedness from peer stressors could become key contributors to loneliness, social anxiety and depressive symptom onset and escalation over adolescence and into adulthood depending on peer stress coping responses (Zimmer-Gembeck, 2016). This makes it important to identify personal resources that can promote more positive and adaptive responses to peer stressful experiences, potentially helping to reduce socioemotional problems and their progression over time (Clear et al., 2020; Goodall et al., 2012; Lucas-Thompson et al., 2019; Roeser & Pinela, 2014; Weinstein et al., 2009). To test this in the present study, stress coping responses were measured here as fewer involuntary responses to stress, which captured the potency of emotional reactivity, as well as responses that tapped engagement (e.g., directly addressing problems and searching for solutions), and disengagement coping (e.g., the tendency to withdraw, avoid, ruminate, and suppress). In general, the findings provide support for the

Table 4

Standardized Direct, Indirect (via dispositional mindfulness) and Total Associations (effects) of the Alternative Model linking Loneliness, Social Anxiety, and Depression with Stress Coping Responses (N = 361).

Path	Direct Effect	Indirect Effect	Total Effect	Proportion Indirect
Loneliness→ Engagement coping	-.24**	-.03*	-.27**	11%
Social anxiety→ Engagement coping	.22**	.04	.26**	15%
Depression→ Engagement coping	.00	.03*	.03*	100%
Loneliness→ Disengagement coping	.00	.00	.00	–
Social anxiety→ Disengagement coping	.35**	.08*	.43**	19%
Depression→ Disengagement coping	.20**	.03*	.23**	13%
Loneliness→ Involuntary stress response	.00	.00	.00	–
Social anxiety→ Involuntary stress response	.40**	.10*	.50**	20%
Depression→ Involuntary stress response	.21**	.05*	.26**	19%

* $p < .05$. ** $p < .01$.

hypothesized model. Adolescents reporting more dispositional mindful awareness, description, non-judgement, and non-reactivity had fewer socioemotional problems, but these associations were almost always fully indirect working via peer stress coping responses. In addition, we tested an alternative model with the same cross-sectional data, which considered whether loneliness, social anxiety and depression are the instigators of peer stress coping responses via adolescents' dispositional mindfulness.

4.1. Principal findings

Our main model and hypotheses were tested by fitting a path model linking awareness, description, non-judgement, and non-reactivity facets of dispositional mindfulness directly and indirectly (via stress coping responses) with adolescents' socioemotional adjustment. Correlations revealed that adolescents higher on each facet of mindfulness reported less loneliness and fewer symptoms of social anxiety and depressive. These findings add to other research with adolescents that, for example, has reported associations of mindful attention and awareness with reductions in adolescent depressive symptoms over time (Calvete et al., 2019), and mindful nonreactivity with reductions in perceived stress and more positive affect over time (Galla et al., 2020). Also, the findings support emerging research identifying dispositional mindfulness as a correlate of more positive stress responding (Donald & Atkins, 2016; Finkelstein-Fox et al., 2019; Hicks et al., 2020; Keng et al., 2018; Weinstein et al., 2009; Zimmaro et al., 2016), and stress and coping responses as mediators explaining why mindfulness is associated with fewer mental health problems or more positive wellbeing (Finkelstein-Fox et al., 2019; Weinstein et al., 2009). However, the novel findings here were that (1) the associations extended to four facets of dispositional mindfulness, even when considered simultaneously in a single model, and (2) associations of mindfulness with adolescents' socioemotional problems were almost always fully indirect when stress coping responses were measured specific to the domain of peer stressors among adolescents. Only in two cases were there remaining, and small, direct associations of mindfulness with adolescents' symptoms; these included a small direct negative association of mindful non-judgement with social anxiety and a second of non-judgement with depressive symptoms. Thus, adolescents' involuntary emotional responses to common peer stressors and their voluntary coping responses to peer stressors, when taken together, fully account for any significant direct association of adolescents' dispositional mindfulness with loneliness, and almost fully account for any direct associations of adolescents' dispositional mindfulness with social anxiety and depressive symptoms.

It is notable that all facets of mindfulness had associations with adolescents' reports of their coping or involuntary stress responses, with associations of non-judgement and non-reactivity associated with all three stress coping composite measures (engagement coping, disengagement coping, and involuntary emotional responses to peer stress). In all cases where associations were significant, adolescents higher in mindfulness reported fewer involuntary negative emotional responses to peer stressors and less frequently endorsed reliance on disengagement forms of coping (e.g., avoidance, minimization). Furthermore, the strongest negative indirect associations between dispositional mindfulness and socioemotional problems were found for mindful non-judgement via both disengagement coping and involuntary emotional responses. The findings for engagement coping were mixed, however – two subscales of mindfulness were significantly associated with engagement coping in the final, trimmed path model but the association was negative for mindful non-judgement and positive for mindful non-reactivity. Although perplexing, this pattern of findings for mindful non-judgement could suggest that, because this facet strongly negatively correlates with involuntary stress responses, there is less need for coping in all forms – both engagement and disengagement. Overall, non-judgement stands out as a possible powerful feature of mindfulness that deserves additional attention in future research on interpersonal stress coping processes.

It is also notable that all measured coping composites were associated with adolescents' loneliness, social anxiety, and depression in the expected directions. Thus, even after accounting for the strong positive associations of involuntary negative interpersonal stress responses with socioemotional adjustment measures, adolescents who reported more engagement coping with peer stressors were less lonely, anxious and depressed. Conversely, those who reported more disengagement and involuntary stress coping responses were more lonely, anxious, and depressed. These findings add further support to the intersection of peer stress coping responses and adolescents' socioemotional adjustment (Seiffge-Krenke, 1995, 2011; Troop-Gordon et al., 2015; Zimmer-Gembeck, 2016).

Measurement of stress coping responses involved reporting the frequency of 57 ways of coping with peer stressors, which formed three stress coping composites. This could suggest that the stress domain of peer relationships is primary to study when examining the associations of stress coping responses with adolescents' socioemotional adjustment. However, we would argue that these findings

cannot be interpreted in this way. Instead, it is more likely that reports of coping with peer stressors would be reflective of both trait level and domain-specific stress reactivity and coping. Thus, reported responses to peer stressors are likely to generalize to adolescents' responses if queried about other stressors in their lives. We assume that these findings would generalize to studies focused on other stress domains, such as academics or family life.

Of the measures of socioemotional adjustment, loneliness was a novel outcome investigated here. The finding that adolescents reporting more of each of the four facets of dispositional mindfulness were also lower in loneliness extends past research that has had an almost exclusive focus on emotional health, rather than social health. This provides some evidence that mindfulness may facilitate better friendships and other relationships or, at least, adolescents higher in mindfulness experience the relationships that they do have as more fulfilling. A small set of studies has begun to consider mindfulness as related to adolescents' social relationships (Pratscher et al., 2018) and some commentaries and research have raised the issue of whether mindfulness is related to social relationships or care for others (e.g., Warren et al., 2020; Zimmer-Gembeck, 2020). Yet, to explain how and why mindfulness impacts on social beliefs, social perspective-taking, or social interactions among adolescents, there is more to consider. For example, one study of adolescents reported only a small association of dispositional mindfulness with compassion for others (Warren et al., 2020) and other researchers have differentiated interpersonal mindfulness from intrapersonal mindfulness in their studies of youth (Pratscher et al., 2018).

4.2. Practical implications of the findings

These findings build on the rising awareness that mindfulness can play a significant role in emotion regulation and stress coping responses (Dvořáková et al., 2019; Hambour et al., 2018; Hanley & Garland, 2014; Hicks, 2020), which supports its continued application as an effective approach for professionals to implement when working with adolescents and young adults across a variety of settings including in schools, the community, and individualised clinical work. Although the current study was correlational, when considered alongside other research (e.g., Baer, 2003; Ciarrochi et al., 2011; Dunning et al., 2019; Pratscher et al., 2018; Schonert-Reichl & Lawlor, 2010; Singh et al., 2007; Tan & Martin, 2016), the findings suggest that improving mindfulness can improve peer stress coping responses, which in turn could mitigate against socioemotional problems of loneliness, social anxiety and depressive symptoms among high school students.

Overall, mindfulness-based intervention studies, which now number in the 100s if not 1000s, show that mindfulness is a practice, a skill, or a way of being that can be nurtured with practice. Although less well-documented in the research, such improvements in mindfulness and associated stress coping responses are possible explanations for why these interventions have been found to benefit mental health (see Emerson et al., 2020; Goldberg et al., 2019; Parsons et al., 2017, for reviews). Although we focused on dispositional mindfulness in the present study, rather than on training or interventions to increase mindfulness, the findings suggest that, if they are effective at improving adolescents' mindfulness skills, mindfulness-based interventions or mindfulness-based stress reduction programs could also improve adolescents' peer stress coping responses. However, considerations of this approach must include understanding the potential of harmful correlates or outcomes of mindfulness that have been reported in some vulnerable populations (Baer et al., 2019) (Burrows, 2016), including adolescents who report high peer victimization (Clear et al., 2020). Also, there have been mixed findings to date for the effectiveness of mindful interventions with youth in schools and in other settings (Emerson et al., 2020; van Dam et al., 2018). Therefore, there are some reasons to remain cautious when considering applying these findings to teach mindfulness to all young people to reduce their negative involuntary reactions to stressors and improve their coping responses. Mindfulness-based interventions are probably not a good fit for all young people. In fact, it may be preferable to focus on the more proximal correlates of socioemotional problems by reducing peer stressors or directly focusing on decreasing involuntary stress responses (e.g., reducing emotionality when threatened and improving emotion recognition), teaching how to appraise stressors, and practising a range of coping responses.

4.3. Limitations and future research: alternative models, study design, and self-report

The findings and their application should be considered alongside the following three limitations of this study. First, we used cross-sectional data to test the hypotheses. Thus, we theorized that dispositional mindfulness is a positive individual resource adolescents can draw on to aid emotional reactivity, coping responses, and well-being. Yet, it remains possible, and even likely, that adolescents who report less loneliness and fewer symptoms of anxiety or depression have a better capacity for, or tend to report more, dispositional mindfulness. This was tested here in an alternative model and the fit of the alternative model was reasonable. However, the fit of the alternative was not as good as the hypothesized model, and some results were interesting or perplexing, such as only small indirect effects of symptoms on stress coping responses via mindfulness and sometimes counterintuitive associations (e.g., a positive total effect of social anxiety on engagement coping via mindfulness). Most research in the field of dispositional mindfulness has considered associations with symptoms and relationships to be unidirectional – from mindfulness to symptoms (Ciarrochi et al., 2011; Pratscher et al., 2018; Tan & Martin, 2016) and the findings of this study seem to support this view. Nonetheless, the potential for bidirectional associations between these constructs should be highlighted; there has been a striking lack of research exploring bidirectional relationships between dispositional mindfulness and symptoms of psychopathology and social competence or relationship development (see Gomez-Odrizola & Calvete, 2020).

Second, we investigated only one personal trait - dispositional mindfulness. Other traits may also be involved. For example, self-esteem, psychological need satisfaction, compassion for self and others, and attentional processes have been argued as possible mediators in these associations (Brown et al., 2007; Chang et al., 2018; Ciesla et al., 2012).

Finally, all measures were from adolescent self-report. Thus, social desirability and shared method variance could have impacted

results. Future research using multiple informants (e.g., parent or peer reports of mindfulness alongside mindful expression of behaviours) would add to our current knowledge significantly (Rickert et al., 2020; Warren et al., 2020).

5. Conclusion

Dispositional mindfulness has been described as a naturally occurring capacity for sustained attention to thoughts, feelings, and sensations in the present on a moment-by-moment basis, in a way that is characterised by curiosity, openness, non-judgement, and acceptance (Bishop et al., 2004). We found that adolescents who report more dispositional mindfulness, including facets of awareness, describing, non-judgement and non-reactivity, are lower in loneliness and report fewer symptoms of social anxiety and depression. Notably, the beneficial concurrent association of adolescents' dispositional mindfulness with fewer socioemotional problems were almost fully indirect, with our primary model supporting the view that the impact of mindfulness is channelled by stress coping responses in the domain of peer stress. We encourage additional research that integrates stress and coping theory (e.g., Compas et al., 2017; Lazarus & Folkman, 1984, 1987; Skinner & Zimmer-Gembeck, 2016; Taylor & Stanton, 2007) with theory and research on mindfulness (e.g., Dvořáková et al., 2019; Zimmer-Gembeck, 2021), to detect effective stress management and mental health promotion activities for young people.

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Declaration of competing interest

The authors have no conflicts of interest to declare.

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