The Relationship between Mindfulness and Resilience in Maltese Undergraduates: A study of Affective Well-being as a Potential Mediator

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Existing research suggests that mindfulness cultivates positive affect while reducing negative affect, and facilitates increases in resilience. More research is needed to examine the complex mechanisms by which emotional affect likely translates mindfulness into increased states of resilience in undergraduates. We hypothesised that the relationship between mindfulness and resilience in Maltese undergraduates is mediated by both positive and negative affect. Using a cross-sectional survey design and quantitative methodology based on mediation analysis, a questionnaire comprising the Kentucky Inventory of Mindfulness Skills, Positive and Negative Affect Schedule, and Brief Resilience Scale was circulated among 226 Maltese undergraduates. The results support previous research indicating significant relationships between mindfulness and both forms of emotional affect, as well as increased resilience. A path analysis revealed full mediation of the interaction between mindfulness and resilience by affective well-being. The indirect pathways through positive and negative affect to resilience, cumulatively accounted for a majority of the explanatory power attributable to mindfulness alone. Finally, an argument is presented in favour of mindfulness as a more formalised intervention within higher education settings, to support broader psychological wellness outcomes among Maltese undergraduates.

Keywords: Mindfulness, resilience, affective well-being, undergraduate students, path analysis

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Introduction

Mindfulness and resilience in undergraduate students

Over a decade ago, one in three Maltese university students already reported experiences of chronic tension and exhaustion (Cefai & Camilleri, 2009). Since then, there has been a significant increase observed in referrals to governmental mental health services from educational institutions in Malta (Calleja, 2020). Emerging from a broader postgraduate research project on mental health in Maltese higher education settings (Atkins, 2022), the present paper focuses on fostering a deeper understanding of the mechanism by which at least one potentially viable system-wide intervention may serve undergraduate students' mental health through increased resilience.

Declining states of mental health in undergraduate students are by no means exclusively a local phenomenon, with Henriques (2014) explicitly described a "college student mental health crisis" underway in the US. Tertiary students are typically exposed to a range of challenges such as educational transitions and development, identity formation, cultivating independence, and managing social demands. Increases in anxiety and depression are, to some degree, expected (Twenge, 2017), but such challenges lead to a risk of developing maladaptive coping strategies and stress- related issues (DeBerard et al., 2004). COVID-19 notwithstanding (Bonnici et al., 2020), however, the majority of university students evidently do manage to cope (Coleman & Hagell, 2007). Resilience thereby emerges as a key factor in explaining proclivities among university students to successfully negotiate transitory challenges to their overall mental health (Embury & Saklofske, 2014).

The biomedical view presupposes medication as an effective treatment for adverse mental health conditions (Henriques, 2014), but by prematurely pathologising negative states as illness, may be fostering an impoverished view of the complex thoughts and emotions that accompany transformative or otherwise significant life experiences (Henriques, 2017). Indeed, the acceptance of adverse conditions without pathologising them, can be considered at least one valid definition of psychological resilience. Kalisch and Kampa (2021) define resilience in terms of long-term maintenance of stable mental health, in spite of adversity like trauma or challenging transitions. According to resilience immunisation theory (Garmezy et al., 1984), resilience acts as a buffer against risk factors like trauma (Beshai & Parmar, 2019) and depression (Poole et al., 2017), thereby precipitating accelerated recovery from symptoms of acute stress (Tugade et al., 2004). Since emotional setbacks are a common feature of life experiences, the ability to adjust positively and maintain psychological well-being can be recognised as an important skill (Kalisch et al., 2017). However, Masten (2001) maintained that humans do not need special qualities to develop resilience.

The development of resilience in emerging adults has been strongly correlated with mindfulness (Barry et al., 2019; Beshai et al., 2018; Keye and Pidgeon, 2013; Norris & Hutchinson, 2018). Mindfulness is itself associated with greater appreciation in life, and is thought to act as a protective buffer against negative experiences and associated mental states (Gilbert & Christopher, 2010; Ramasubramanian, 2017; Reynolds et al., 2017). Bishop et al. (2004) define trait/dispositional mindfulness as the mental tendency to be mindful (Bishop et al., 2004). Dispositional mindfulness permits self-regulation of attention, with a focus on thoughts and feelings occurring in the present combined with, according to Brown & Ryan, 2003), an accepting and

curious perspective. Mindfulness is said to develop an awareness of internal thoughts and feelings that is non-discriminatory and accepting (Brown et al., 2007). Studies have linked mindfulness with decreased risk of burnout (Rees et al., 2016), by regulating affectivity to stress (Brown et al., 2007). Mindful meditation interventions have been associated with specific clinical benefits in health care settings, including reductions in stress, improvement of general quality of life (Norris & Hutchinson, 2018), and at least in the case of adolescents, decreases in risk of self-injury (Calvete et al., 2017).

Mindfulness, resilience, and the influence of positive and negative affect

Like resilience, the capacity to experience positive as opposed to distracting emotions can be considered a valuable skill. Affective well-being, in this sense, has also been associated with generally positive well-being (Diener, 1984; Wichers et al., 2010). More specifically, trait-like Positive Affect (PA) and Negative Affect (NA) are known to exhibit a degree of consistency over time, measured in terms of recent experience of, or emotional predisposition towards, positive and negative emotions (Watson & Clark, 1992). Since emotions are known to play an important role in academic success among undergraduate students, PA has been linked to improved personal resourcefulness, creativity, and problem-solving skills (Fredrickson et al., 2008). The relationship between PA, NA, and the nature of experience of the present moment (Pressman & Cohen, 2005), invokes a broader psychological framework that includes the ideas and principles of mindfulness.

Like mindfulness, PA has been associated with increased resilience (Wichers et al., 2010), implying a degree of interplay among the two explanatory factors. Bishop et al. (2004) propose that mindfulness practice promotes non-discriminatory awareness of thoughts and feelings, while curbing reactive modes of thinking to affect reduced emotional distress. It is also thought to limit natural variations in emotional state (Kabat-Zinn, 1994). Experienced practitioners of mindful meditation able to attend to the present moment, have demonstrated heightened capacity for experiencing positive emotions (Du et al., 2019; Quoidbach et al., 2015). A positive feedback loop is thereby initiated, as such emotions in turn help improve awareness of the present moment (Garland et al., 2015). Du et al. (2019) similarly argued in favour of a self-perpetuating cognitive-emotional cycle, serving to enhance positive affective well-being. Over and above deeper and more frequent day-to-day engagement with positive emotions (Fredrickson et al., 2008), adaptive engagement with stress-induced experiences through mindfulness ultimately results in a reduction of negative emotions (Himes et al., 2020).

Rutten et al. (2013) further links these emotional effects more specifically to resilience, and the behavioural as well as psychological changes associated with it. Resilient people tend to be more curious, open to experiences, and optimistic. According to Block and Kremen (1996), a reciprocal causality between PA and resilience thus emerges, (leading to, for instance, use of humour as a coping mechanism and means of fostering positive emotions (Masten, 2001). Fredrickson's (1998) "Broaden-and-Build" theory predicts that positive emotions expand thought-action repertoires, aid understanding of events within a broader context, and lower resonance of negative experiences. Fredrickson (2004) later argued that PA further builds resilience as an enduring personal resource, by broadening attention and facilitating cognitive flexibility, creativity and the ability to cope.

The interplay of mindfulness, affect and resilience

While studies have generally shown a clear relationship between mindfulness and resilience (Polizzi et al., 2018), others reveal a degree of overlap between mindfulness and the constructs of PA and NA. In a study by Polizzi et al. (2018), enhanced emotional regulation (increased PA and decreased NA) along with resilience, accounted for 50% of the variation in mindfulness in undergraduate psychology students. Fredrickson et al. (2003) similarly found that the relationship between psychological resilience and capacity to rebound from adversity in students was mediated by PA. So, given our primary interest in increased resilience through mindfulness, we sought to understand in greater depth, the specific contribution of affective well-being, namely how important is affect, and in what way, exactly, does it influence those seeking to improve their resilience through mindful practice.

Ramasubramanian (2017) showed that mindfulness and affective well-being both predict resilience in college students. In short, mindfulness enhances PA (while reducing NA), which in turn develops resilience. However, Finkelstein-Fox et al. (2019) found that stress appraisal accounted for a significant proportion (19%) of the inverse correlation between mindfulness and NA, leaving PA unaffected. In other words, capacity for acceptance facilitated the influence of mindfulness on positive, but not negative, emotions. They further showed that self-blame influenced the effect of mindfulness on NA, but once again, not on PA. These findings suggest, as previously posited by Watson (1988), that distinctive pathways exist surrounding PA and NA in the management of stress and adverse psychological states. It follows, therefore, that the relationship between mindfulness and resilience likely operates across alternative and distinctive pathways, if PA and NA are taken into account.

Ultimately, we aim to build on the postgraduate work of Atkins (2022) on mental health in Maltese higher education settings, by empowering undergraduate students to engage in effective strategies to enhance their resilience and consequently, their academic performance and overall psychological well-being. Given the known relationship between mindfulness and resilience, and the existence of an array of extraneous psychological constructs associated with both factors, we hypothesised that PA and NA, specifically, would emerge as significant mediating factors. We note a dearth in the literature surrounding affective well-being as a mediator in the relationship between mindfulness and resilience. As Watford and Stafford (2015) noted, a sound understanding of the mechanisms governing this relationship remain lacking. More specifically, we hypothesized, firstly that the relationship between mindfulness and resilience is mediated by affective well-being; and secondly that positive and negative affect differ in their degrees of influence on mindfulness and resilience.

Methodology

Data collection

The study was planned according to the British Psychological Society (BPS) Code of Ethics and Conduct (2018), BPS Ethics Guidelines for Internet-Mediated Research (2017) and the Data Protection Act (2018) guidelines. Following ethical review and approval by De Montfort University, Faculty of Health and Life

Sciences Research Ethics Committee, as well as clearance by the Faculty of Social Well-Being of the University of Malta and MCAST Research Ethics Committee, a cross-sectional online questionnaire-based study among a mixed sample of Maltese undergraduate students was conducted to address the main research hypotheses. Four main variables were operationalised and measured using the online questionnaire, using existing validated scales, as shown in Table I. These were the Kentucky Inventory of Mindfulness Skills (KIMS), (Baer et al., 2006), the Positive Affect and Negative Affect Schedule (PANAS) for PA and NA (Watson, 1988), and the Brief Resilience Scale (BRS) (Smith et al., 2008).

Table I. Main variables and their measurement

	Variable	Scale	Measurement	Items	Subdomains/Dimensions	Cronbach's Alpha
Y	Resilience	BRS	5-point Likert scale	6	Bouncing Back from Stressful events	.79
X	Mindfulness	KIMS	5-point Likert scale	39	Observing, Describing, Act with Awareness, Accept without Judgement	.81
$m1$	Positive Affect	PANAS	5-point Likert scale	10	Positive Affect	.85
$m2$	Negative Affect	PANAS	5-point Likert scale	10	Negative Affect	.87
Note. Total BRS scores can vary between 6 and 30, KIMS scores from 39 to 195, and PA/NA each from 10 to 50.						

The online survey also comprised an initial section of demographic information, including gender (female/male), age (years), educational institution (Malta College of Arts, Science & Technology [MCAST] or University of Malta [UM]), and year of study (1st, 2nd, or 3rd year). The demographic questions, BRS, KIMS and PANAS (described in Table I) constituted a total of 69 items, and were transposed into an anonymous online questionnaire accessible via hyperlink, using the *Qualtrics* web-based platform. The selection criteria were set to include all Maltese full-time higher education (levels 5 and 6 on the European Qualifications Framework) students, aged 18 years or over, attending either MCAST or UM (the two main publicly funded higher educational institutions on the Maltese islands).

The *G*Power* calculator for F tests, specifically multiple linear regression, recommended a total sample size of $N = 119$, for an effect size of .15 (moderate) at 95% power. A non-probability convenience/opportunity sampling strategy was used by circulating an email with a link to the questionnaire among a total of 8,281 students (via the registrars of UM and MCAST). Throughout April and May of 2021, a total of 401 submissions were returned, however, 175 responses had to be eventually excluded due to missing values. This resulted in a final sample size of $N = 226$ Maltese undergraduate students. The participants were aged between 18 and 47 years ($M = 21.55$, $SD = 4.49$, $IQR = 3$), of whom 70.4% ($n = 159$) identified as female, and 29.6% ($n = 67$) as male. Of the total number of respondents, 35.8% ($n = 81$) were enrolled at MCAST,

and 64.2% ($n = 145$) at UM. 35.8% ($n = 81$) were in their first year of study, 27% ($n = 61$) in their second, and 37.2% ($n = 84$) in their third and final year. Participation was entirely voluntary and participants were not remunerated for completing the online questionnaire.

Data analysis

All data were entered into *R Studio (v2022.07.2)* open-source statistical analysis software. The *mediate()* function within the *psych* package was used to test the main study hypotheses at the 95% confidence level. Following an evaluation of the basic descriptive and inferential statistics, the analysis proceeded mainly according to the logic of mediation proposed by Preacher and Hayes (2004). The approach seeks to estimate the effect of a one or more mediators (*m*) on the relationship between an independent (*x*) and dependent (*y*) variable. Mediation analysis is correlational in nature, and cannot, on its own, imply causality (Rockwood & Hayes, 2020). It is instead intended to provide evidence for mediation pathways using significance and effect size values (Shrout & Bolger, 2002). According to the procedures described by Preacher and Hayes (2004) the study was based on what could be defined as "Model 4" (with multiple mediators). In parallel structure, PA and NA were entered simultaneously in the model. Figure 1 shows the main proposed mediation model guiding the study as a conceptual path diagram.
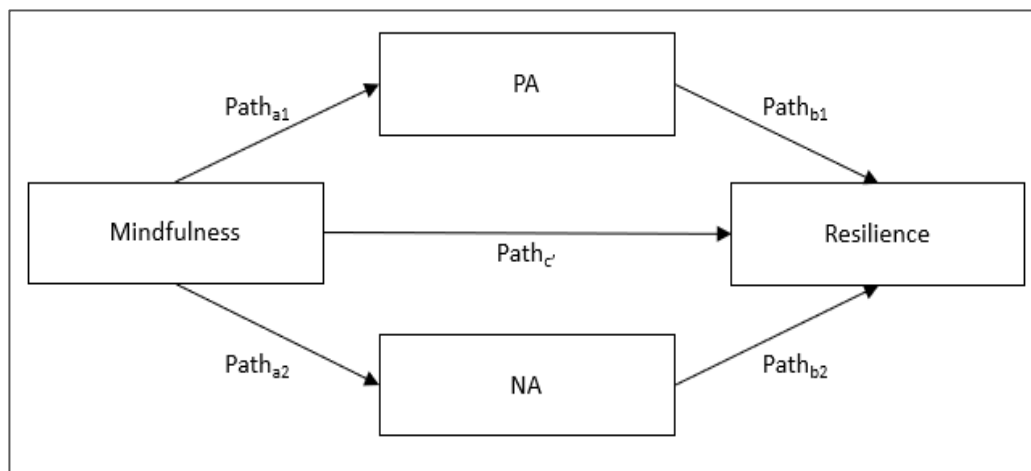

Figure 1. Path diagram for the relationship between mindfulness and resilience, mediated by positive and negative affectivity

Mediation analysis generally seeks to estimate the modeled relationships via a set of direct and indirect pathways. The middle pathway is *c'*, which is the direct effect of *x* on *y* while taking all other factors ($m_1 + m_2 + \ldots + m_n$) in the model into account. In the present study, *x* was mindfulness, m_1 was PA, m_2 was NA, and *y* was resilience. Estimating *c'* means quantifying the relationship between mindfulness and resilience, while taking the influence of both PA and NA into account. Path *c* (as opposed to *c'*), is simply the effect of *x* on *y*, without *m* (or any other additional *m* variables), or in our case, the effect of mindfulness on resilience, with no other variables taken into account. The pathways illustrated above were derived using the regression models

as defined below in Table II.

Table II. Regression models used to derive mediation model pathways

Regression Model	Regression Formula	Path
PA ← Mindfulness	$y = b_0 + b_1x + e$	$b_1 = Path_{a1}$
NA ← Mindfulness	$y = b_0 + b_1x + e$	$b_1 = Path_{a2}$
Resilience ← Mindfulness	$y = b_0 + b_1x + e$	$b_1 = Path_c$
Resilience ← Mindfulness + PA + NA	$y = b_0 + b_1x_1 + b_2m_1 + b_3m_2 + e$	$b_1 = Path_c'$ $b_2 = Path_{b1}$ $b_3 = Path_{b2}$

According to Preacher and Hayes (2004), the product of paths *a1* and *b1* represents the total indirect effect of mindfulness on resilience through PA, while the product of paths *a2* and *b2* represents the total indirect effect of mindfulness on resilience through NA. One of the main goals of mediation analysis is to determine if these indirect pathways actually constitute statistically significant relationships. These can then be compared to the main direct effects both with and without the mediating factors. To test the significance of individual indirect mediator pathways, bootstrapped 95% confidence intervals were constructed around the estimated effects using *mediate()*.

The main research hypotheses, therefore, could be more clearly formulated as:

H_{1a}: The indirect effect through PA is significant

H_0: $Path_{a1} \cdot Path_{b1} = 0$

H_{1a}: $Path_{a1} \cdot Path_{b1} \neq 0$

H_{1b}: The indirect effect through NA is significant

H_0: $Path_{a2} \cdot Path_{b2} = 0$

H_{1b}: $Path_{a2} \cdot Path_{b2} \neq 0$

If either of the above null hypotheses are rejected, then the evidence supports *Research Hypothesis 1*. And finally, if the following null hypothesis is rejected, then the evidence a l s o supports *Research Hypothesis 2*:

H_{2a}: The indirect effects through PA and NA are not equal

H_0: $Path_{a1} \cdot Path_{b1} = Path_{a2} \cdot Path_{b2}$

H_{2a}: $Path_{a1} \cdot Path_{b1} \neq Path_{a2} \cdot Path_{b2}$

Results

Given that the KIMS measures mindfulness across four subdomains, the descriptive statistics in each dimension are presented first in Table III.

Table III. Descriptive statistics for the four subdomains of KIMS

Factor	Items n	Mean	(Normalised)	SD	SE	95% CI
Observing	12	37.96	(3.16)	7.46	0.50	36.96, 38.93
Describing	8	24.14	(3.02)	6.11	0.41	23.35, 24.96
Acting with Awareness	10	26.42	(2.64)	6.83	0.45	25.52, 27.31
Accepting without Judgement	9	24.07	(2.67)	7.08	0.47	23.14, 25.00

Note. The "Normalised" column (*Mean* divided by Items *n*), is included for reference only, given that the scoring for the KIMS is based on summation only.

‘Observing’ was the most prolific domain according to the KIMS data. This may be of interest to researchers interested more specifically in mindfulness among Maltese undergraduates. However, for the purpose of our analysis, the total KIMS score across *all* domains was used as an overall measure of mindfulness. The descriptive statistics for this final score, along with the other three main variables (PA, NA and R) are shown in Table IV.

Table IV. Descriptive statistics for the four main variables

Factor	Mean	(Normalised)	SD	SE	95% CI	Skewness (SE)	Kurtosis (SE)
Mindfulness	112.60	(2.88)	16.75	1.11	110.40, 114.79	0.15 (0.16)	0.82 (0.32)
PA	30.79	(3.79)	7.24	0.48	29.84, 31.74	-0.01 (0.16)	-0.27 (0.32)
NA	29.70	(2.97)	8.35	0.56	28.61, 30.80	-0.13 (0.16)	-0.50 (0.32)
Resilience	17.22	(2.87)	4.33	0.29	16.65, 17.79	0.07 (0.16)	-0.06 (0.32)

Note. As in Table III, normalised values are presented for reference only.

For the purpose multiple regression modelling as a basis for the mediation analysis, a visual inspection of the histograms confirmed that the data were approximately normally distributed (Figure 2).
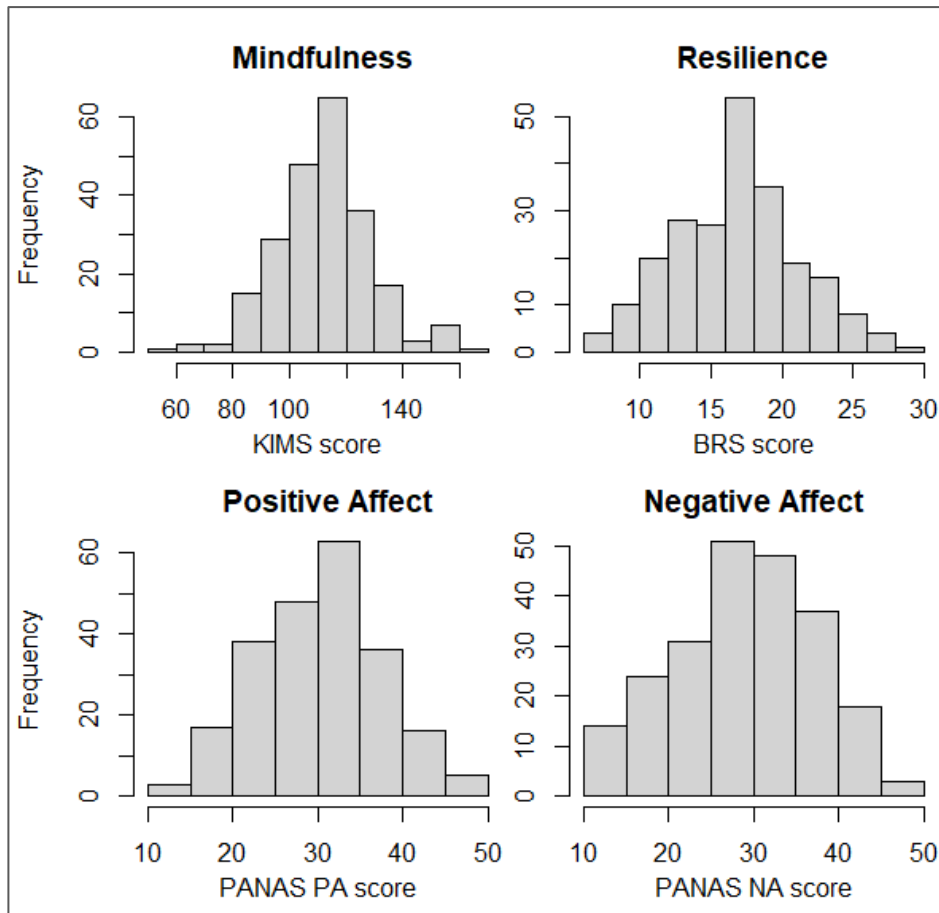
Figure 2. Matrix of histograms for the four main variables

To test for multicollinearity, as well as to begin exploring the main effects operating in the data, a correlation matrix comprising the four main variables was constructed (Table V).

Table V. Standard correlation matrix for the four main variables

	Mindfulness	PA	NA
PA	$r = .52, p < .001$		
NA	$r = -.49, p < .001$	$r = -.26, p < .001$	
Resilience	$r = .43, p < .001$	$r = .43, p < .001$	$r = -.48, p < .001$
Note: All relationships were significant at the 99.9% confidence level.			

The significant correlations raised some concerns about multicollinearity. An inspection of the variable inflation factors, however, taken as $VIF = 1 / (1 - R^2)$, yielded values under the common threshold of 5 for all of mindfulness ($R^2 = .41$, $VIF = 1.69$), PA ($R^2 = .27$, $VIF = 1.37$), and NA ($R^2 = .24$, $VIF = 1.32$). To address the linear relationship assumption for mediation analysis, we also visually inspected scatter plots for each relationship (Figure 3).
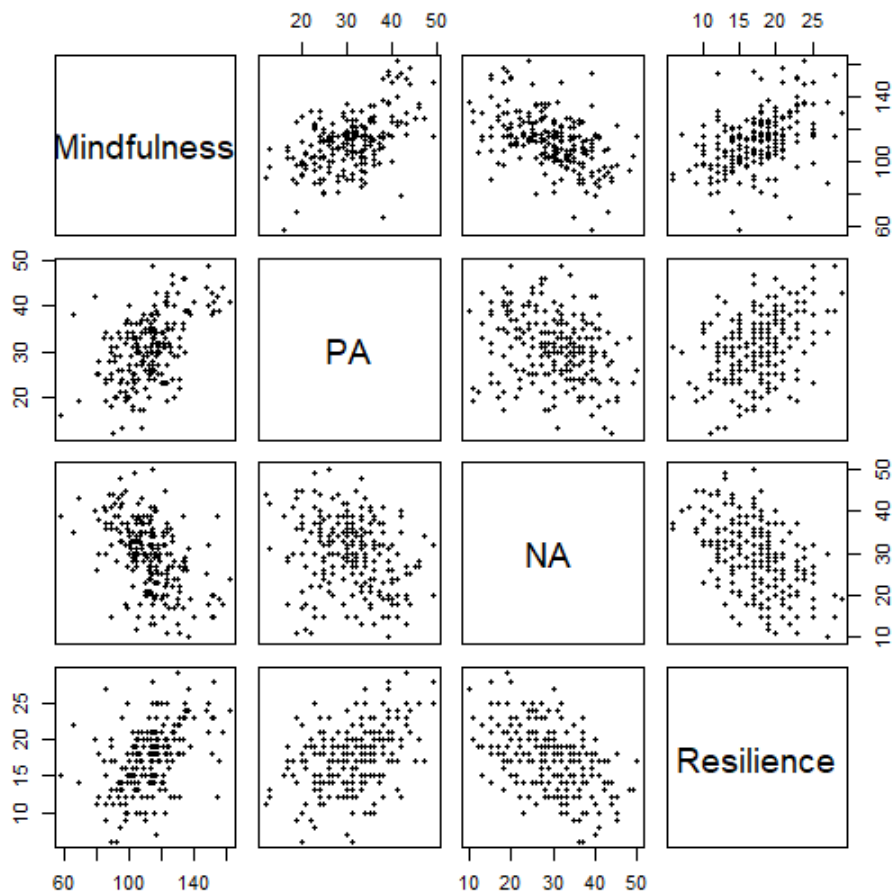
Figure 3. Matrix of scatter plots for relationships between the four main variables.

The scatter plots supported the linearity assumption. Looking at the relationships themselves in more detail, it was clear that correlations reported in the literature between the main constructs of interest, were evident in the data. Most notably, the main (unadjusted) effect of mindfulness on resilience was both strong and statistically significant ($r = .43$, $p < .001$), supporting the general assertions from previous studies (Barry et al., 2019; Beshai et al., 2018; Keye & Pidgeon, 2013; Norris & Hutchinson, 2018). Furthermore, Rees et al. (2016) showed that mindfulness predicts the ability to experience more positive emotions and report fewer negative ones. Our findings also support this claim, via moderately strong and statistically significant relationships between mindfulness and PA ($r = .52$, $p < .001$), as well as NA ($r = -.49$, $p = <.001$).

It should be noted, however, that these are main effects, and do not allow covariance among the sets of factors needed to test mediation. Also, they do not contain any control for extraneous variables. We therefore checked the associations of each of the additional variables measured as controls (gender, age, institutional affiliation, and year of study), shown in Table VI.

Table VI. Correlation coefficients for control variables on mindfulness, PA, NA and resilience

	Mindfulness	**PA**	**NA**	**Resilience**
Gender	$r = -.13, p = .06$	$r = -.20, p < .01**$	$r = .11, p = .10$	$r = -.11, p = .11$
Age	$r = .20, p < .01**$	$r = .16, p = .02*$	$r = -.07, p = .29$	$r = .12, p = .07$
Institution	$r = -.03, p = .66$	$r = -.11, p = .12$	$r = .19, p < .01**$	$r = -.10, p = .15$
Year of study	$r = .10, p = .12$	$r = -.02, p = .78$	$r = .10, p = .15$	$r = .04, p = .59$
Note: * denotes significance at the 95% confidence level, ** at 99%, and *** at 99.9%.				

It was interesting to note that mindfulness ($r = .20, p < .01$), as well as PA ($r = .16, p = .02$), tended to increase with age. PA also varied across gender ($r = -.20, p < .01$), with females exhibiting a significant average reduction in PA. Furthermore, there appeared to be a relationship between institutional affiliation and NA ($r = .19, p < .01$). More specifically, increases in average NA were significantly associated with attendance at UM, as opposed to MCAST. Although the effect sizes are relatively small, these findings are interesting and worthy of further study. The factors were measured, however, primarily to introduce an element of control for the mediation analysis. Given that significant relationships were evident, we decided to include gender, age and institution as control variables in the main mediation model. Confident that the data satisfied the primary assumptions for mediation analysis, and having nominating appropriate covariates, we proceeded to run the necessary regression analyses. The results are therefore presented as evidence for mediation, *while controlling for gender, age and institutional affiliation*. First, path *c* was estimated by regressing resilience on mindfulness as the main independent variable, together with gender, age, and institution.

Table VII. Model output on resilience for path c (no mediators), including control variables

Factor	**B**	**SE**	**t**	**p**	**95% CI**
(Constant)	5.30	2.17	2.44	.02	1.02, 9.58
Mindfulness	0.11	0.02	6.70	<.001	0.08, 0.14
Gender	-0.39	0.58	-0.66	.51	-1.54, 0.76
Age	0.02	0.06	0.40	.69	-0.09, 0.14
Institution	-0.69	0.55	-1.24	.22	-1.77, 0.40
Note: Model $R^2 = .19$ (Adjusted = .18), $F = 13.21$, p < .001.					

The analysis supports previous research (Finkelstein-Fox et al., 2019; Himes et al., 2020; Polizzi et al., 2018; Ramasubramanian, 2017; Wichers et al., 2010), that mindfulness has a statistically significant effect on resilience ($b = 0.11, p < .001$), and even while holding gender, age and institutional affiliation constant, it explained 19% of the variation in resilience. To infer mediation, the change in size and significance of this effect was noted when including the mediators into the regression model. Table VIII shows the extended model with PA and NA included.

Table VIII. Full model output on resilience for paths b1, b2, and c', including control variables

Factor	B	SE	t	p	95% CI
(Constant)	13.87	2.65	5.20	<.001	8.61, 19.12
Mindfulness	0.03	0.02	1.37	.17	-0.01, 0.06
PA	0.17	0.04	4.32	<.001	0.09, 0.25
NA	-0.19	0.03	-5.56	<.001	-0.25, -0.12
Gender	0.04	0.53	0.08	.94	-1.01, 1.10
Age	0.03	0.05	0.61	.54	-0.07, 0.14
Institution	0.05	0.51	0.11	.92	-0.96, 1.07
Note: Model R^2 = .34 (Adjusted = .34), F = 18.78, p < .001.					

The size and significance of the effect of mindfulness on resilience was no longer significant in the above model, suggesting full mediation by affective well-being (PA + NA). In other words, when taking the effects of PA and NA into account, mindfulness no longer had a statistically significant influence on resilience. This suggests that the effects of mindfulness on resilience, therefore, operate primarily indirectly, *through* emotional affect. To estimate the indirect effects of mindfulness through PA and NA respectively, Tables IX and X show the regression outputs to determine paths *a1* and *a2* of the mediation model (mindfulness to PA, and mindfulness to NA).

Table IX. Model output on PA for path a1, including control variables

Factor	b	SE	t	p	95% CI
(Constant)	7.72	3.40	2.27	.02	1.02, 14.42
Mindfulness	0.21	0.03	8.46	<.001	0.16, 0.26
Gender	-1.93	0.91	-2.21	.04	-3.73, -0.13
Age	0.05	0.09	0.58	.56	-0.13, 0.24
Institution	-1.07	0.86	-1.24	.22	-2.78, 0.63
Note: Model R^2 = .29 (Adjusted = .28), F = 22.70, p < .001.					

Table X. Model output on NA for path a2, including control variables

Factor	b	SE	t	p	95% CI
(Constant)	53.00	3.96	13.37	<.001	45.19, 60.81
Mindfulness	-0.25	0.03	-8.41	<.001	-0.30, -0.19
Gender	0.56	1.06	0.53	.60	-1.54, 2.66
Age	0.10	0.11	0.91	.37	-0.12, 0.32
Institution	3.00	1.01	2.98	<.01	1.02, 4.99
Note. Model R^2 = .28 (Adjusted = .26), F = 20.98, p < .001.					

The results support previous literature on the important and statistically significant links between

mindfulness and both forms of emotional affect (Himes et al., 2020; Quoidbach et al., 2015). With reference to negative psychological states, the inverse relationships between mindfulness and NA (b = -0.25, p < .001), as well as between NA and resilience (b = -0.19, p < .001), support previous research findings on the adverse psychological effects of NA (Wichers et al., 2010). According to the complete set of regression outputs, indirect effects for PA and NA could be calculated as $Path_{a1} \cdot Path_{b1}$ = (0.213)*(0.169) = 0.036, and $Path_{a2} \cdot Path_{b2}$ = (-0.247)*(-0.186) = 0.046. The final mediation model including path coefficients and control variables is shown in Figure 4.
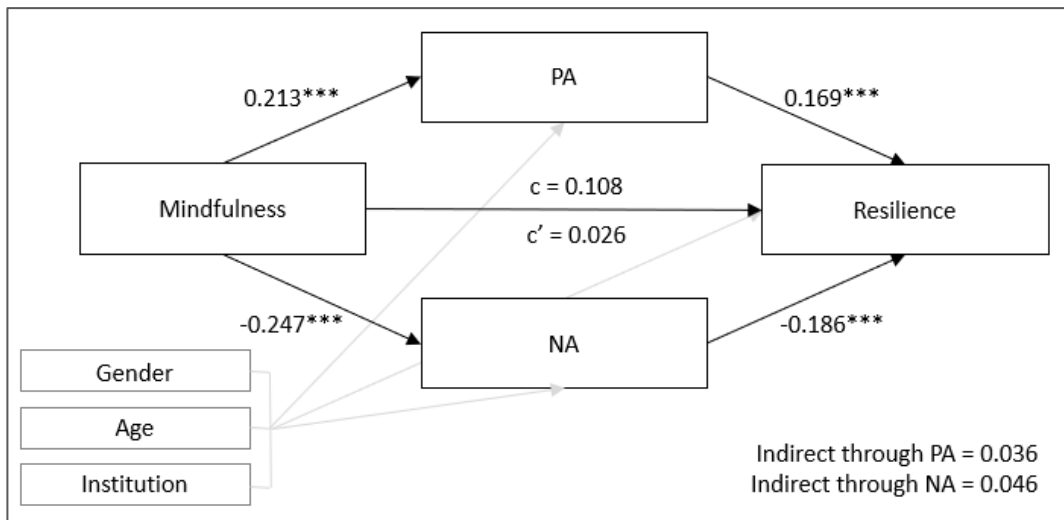

Figure 4. Specified mediation mode with path coefficients

The path coefficients show the sum of indirect effects accounting for 76% of the initial total effect of mindfulness alone on resilience. Following specification of the model, 95% confidence intervals were finally constructed around the beta estimates using the bootstrapping method, as shown in Table XI, with a view to testing the main hypotheses driving the study.

Table XI. Output of bootstrapping for indirect effects of PA and NA

Indirect effect	b	SE	95% CI
Through PA	0.04	0.01	0.02, 0.06
Through NA	0.05	0.01	0.03, 0.07
Note. Values were derived using the mediate() function in R Studio (psych package).			

Since neither confidence interval included 0, the null hypotheses for H_{1a} and H_{1b} that the indirect effects for PA and NA were not significant, could be rejected at the 95% confidence level. The evidence supports *Research Hypothesis 1*, that PA and NA mediate the relationship between mindfulness and resilience. Since the direct effect (c') was no longer significant when accounting for the mediators, the findings suggest full mediation of the relationship between mindfulness and resilience, by affective well-being. Furthermore, with regard to *Hypothesis 2*, given that the confidence intervals for PA and NA do not overlap, the H_0 that

$Path_{a1} \cdot Path_{b1} = Path_{a2} \cdot Path_{b2}$ could not be rejected. In other words, PA and NA exerted a similar, albeit inverse, strength of influence on the relationship between mindfulness and resilience.

Discussion

Our mediation model was based fundamentally on the capacity of mindfulness to increase PA, decrease NA, and ultimately increase resilience (Du et al., 2019; Ramasubramanian, 2017). Our findings lend credence to the idea that not only do PA and NA independently predict resilience, but they also account for a majority of the effects previously attributed to mindfulness alone. In other words, after partitioning the effects of PA and NA, the construct of mindfulness alone no longer accounted for significant variations in resilience in our sample of Maltese undergraduate students. Indeed, 76% of the initial influence of mindfulness on resilience appeared to be channeled through the mediating constructs of PA and NA. We propose that these results more broadly support the central tenets of Frederickson's (1998; et al., 2008) "Broaden-and-Build" theory. In other words, the ability to give attention to the present moment, as a function of capacity for mindfulness practice, ultimately reinforces students' experience of positive emotions (Garland et al., 2015; Quoidbach et al., 2015). This, in turn, effectively broadens attention triggers, and drives an upward, self-perpetuating, positive cognitive-emotional cycle.

Undergraduate students who are better equipped to meet the challenges specific to their stage of life are, by definition, more resilient, and interventions to this effect should focus on developing the ability to experience more positive emotions, and be less reactive to negative ones. Mindfulness appears to provide the skills needed to approach experiences in a more positive and rational manner (Garland et al., 2011). Higher levels of acceptance likely improve one's ability to experience positivity, even during times of heightened perceived stress (Brown et al., 2007). Our findings also support the broadening of awareness commonly theorised to result from effective mindfulness practice (Du et al., 2019), which leads to more positive appraisals of experiences, and more positive emotions overall. These can have a buffering effect against common stressors, and essentially build greater capacity for coping with major crises (Fredrickson et al., 2008).

Limitations

It should be acknowledged that participants in this study were not randomly selected. Survey respondents volunteered to participate based on information about the study via email, and therefore likely had some prior knowledge of mindfulness, or at least some interest in their own psychological wellness. This may lead to a bias in favour of the general efficacy of psychological interventions. There was also a relatively high proportion of erroneous and missing data points, which was addressed using a listwise deletion strategy. We opted for full removal of cases containing missing data rather than imputation to preserve the validity and empirical grounding of the data, since the final remaining tally of $N = 226$ participants was still well above the *G*Power* calculator suggested sample size of $N = 119$.

The cross-sectional design of the study also made it difficult to infer causal ordering of the observed relationships. We endeavoured to compensate by carefully considering the literature and underlying theory

when formulating the main research hypotheses driving the study. It should also be acknowledged that alternative theoretically interesting psychological constructs exist, and were necessarily omitted. Future studies might investigate the contribution of PA and NA in more controlled conditions, perhaps making use of randomised controlled trials to compensate for the convenience/opportunity sampling approach common in survey studies. Further research might also investigate local Maltese settings in some more detail, possibly exploring how socio-historical and cultural factors influence PA and NA in the local context. Apparent differences in psychological states across genders and institutional affiliation in Malta shown in our findings, also represent enticing opportunities for further study.

Conclusion

The results of the present study ultimately promote the use of mindfulness practice in undergraduate students, and show that it has promising applications in the development of resilience. Considering its benefits, low cost, and relative ease of implementation (Barry et al., 2019), mindfulness interventions may have a place as more formalised interventions in Maltese higher education settings (Vidic & Cherup (2019), perhaps even leading to a future reduction in government mental health service referrals (Calleja, 2020).

Conflict of interest statement

The authors have no conflicts of interest to disclose.

References

Atkins, E. (2022). *The mediating effect of affective wellbeing in the relationship between mindfulness and resilience in undergraduate students*. Master's Dissertation. De Montford University, UK.

Baer, R. A., Smith, G., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*(1), 27-45. http://doi/10.1177/1073191105283504.

Barry, K., Woods, M., Martin, A., Stirling, C., & Warnecke, E. (2019). A randomized controlled trial of the effects of mindfulness practice on doctoral candidate psychological status. *Journal of American College Health, 67*(4), 299-307. http://doi.org/10.1080/07448481.2018.1515760.

Beshai, S., & Parmar, P. (2019). Trait mindfulness may buffer against the deleterious effects of childhood abuse in recurrent depression: A retrospective exploratory study. *Clinical Psychologist, 23*(1), 26–36. https://doi.org/10.1111/cp.12147.

Beshai, S., Prentice, J., & Huang, V. (2018). Building blocks of emotional flexibility: Trait mindfulness and self-compassion are associated with positive and negative mood shifts. *Mindfulness, 9*(3), 939–948. https://doi.org/10.1007/s12671-017-0833-8.

Block, J., & Kremen, A. (1996). IQ and ego-resiliency: Conceptual and empirical connections and separateness. *Journal of Personality and Social Psychology, 70*(2), 349–361. https://doi.org/10.1037/0022-3514.70.2.349.

Bishop, S., Lau, M., Shapiro, S., Carlson, L., Anderson, N., Carmody, J., Segal, Z. V., Abbey, S., Speca, M., Velting, D., & Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*(3), 230–241. https://doi.org/10.1093/clipsy.bph077.

Bonnici, J., Clark, M., & Azzoppardi, A. (2020). Fear of COVID-19 and its Impact on Maltese University Students' Wellbeing and Substance Use. *Malta Journal of Health Sciences.* https://www.um.edu.mt/library/oar/handle/123456789/66998.

Brown, K., & Ryan, R. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. Journal of Personality and Social Psychology, 84, 822-848. https://doi.org/10.1037/0022-3514.84.4.822.

Brown, K., Ryan, R., & Creswell, J. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry, 18*, 211–237. http://doi.org/10.1080/10478400701598298.

Calleja, L. (2020). Adolescents' mental health needs are not being met, expert warns. Maltatoday. Retrieved from https://www.maltatoday.com.mt/lifestyle/health/99843/adolescents_mental_health_needs_are_not_being_met_expert_warns_#.X-sqDhZ7lPY.

Calvete, E., Orue, I., & Sampedro, A. (2017). Does the acting with awareness trait of mindfulness buffer the predictive association between stressors and psychological symptoms in adolescents? *Personality and Individual Differences, 105*, 158–163. https://doi.org/10.1016/j.paid.2016.09.055.

Cefai, C., & Camilleri, L. (2009). Healthy students healthy lives: The health of Maltese university students. Malta: University of Malta. *European Centre for Educational Resilience and Socio-Emotional Health, 224*. https://www.um.edu.mt/library/oar/handle/123456789/18935.

Coleman, J., & Hagell. A. (2007). *Adolescence, risk and resilience: Against the odds*. John Wiley and Sons, Ltd.

Data Protection Act. (2018). *Chapter 586 of the Laws of Malta*. https://legislation.mt/eli/cap/586/eng/pdf

DeBerard, M. S., Spielmans, G. I., & Julka, D. L. (2004). Predictors of academic achievement and retention among college freshmen: A longitudinal study. *College Student Journal, 38*, 66–80. https://doi.org/10.12691/education-2-6-13.

Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95*(3), 542–575. https://doi.org/10.1037/0033-2909.95.3.542.

Du, J., An, Y., Ding, X., Zhang, Q., & Xu, W. (2019). State mindfulness and positive emotions in daily life: An upward spiral process. *Personality and Individual Differences, 141*, 57-61. https://doi.org/10.1016/j.paid.2018.11.037.

Embury, P., & Saklofske, H. (2014). Resilience interventions for youth in diverse populations. Springer.

Finkelstein-Fox, L., Park, C., & Riley, K. (2019). Mindfulness' effects on stress, coping, and mood: A daily diary goodness-of-fit study. *Emotion, 19*(6), 1002–1013. https://doi.org/10.1037/emo0000495

Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology, 2*, 300–319. https://doi.org/10.1037/1089-2680.2.3.300.

Fredrickson, B. L. (2004). The broaden-and-build theory of positive emotions. *Philosophical Transactions of the Royal Society B: Biological Sciences, 359*(1449), 1367–1377. https://doi.org/10.1098%2Frstb.2004.1512.

Fredrickson, B. L., Cohn, M. A., Coffey, K. A., Pek, J., & Finkel, S. M. (2008). Open hearts build lives: Positive emotions, induced through loving-kindness meditation, build consequential personal resources. *Journal of Personality and Social Psychology, 95*, 1045–1062. https://doi.org/10.1037/1089-2680.2.3.300.

Garland, E. L., Gaylord, S. A., & Fredrickson, B. L. (2011). Positive reappraisal mediates the stress-reductive effects of mindfulness: An upward spiral process. *Mindfulness, 2,* 59–67. https://doi.org/10.1007/s12671-011-0043-8.

Garland, E. L., Farb, N., Goldin, P., & Fredrickson, B. L. (2015). Mindfulness broadens awareness and builds eudaimonic meaning at the attention- appraisal-emotion interface: a process model of mindful positive emotion regulation. *Psychological Inquiry, 26*(4), 293–314. https://doi.org/10.1080/1047840X.2015.1064294.

Garmezy, N., Masten, A., & Tellegen, A. (1984). The study of stress and competence in children: A building block for developmental psychopathology. *Child Development, 55*(1), 97-111. https://doi.org/10.2307/1129837.

Gilbert, B., & Christopher, M. (2010). Mindfulness-based attention as a moderator of the relationship between depressive affect and negative cognitions. *Cognitive Therapy and Research, 34*, 514-521. http://doi.org/10.1007/s10608-009-9282-6.

Henriques, G. (2014). *What is causing the college student mental health crisis?* Psychology Today. Retrieved from: https://www.psychologytoday.com/blog/theory-knowledge/201402/what-iscausing-the-college-student-mental-health-crisis.

Henriques, G. (2017). *Understanding emotions and how to process them*. Psychology Today. Retrieved from: https://www.psychologytoday.com/blog/theoryknowledge/201701/understanding-emotions-and-how-process-them.

Himes, L., Hubbard, N., Maruthy, G., Gallagher, J., Turner, M., & Rypma, B. (2021). The relationship between trait mindfulness and emotional reactivity following mood manipulation. *Mindfulness 12,* 170–185. https://doi.org/10.1007/s12671-020-01510-7.

Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. Hyperion.

Kalisch, R., & Kampa, M. (2021). Stressor appraisal as an explanation for the influence of extra- individual factors on psychological resilience. In M. Ungar (Ed.), *Multisystemic Resilience* (pp. 136-152). Oxford University Press. https://doi.org/10.1093/oso/9780190095888.003.0008.

Kalisch, R., Baker, D., Basten, U., Boks, M., Bonanno, G., & Brummelman, E. … Kleim, B. (2017). The resilience framework as a strategy to combat stress-related disorders. *Nature human behaviour, 1*(11), 784–790. https://doi.org/10.1038/s41562-017-0200-8.

Keye, M., & Pidgeon, A. (2013). Investigation of the Relationship between Resilience, Mindfulness, and

Academic Self-Efficacy. *Open Journal of Social Sciences, 1,* 1-4. https://10.4236/jss.2013.16001.

Masten, A. (2001). Ordinary magic. Resilience processes in development. *The American Psychologist, 56*(3), 227-38. https://doi.org/10.1037//0003-066x.56.3.227.

Norris, D., & Hutchinson, A. (2018). Mindfulness: The neurobehavioral basis of resilience. In K. Hendricks Thomas & D. L. Albright (Eds.), *Bulletproofing the psyche: Preventing mental health problems in our military and veterans.* (pp. 47–65). Praeger/ABC-CLIO.

Polizzi, C., Gautam, A., & Lynn, S. (2018). Trait mindfulness: A multifaceted evaluation. *Imagination, Cognition and Personality, 38*(2), 106–138. https://doi.org/10.1177/0276236618774321.

Poole, J., Dobson, K., & Pusch, D. (2017). Childhood adversity and adult depression: The protective role of psychological resilience. *Child Abuse & Neglect, 64*, 89-100. https://doi.org/10.1016/j.chiabu.2016.12.012.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers, 36*, 717-731. https://doi.org/10.3758/BF03206553.

Pressman, S., & Cohen, S. (2005). Does positive affect influence health? *Psychological Bulletin, 131,* 925–971. http://doi.org/10.1037/0033-2909.131.6.925.

Quoidbach, J., Gross, J., & Mikolajczak, M. (2015). Positive Interventions: An Emotion Regulation Perspective. *Psychological Bulletin, 141*(3), 655–693. https://psycnet.apa.org/doi/10.1037/a0038648.

Ramasubramanian, S. (2017). Mindfulness, stress coping and everyday resilience among emerging youth in a university setting: A mixed methods approach. *International Journal of Adolescence and Youth, 22*(3), 308–321. https://doi.org/10.1080/02673843.2016.1175361.

Rees, C. S., Heritage, B., Osseiran-Moisson, R., Chamberlain, D., Cusack, L., Anderson, J., Terry, V., Rogers, C., Hemsworth, D., Cross, W., & Hegney, D. G. (2016). Can we predict burnout among student nurses? An exploration of the ICWR-1 model of individual psychological resilience. Frontiers in psychology, 7, 1072. https://doi.org/10.3389/fpsyg.2016.01072.

Reynolds, L., Bissett, I., Porter, D., & Consedine, N. (2017). A Brief Mindfulness Intervention Is Associated with Negative Outcomes in a Randomised Controlled Trial Among Chemotherapy Patients. *Mindfulness 8,* 1291–1303 (2017). https://doi.org/10.1007/s12671-017-0705-2.

Rockwood, N., & Hayes, A. F. (2020). Mediation, moderation, and conditional process analysis: Regression-based approaches for clinical research. In A. G. C. Wright and M. N. Hallquist (Eds.) *Handbook of research methods in clinical psychology.* Cambridge University Press.

Rutten, B. P., Hammels, C., Geschwind, N., Menne-Lothmann, C., Pishva, E., Schruers, K., van den Hove, D., Kenis, G., van Os, J., & Wichers, M. (2013). Resilience in mental health: linking psychological and neurobiological perspectives. *Acta Psychiatrica Scandinavica*, 128(1), 3-20. http://doi.org/10.1111/acps.12095.

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7,* 422-445. http://doi.org/10.1037/1082-

989X.7.4.422.

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine, 15*, 194-200. http://doi.org/ 10.1080/10705500802222972.

The British Psychological Society (2018). Code of Ethics and Conduct. https://www.bps.org.uk/sites/bps.org.uk/files/Policy%20-%20Files/BPS%20Code%20of%20Ethics%20and%20Conduct%20(Updated%20July%202018).pdf

Tugade, M. M., Fredrickson, B. L., & Barrett, L. F. (2004). Psychological resilience and positive emotional granularity: examining the benefits of positive emotions on coping and health. *Journal of Personality, 72*(6), 1161-90. http://doi.org/10.1111/j.1467-6494.2004.00294.x.

Twenge, J. M. (2017). *iGen: Why today's super-connected kids are growing up less rebellious, more tolerant, less happy – and completely unprepared for adulthood*. Atria Books.

Vidic, Z., & Cherup, N. (2019). Mindfulness in classroom: Effect of mindfulness-based relaxation on college students' stress, resilience, self efficacy and perfectionism. *College Student Journal, 53*, 130-142.

Watford, T. S., & Stafford, J. (2015). The impact of mindfulness on emotion dysregulation and psychophysiological reactivity under emotional provocation. Psychology of Consciousness: Theory, *Research, and Practice, 2*(1), 90-109. http://doi.org/10.1037/cns0000039.

Watson, D. (1988). The vicissitudes of mood measurement: Effects of varying descriptors, time frames, and response formats on measures of positive and negative affect. *Journal of Personality and Social Psychology, 55*, 128–141. https:// org/doi/10.1037/0022-3514.55.1.128.

Watson, D., & Clark, L. A. (1992). On traits and temperament: General and specific factors of emotional experience and their relation to the five-factor model. *Journal of Personality, 60*, 441–476. http://doi.org/10.1111/j.1467-6494.1992.tb00980.x.

Wichers, M., Peeters. F., Geschwind, N., Jacobs, N., Simons, C., Derom, C., Thiery, E., Delespaul, P. H., & van Os J. (2010). Unveiling patterns of affective responses in daily life may improve outcome prediction in depression: a momentary assessment study. *Journal of Affective Disorders, 124*(1-2), 191-5. http://doi.org/10.1016/j.jad.2009.11.010.