



Greater autonomous motivation for study and basic psychological need satisfaction by being presently aware and ‘letting go’: An exploration of mindful attention and nonattachment

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Abstract

Mindful attention appears to facilitate greater satisfaction of basic psychological needs (i.e., autonomy, competence, and relatedness). Recent findings suggest that nonattachment may arise from mindfulness, with nonattachment being found to mediate relationships between mindfulness and various outcomes, such as increased wellbeing. Across two undergraduate samples, nonattachment was found to partially mediate relationships between mindful attention and the perceived satisfaction of each of autonomy, competence, and relatedness with others ($N=247$), and greater relative autonomous motivation for study ($N=578$). The findings therefore support and extend on existing research related to mindful attention within the Self-Determination Theory literature while also adding to the growing literature on the apparent benefits of nonattachment. Future research on autonomous motivation and basic need satisfaction may therefore benefit from considering nonattachment alongside mindful attention.

Keywords Self-determination theory · Autonomy · Mindfulness · Motivation · Education

Self-Determination Theory (SDT) posits that the satisfaction of basic psychological needs for autonomy (i.e., volitional behaviour in accordance with one’s values), competence (i.e., to experience mastery and feel effective), and relatedness with others (i.e., a sense of belonging and connectedness with others) are crucial to personal growth and wellbeing (see Deci and Ryan 2000; Ryan and Deci 2017 for reviews). The satisfaction of these basic needs has also been associated with greater academic engagement, and reduced burnout and boredom (Sulea et al. 2015). However, the development of autonomous motivation in educational settings may facilitate basic need satisfaction (Filak and Sheldon 2008). Autonomous motivation requires an individual to find meaning and purpose in the external demands imposed by various rules, laws, and norms, and to internalise them as their own (Deci and Ryan 2000; Ryan and Deci 2017; Weinstein et al. 2012). This marks a progression from controlled

forms of motivation, comprising external regulation (i.e., to obtain rewards or avoid punishment) and introjected regulation (e.g., to avoid negative feelings such as guilt from not meeting the expectations of oneself or others) to autonomous motivation. This includes identified regulation (i.e., understanding that a particular behaviour is important), and integrated (i.e., because a behaviour accords with one’s sense of self) regulation. The motivational spectrum also includes amotivation (i.e., no motivation or understanding to guide behaviour) and intrinsic motivation (i.e., behaviour guided by inherent enjoyment or satisfaction; Deci and Ryan 2000; Ryan and Deci 2017); see also Assor et al. 2009; Sheldon et al. 2017). Autonomous motivation is therefore about behaviour that is guided more by a personal sense of *wanting* to do it rather than feeling that it is something one *must* do or is *suggested* to do.

This is particularly important in the self-directed environment of university study, as higher levels of autonomous motivation are associated with greater academic engagement (Connell and Wellborn 1991; Elphinstone and Farrugia 2016; Jang et al. 2012), reduced procrastination (Senécal et al. 1995), greater enjoyment of study and higher grades (Black and Deci 2000), and reduced dropout rates (Vallerand and Bissonette 1992). Ratelle et al. (2007)

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also found that autonomous motivation was associated with greater enjoyment of study, being less distracted in class, and reduced dropout. Considering that higher education institutions have long desired to improve student retention and course completion (e.g., Bradley et al. 2008; Zepke and Leach 2005), identifying the means through which basic psychological need satisfaction and autonomous motivation can be fostered appears important. The literature has hitherto focussed on mindful attention as one such construct.

Mindful attention, “an enhanced attention to and awareness of current experience of present reality” (Brown and Ryan 2003, p. 822), is proposed to assist in being aware of and receptive to internal and external experience. This is considered to help with focusing on self-endorsed values, interests, and behaviours, and thus being better able to select and engage in behaviours that are aligned with autonomy, competence, and relatedness with others (e.g., Brown and Ryan 2003; Deci et al. 2015; Ryan and Deci 2017). Indeed, mindful attention as measured by the Mindful Awareness Attention Scale (MAAS; Brown and Ryan 2003) has been associated with greater self-reported satisfaction of the basic psychological needs for autonomy, competence, and relatedness with others (Brown and Ryan 2003; Chang et al. 2015; Schultz et al. 2015). Furthermore, the self-reflection and insight arising from openly attending to internal and external experience may enable greater congruence between values and behaviour, and thus more internalised and integrated (i.e., autonomously motivated) forms of self-regulation (Deci et al. 2015; Ryan and Deci 2017). Accordingly, mindful attention has been associated with greater autonomous self-regulation (Levesque and Brown 2007; see also Donald et al. 2019 for a review). Note here that the term mindful attention rather than mindfulness has been used. This is in order to more accurately articulate the concept due to the varying ways in which mindfulness has been operationalised in the psychological literature (see Van Dam et al. 2018).

The present study seeks to extend research examining mindful attention by further investigating the comparatively new construct of nonattachment. Nonattachment has also been correlated with greater autonomous motivation (Sahdra et al. 2010) and higher levels of autonomy, competence, and relatedness (Whitehead et al. 2019). This appears to respectively reflect that nonattached individuals are able to live in an open, ‘choiceful’, and accepting manner, to not place unobtainable expectations on themselves, and to openly accept other people as they are (Whitehead et al. 2018). Additionally, nonattachment appears to partially mediate the relationship between greater mindfulness (as measured by the Freiberg Mindfulness Inventory; see Walach et al. 2006) and positive academic outcomes (Elphinstone et al. 2019). Therefore, nonattachment has the potential to further clarify how mindful attention contributes to the satisfaction

of basic psychological needs and emergence of autonomous motivation.

Nonattachment is an enduring quality marked by reduced clinging to desirable experiences or avoidance of negative experiences, or the need for experience to be any way in particular (Sahdra et al. 2010, 2015; Whitehead et al. 2019). ‘Attachment’ in this context relates to mental fixations on how ourselves, others, or life in general needs to be. Shonin et al. (2014) suggest that attachments involve a heightened cognitive or emotional focus on objects, constructs, or ideas which exceeds the intrinsic worth of those elements. Additionally, ‘attachment’ in this context is distinct from parent–child or romantic attachment. It is theoretically possible to be securely attached to others and also nonattached (Sahdra and Shaver 2013). Indeed, Sahdra et al. (2010) found that greater nonattachment was associated with reduced anxious and avoidant attachment (see also Elphinstone and Whitehead 2019). The importance of identifying our attachments, or mental fixations, is that Buddhist theory proposes that they are the underlying cause of suffering (e.g., negative feelings and emotions; Hanh 2006). For example, Whitehead et al. (2018) found that individuals who were highly attached (i.e., low nonattachment) often reported great stress or frustration in their relationships due to other people failing to live up to high expectations. In this sense, it is not necessarily the behaviour of others that inherently causes frustration, but that their behaviour fails to align with expectation. Nonattachment involves being able to ‘let go’ of these fixations and to engage with and accept aspects of life as they are.

A growing body of evidence suggests that nonattachment is distinguishable from mindfulness, inclusive of mindful attention and other conceptualisations of mindfulness. Nonattachment has been found to mediate relationships between various forms of mindfulness and increased wellbeing (Ju and Lee 2015; Sahdra et al. 2016; Tran et al. 2014; Whitehead et al. 2019; see also Wang et al. 2016), adaptability (Elphinstone et al. 2019; Sahdra et al. 2016), and wisdom, self-transcendence, and self-actualization (Whitehead et al. 2020). In contrast, Bhambhani and Cabral (2016) suggest that rather than a mediational relationship, mindfulness and nonattachment are independent predictors of reduced psychological distress. Lamis and Dvorak (2014) similarly investigated a model in which mindfulness and nonattachment were independent predictors of reduced suicide rumination. However, in line with the theoretical causality of the mediation perspective, nonattachment appears to increase after participation in eight-week programs based on guided meditation and mindfulness-based exercises (e.g., Van Gordon et al. 2017; Wu et al. 2019).

In further support of a mediation approach, Desbordes et al. (2015) suggest that current definitions of mindfulness overlook the concept of equanimity (i.e., “an even-minded mental state or dispositional tendency toward all experiences

or objects, regardless of their origin or their affective valence” (Desbordes et al. 2015, p. 1), which is argued to better capture the core disposition that is the goal of mindfulness practice. That is, the *primary* purpose of engaging in practices such as meditation is not to become more adept at being aware of momentary experience (i.e., mindful attention), but rather, increased awareness of momentary experience is one outcome which then aids in developing an equanimous approach to life. Desbordes et al. therefore view mindfulness and equanimity as separate skills. Mindfulness is the foundational skill that brings awareness back to experience in the present moment, and this practice helps to promote the gradual development of equanimity, which is currently best captured by the Buddhist ideal of nonattachment (Desbordes et al. 2015). It is for this reason that nonattachment may play a role in explaining why mindful attention contributes to the satisfaction of basic psychological needs and the development of autonomous motivation.

To begin illustrating the complementary role of mindful attention and nonattachment, and to draw inspiration from arguments made by Ryan and Rigby (2015; see also Brown et al. 2007; Ryan and Deci 2017), consider an individual who identifies as being a ‘successful’ person. This is an attachment to a particular reified self-representation based on socially-created standards. There is no essential essence within any person that objectively and universally indicates ‘success’. Rather, ‘success’ is a contextually bound idea in which one may project an image of ‘success’ through acquiring certain objects, achieving certain outcomes, or interacting with certain people. However, if one’s ego or sense of self are defined by maintaining a particular identity, it can be especially difficult to encounter any situation in which this identity may be changed or challenged (Brown et al. 2007, 2008; Niemiec et al. 2008; see also Fromm 1976). In this ego involved state (see Ryan 1982; Niemiec et al. 2008), one’s behaviour may be predominantly guided or controlled by external forces, undermining autonomy (e.g., Brown et al. 2007, 2008; Niemiec et al. 2008; Ryan and Deci 2017; Ryan and Rigby 2015). To uphold the view of oneself as a ‘success’ for example, behaviour may be guided by reasons associated with external regulation (i.e., to obtain a reward, such as a new promotion) or the internal pressure typical of negative introjection (i.e., to avoid negative thoughts or feelings associated with not appearing ‘successful’).

Mindful attention is considered to reduce the reification of self-representations and thus, the autonomy-thwarting role of ego involvement (Brown et al. 2007, 2008; Niemiec et al. 2008; Ryan and Deci 2017; Ryan and Rigby 2015). However, other aspects argued to minimise ego involvement such as the reduced fixation on needing things, including the self, to be a certain way, and also the awareness and acceptance of impermanence and the absence of a static self (Ryan and Rigby 2015), are considered to be hallmarks

of nonattachment (Sahdra et al. 2010; Whitehead et al. 2019). This is perhaps why, elsewhere in their argument, Ryan and Rigby (2015) also acknowledge other notions of mindfulness, defining it as, “observing without ‘grasping’ or ‘clinging’ to what unfolds—not burdening it with evaluation but simply being aware of what occurs” (p. 246). This appears to combine mindful attention (i.e., being aware of what occurs) with a reduction in ‘grasping’ that is arguably related to nonattachment. Elsewhere Ryan and Rigby contend that the, “characteristics of willingness, nonattachment, and more effective processing all bespeak the potentially central role of mindfulness in integrated self-functioning” (p. 259). This seems akin to the argument of Desbordes et al. (2015; see also Shapiro et al. 2006) in which equanimity (or nonattachment) may arise from mindful attention. The difficulty in distinguishing between concepts when talking of mindfulness is common throughout the psychological literature, hence the diversity of ways in which mindfulness is conceptualised and measured (Van Dam et al. 2018).

Therefore, in accordance with the process proposed by Desbordes et al. (2015), mindful attention may be the process through which someone becomes acutely aware of their perception of the self as a ‘success’, whereas nonattachment may enable one to dispassionately examine and ‘let go’ of this particular mental fixation. Sahdra et al. (2010) similarly propose that while mindful attention enables an awareness of what is occurring in one’s field of consciousness, it is nonattachment that provides the ability to flexibly engage with experiences without clinging to or suppressing them. Nonattachment may therefore be part of avoiding ego-involvement and subsequent controlled motivation, in addition to mindful attention which has been the primary focus of the literature to date (e.g., Brown et al. 2007, 2008; Niemiec et al. 2008; Ryan and Deci 2017; Ryan and Rigby 2015). Accordingly, nonattachment has been associated with having a non-contingent sense of self and greater autonomous motivation (Sahdra et al. 2010; see also Whitehead et al. 2019), as well as greater satisfaction of autonomy, competence, and relatedness (Whitehead et al. 2019). Nonattachment has been shown to relate to individuals’ capacity to live their life with greater ease and balance, as they do not become unduly stuck or fixated on the way their life *should* be but can be open to live as it grows and changes (Whitehead et al. 2018). When individuals are governed by attachments that may take the form of expectations about the future, themselves, or pining for how life used to be, they may cease to be driven by internal factors such as what truly makes them happy or what can assist in making their life more meaningful.

The primary aim of the current study is to therefore investigate the extent to which nonattachment mediates relationships between mindful attention and relative autonomous motivation for study, as well as the perceived satisfaction of autonomy, competence, and relatedness with others. Doing

so will extend on and combine findings linking basic psychological need satisfaction with mindful attention (Brown and Ryan 2003; Schultz et al. 2015) and nonattachment (Whitehead et al. 2019); autonomous motivation with mindful attention (Levesque and Brown 2007; see also Donald et al. 2019) and nonattachment (Sahdra et al. 2010); and studies suggesting that nonattachment is a mechanism of mindfulness (e.g., Sahdra et al. 2010; Tran et al. 2014; Whitehead et al. 2019, 2020; see also Desbordes et al. 2015). It is therefore hypothesised that greater nonattachment will at least partially mediate relationships between higher levels of mindful attention and greater perceived satisfaction of autonomy, competence, and relatedness with others, and relative autonomous motivation for study.

Method

Participants and procedure

Two samples were collected. The first sample, which was used to investigate the relationships between mindful attention, nonattachment, and basic psychological need satisfaction, comprised 247 first year Australian undergraduate psychology students (194 females, 53 males) aged from 18 to 60 ($M = 32.02$, $SD = 10.55$). Respondents completed an online survey at a time and place of their choosing in exchange for course credit. The second sample was used to investigate relationships between mindful attention, nonattachment, and relative autonomous motivation for study. This sample included 280 males and 298 females aged from 18 to 74 ($M = 26.77$, $SD = 10.18$). All respondents were undergraduate students within faculties of business ($n = 259$), humanities ($n = 156$), science and engineering ($n = 104$), or were studying via online correspondence ($n = 59$). These respondents were emailed a link to an online survey and chose to complete it at their discretion in exchange for a report on their scores.

Measures

Mindful attention

In Sample 1 mindful attention was assessed with the MAAS (Brown and Ryan 2003) as it is commonly used throughout the SDT literature (see Ryan and Deci 2017 for a review). The measure includes 15 items (e.g., “I rush through activities without really being attentive to them”) with each rated on a six-point scale (1 = Almost always, 6 = Almost never). For the sake of brevity, Sample 2 completed the four-item (e.g., “I am easily distracted”) Acting with Awareness facet from the short-form of the Five Factor Mindfulness Questionnaire (Tran et al. 2013). Each item is rated on a five-point

scale (1 = Never or very rarely true, 5 = Very often or always true). This facet was developed in the original version of the FFMQ by factor analysing a range of mindfulness measures and was predominantly found to comprise items from the MAAS (Baer et al. 2006). The short-form includes just one item from the MAAS. However, the focus on present-centred awareness remains consistent with the definition of mindful attention provided by Brown and Ryan (2003) when developing the MAAS, and the view of Desbordes et al. (2015) in which mindfulness contributes to awareness of the present which may then lead to the development of equanimous constructs such as nonattachment.

Nonattachment scale (NAS)

Both samples completed a seven-item measure of nonattachment (Elphinstone et al. 2015; see also Sahdra et al. 2015, 2016). All items (e.g., “I can enjoy pleasant experiences without needing them to last forever”) are rated on a six-point scale (1 = Strongly Disagree, 6 = Strongly Agree), with higher scores indicating increased nonattachment. Nonattachment was shown by Sahdra et al. (2016) to be distinct to each of the five facets of the FFMQ (i.e., mindful awareness, nonjudgement, nonreactivity, observing, describing; see Baer et al. 2006), and has also been shown to be distinct to the MAAS (Ju and Lee 2015) and Freiberg Mindfulness Inventory (Whitehead et al. 2019).

Basic psychological need satisfaction scale (BPNS)

Sample 1 completed the BPNS (Gagné, 2003) which includes 21 items. Six items assess the extent to which individuals feel autonomous (e.g., “I feel like I am free to decide for myself how to live my life”), six assess perceived competence (e.g., “Often, I do not feel very competent”), and nine items assess relatedness (e.g., “I consider the people I regularly interact with to be my friends”). Responses to each item are on a seven-point scale (1 = Not at all true, 7 = Very true).

Relative autonomous motivation for study

To assess the relative autonomous motivation for study in Sample 2, a 24-item measure developed by Sheldon et al. (2017) was used. Each item was modified to focus specifically on the reasons for engaging in academic study. Four items assess each of amotivation (e.g., “I once had good reasons for studying at university, now I don’t”), external regulation (e.g., “Because important people (e.g., parents) will like me better if I study at university”), negative introjection (e.g., “Because I would feel ashamed if I didn’t go to university”), positive introjection (e.g., “Because I want to feel proud of myself”), identified regulation (e.g., “Because I strongly value studying at university”), and intrinsic

Table 1 Descriptive statistics and correlations for all variables in Sample 1

	1	2	3	4	5	6	7
1. Nonattachment	(.84)						
2. Mindful attention	.54	(.90)					
3. Autonomy	.55	.47	(.72)				
4. Competence	.62	.57	.70	(.78)			
5. Relatedness	.42	.37	.57	.55	(.86)		
6. Age	.38	.26	.15	.26	.02	–	
7. Gender	– .19	– .13	– .10	– .08	– .00	– .04	–
<i>M</i>	4.34	3.68	4.89	4.79	5.25	32.02	–
<i>SD</i>	.87	.84	.94	1.02	.90	10.55	–

All correlations in bold are significant at $p < .05$. Values in parentheses refer to Cronbach's alpha coefficient for that scale

motivation (e.g., “Because I enjoy studying at university”). Each item is rated on a seven-point scale (1 = Strongly disagree, 7 = Strongly Agree). In accordance with the suggestion of the authors, an overall Relative Autonomy Index (RAI) score was created with the following formula: intrinsic + identified + positive introjection—negative introjection—external regulation—amotivation.

Analysis plan

Prior to running the analyses each sample was assessed for outliers. No outliers were detected in Sample 1. In Sample 2 there were seven univariate outliers (based on a cut-off of $z \pm 3.29$, $p < 0.001$; see Tabachnick and Fidell 2007) on age, two outliers on nonattachment, and one on the overall RAI score. After removing these the sample size decreased to $N = 568$.¹ The sample sizes exceed the approximate minimum sample size ($N = 162$) suggested by Fritz and MacKinnon (2007) for a simple mediation (i.e., three variables) with 0.8 power. This is with the assumption of small-to-medium effect sizes for the *a* path (i.e., mindful attention to nonattachment) and *b* path (i.e., nonattachment to the dependent variable). The estimates provided by Fritz and MacKinnon do not account for the presence of covariates. In addition, the sample sizes are in accordance with those used in existing studies (e.g., Ju and Lee 2015; Sahdra et al. 2010; Wang et al. 2016; Whitehead et al. 2019).

Age and gender were included in the mediation analyses as covariates. Sahdra et al. (2010) reported that older respondents tended to report higher levels of nonattachment, while no gender difference in nonattachment was observed. However, female students have tended to report reduced amotivation and greater intrinsic motivation for study than

male students (Elphinstone and Farrugia 2016; Ratelle et al. 2007).

In both samples, mediation analyses were conducted with the MAAS as the independent variable and nonattachment as the mediator, and with age and gender entered as covariates. In Sample 1, three analyses with each of autonomy, competence, and relatedness as separate dependent variables were conducted. In Sample 2, a single mediation analysis with the overall RAI score as the dependent variable was performed. The mediation analyses were calculated using the Process Macro for SPSS (Hayes 2017). As recommended by Hayes (2017), 5000 bootstrapped resamples were used in order to calculate the direct and indirect effects.

Results

Sample 1: Mindful attention, nonattachment, and basic need satisfaction

The descriptive statistics and correlation matrix for all variables are presented in Table 1. Correlations indicated that higher scores on nonattachment were associated with greater mindful attention. Both variables were also associated with the greater perceived satisfaction of autonomy, competence, and relatedness. Older respondents reported higher levels of nonattachment and mindful attention, as well as autonomy and competence. Age and relatedness were not significantly correlated. The correlations also indicated that female respondents in the current sample tended to report lower scores on mindful attention and nonattachment than male students. All measures were at least adequately reliable.

Figure 1 (see also Table 3 in Appendix 1) shows standardised regression coefficients to summarise the results from the three separate mediation analyses. Mindful attention and nonattachment were each directly associated with greater autonomy, competence, and relatedness with others. The indirect effects were also significant ($p < .05$),

¹ The analyses were replicated using the original sample, inclusive of outliers. No meaningful changes that influenced the interpretation of the results were observed.

Fig. 1 The combined results of each mediation analysis in Sample 1. All paths show standardised regression coefficients and are significant at $p < .05$

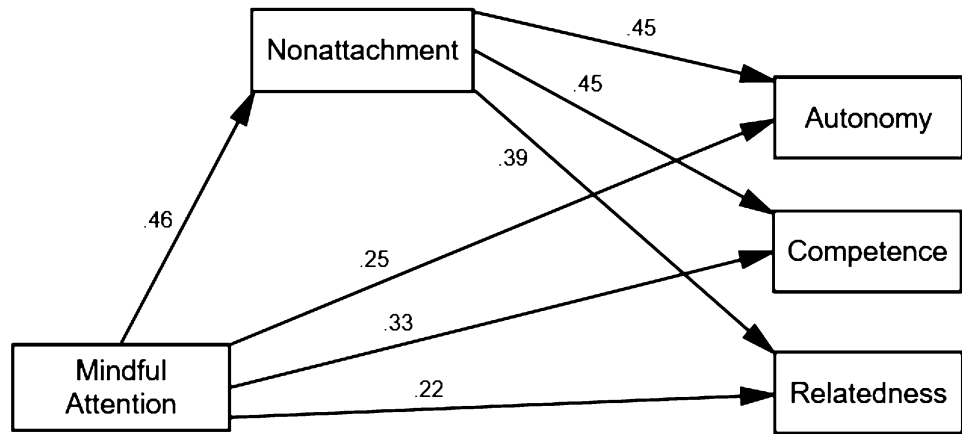


Table 2 Descriptive statistics and correlations for all variables in Sample 2

	1	2	3	4	5	6	7	8	9	10	11
1. Nonattachment	(.84)										
2. Mindfulness	.32	(.86)									
3. Amotivation	-.20	-.32	(.92)								
4. External regulation	-.24	-.33	.59	(.88)							
5. Negative introjection	-.34	-.38	.45	.75	(.91)						
6. Positive introjection	-.03	-.14	.01	.23	.42	(.82)					
7. Identified regulation	.23	.15	-.40	-.19	-.03	.54	(.85)				
8. Intrinsic motivation	.25	.15	-.33	-.16	-.10	.40	.74	(.89)			
9. RAI	.34	.33	-.75	-.69	-.57	.30	.73	.73	(.87)		
10. Age	.19	.20	-.11	-.32	-.33	-.04	.13	.11	.27		
11. Gender	.04	.05	-.13	-.12	-.03	.21	.18	.09	.20	.09	
<i>M</i>	4.37	3.29	2.17	2.13	2.76	4.78	5.63	4.97	17.40	26.29	
<i>SD</i>	.92	.98	1.45	1.42	1.78	1.47	1.19	1.39	11.50	9.26	

RAI Relative Autonomy Index

All correlations in bold are significant at $p < .05$. Values in parentheses refer to Cronbach’s alpha coefficient for that scale

indicating that mindfulness was significantly indirectly associated with greater autonomy ($\beta = .21$, 95% Confidence Interval [CI] .14, .27), competence ($\beta = .21$, 95% CI .15, .27), and relatedness with others ($\beta = .18$, 95% CI .11, .26). Therefore, the total effects ($p < .001$) of mindful attention on the satisfaction of autonomy, competence, and relatedness with others were respectively, .46, .54, and .40.

For the covariates, age ($\beta = .26$) and gender ($\beta = -.12$) were each significantly ($p < .05$) associated with greater nonattachment, indicating that older respondents and male respondents tended to report higher levels of nonattachment. Age and gender were not significantly associated with autonomy or competence. Increased age, but not gender, was significantly associated with reduced relatedness ($\beta = -.19$, $p < .05$).

Sample 2: Mindful attention, nonattachment, and relative autonomous motivation for university study

As shown in Table 2, nonattachment was again associated with greater mindful attention. Both measures were associated with greater relative autonomous motivation for study (i.e., RAI scores). This appeared to be the result of mindful attention and nonattachment each being associated with higher scores on identified regulation and intrinsic motivation, and reduced amotivation, external regulation and negative introjection. Mindful attention but not nonattachment was associated with reduced positive introjection. Older respondents again reported greater mindful attention and nonattachment, reduced amotivation, external regulation, and negative introjection, and greater identified regulation,

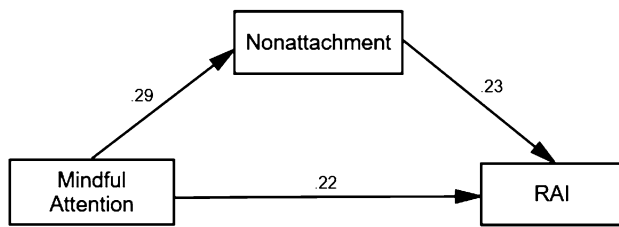


Fig. 2 Mediation model in Sample 2. All paths show standardised regression coefficients and are significant at $p < .05$. RAI/Relative Autonomy Index

intrinsic motivation, and relative autonomous motivation for study. Age and positive introjection were not significantly correlated. The significant correlations for gender indicated that female respondents tended to report reduced amotivation and external regulation, and greater positive introjection, identified regulation, intrinsic motivation, and overall relative autonomous motivation for study than male respondents. All measures used in Sample 2 were found to be highly reliable.

The standardised results of the mediation analysis (Fig. 2, see also Table 4 in Appendix 2) indicated that higher scores on nonattachment and mindful attention were each directly associated with greater relative autonomy for study. Greater mindful attention was also significantly indirectly associated with greater relative autonomous motivation for study via increased nonattachment ($\beta = .07$, 95% CI .04, .10). The total effect for mindful attention on relative autonomy study was therefore .28 ($p < .001$). The covariates of age ($\beta = .18$) and gender ($\beta = .16$) were each significantly ($p < .05$) associated with RAI scores, indicating that older respondents and females in the current sample tended to report greater relative autonomous motivation for study.

Discussion

The current study investigated the extent to which nonattachment mediates relationships between mindful attention and satisfaction of basic psychological needs, and also relative autonomous motivation for study. As expected, the significant indirect effects indicated that higher levels of nonattachment partially mediated relationships between increased mindful attention and greater perceived satisfaction of autonomy, competence, and relatedness with others, and also greater relative autonomous motivation for study.

These findings support and extend on those showing that mindful attention (e.g., Brown and Ryan 2003; Chang et al. 2015; Levesque and Brown 2007; Schultz et al. 2015) and nonattachment (Sahdra et al. 2010; Whitehead et al. 2019) are associated with greater basic psychological need satisfaction and autonomous motivation. The findings also align with those suggesting that nonattachment is a mechanism through which mindfulness contributes to outcomes such as increased wellbeing (e.g., Ju and Lee 2015; Sahdra et al. 2016; Whitehead et al. 2019; see also Desbordes et al. 2015). The current study therefore adds further nuance to arguments made within the SDT-based literature about the role of mindful attention. In particular, by suggesting that mindful present-moment awareness and attention on internal and external experience (e.g., Brown and Ryan 2003; Deci et al. 2015; Ryan and Deci 2017; Ryan and Rigby 2015) along with reduced fixation on needing experience to be a particular way (Sahdra et al. 2010; Whitehead et al. 2019) may help to facilitate need-supportive thoughts and behaviours.

Considering the apparent benefits of basic need satisfaction (Filak and Sheldon 2008; Sulea et al. 2015) and autonomous motivation in academic settings (e.g., Black and Deci 2000; Jang et al. 2012; Ratelle et al. 2007), the current findings suggest that fostering mindful attention and nonattachment in students is a worthy goal. While the reported effectiveness of mindfulness-based interventions may have been overblown and findings ought to be considered carefully (e.g., Joiner 2017; Van Dam et al. 2018), there is some evidence that mindfulness-based programs could be useful in college/university settings. For example, interventions have been found to reduce negative affective experiences and associated coping strategies such as problem drinking (Vinci et al. 2014), and to also reduce anxiety and contribute to greater academic performance (Warnecke et al. 2011). The implementation of mindfulness-based programs that have shown sustained increases in nonattachment (see Van Gordon et al. 2017; Wu et al. 2019) may contribute to increases in need satisfaction and autonomous motivation for study.

Such an investigation may further extend on the current findings by considering the influence of autonomy supportive teaching, which has been associated with greater need satisfaction and relative autonomous motivation for study (Filak and Sheldon 2008). Mindful attention has also been found to buffer against the thwarting of basic needs, even in less-supportive work environments (Schultz et al. 2015). Therefore, future research could examine the unique contributions of mindful attention and nonattachment to need

satisfaction alongside autonomy supportive teaching. Additionally, it may be that students who report greater mindful attention and nonattachment are still able to maintain autonomous motivation for study, for example, in less supportive learning environments. A combined investigation of nonattachment and mindful attention could also occur in work environments to extend on the findings of Schultz et al. (2015).

Other findings reported in the current study, such as those for age, may also be avenues for future research. In the first sample increased age was initially significantly, albeit weakly, correlated with greater satisfaction of autonomy and competence. When included in the mediation model with mindful attention and nonattachment age no longer predicted satisfaction of either autonomy or competence, but interestingly became a predictor of reduced satisfaction of relatedness. The latter finding may reflect that loneliness can increase with age, due to factors such as changes in income and work status (Luhmann and Hawkley 2016). It may be that lifespan changes in mindful attention and nonattachment that help to account for relationships between age and the satisfaction of autonomy and competence. A convergent finding reported by Elphinstone and Whitehead (2019) indicated that while increased age was initially significantly correlated with reduced materialism, this relationship became non-significant in a model with nonattachment. The authors proposed that while materialism has typically been shown to decline with age (e.g., Kasser and Ryan 1993; Unanue et al. 2014), it may not be due to the effect of age per se, but due to an increase in nonattachment throughout the lifespan. Such a claim is credible considering that nonattachment may increase through experiencing major life events (e.g., the birth of a child or death of a loved one; Sahdra et al. 2010), or in response to overcoming traumatic experiences (Whitehead et al. 2018). Furthermore, major life events may lead to a prioritisation of intrinsic rather than extrinsic aspirations that better align with basic psychological need satisfaction (Grouzet 2013). Therefore, future research could examine the extent to which lifespan changes in basic need satisfaction, particular for autonomy and competence, are due to changes in mindful attention and nonattachment.

There were also a number of limitations in the current study. One limitation, which also presents an opportunity for research relates to the use of the MAAS to assess mindful attention. The MAAS has been rated by Buddhist clergy as aligning well with the attentional aspect of mindfulness but not with other ideals considered to comprise mindfulness, such as wisdom and ethics (Feng, Krägeloh et al. 2018). While the inclusion of nonattachment in the current study

was a strength over using the MAAS alone, nonattachment itself does not cover the breadth of what the Buddhists interviewed by Feng et al. (2018) considered to comprise mindfulness. The current study could therefore be replicated with the use of other popular measures of mindfulness, such as the Five Factor Mindfulness Questionnaire (Baer et al. 2006), and Freiberg Mindfulness Inventory (Walach et al. 2006). However, these too have also been considered to overlook the wisdom-related aspects of mindfulness (Feng et al. 2018). Thus, future research could build on the current study by including wisdom-based constructs.

A benefit of doing so is to mitigate concerns around what has colloquially been called *McMindfulness*. Joiner (2017) for example suggests that this superficial form of mindfulness, in which the focus is predominantly on being mindfully aware and nonjudgmental of the self without the context or awareness of broader ethical or moral concerns, contributes to narcissistic attitudes. Purser (2019) makes a similar argument, and additionally contends that *McMindfulness* is being used to help people tolerate increasingly stressful and insecure working environments rather than actively work towards changing the underlying systemic problems. These concerns are particularly salient in investigations of autonomous motivation, as Ryan and Deci (2017) suggest that a person could theoretically internalise and become autonomously motivated to a degree to engage in selfish or anti-social acts. In light of Buddhism's ethical tradition that people ought to identify and discern between wholesome and unwholesome states and qualities (Bodhi 2011), the investigation of wisdom-related constructs alongside mindful attention and nonattachment may help to better understand the individual differences that contribute to autonomous motivation, and the manner in which this is enacted in one's life. Accordingly, these concerns hold that it should not be concluded from the current findings that students who are mindfully attentive, nonattached, and autonomously motivated will inevitably achieve positive outcomes or do good for themselves or others.

An additional limitation that could provide the basis for further study is whether the current findings hold when accounting for the influence of neuroticism. Mindful attention (Brown and Ryan 2003) and nonattachment (Sahdra et al. 2010) have each been moderate-to-strongly associated with reduced neuroticism. Further, Sulea et al. (2015) found that higher levels of neuroticism were significantly correlated with reduced satisfaction of needs for autonomy and relatedness. Decuyper et al. (2018) similarly reported that neuroticism was associated with reduced satisfaction of

autonomy, competence and relatedness. Importantly, neuroticism was found to moderate the relationship between mindful attention and the satisfaction of relatedness, but not the satisfaction of autonomy or competence. It is therefore plausible that neuroticism may play a role in accounting for relationships between mindful attention and nonattachment with autonomous motivation for study and basic need satisfaction.

Finally, while the current findings supported the hypotheses the results are limited by the samples that were used. The cross-sectional nature of the samples precludes any evidence of causality. Future research could, for example, examine changes in basic need satisfaction over time as a result of participating in the aforementioned mindfulness-based programs that have been shown to increase levels of nonattachment (see Van Gordon et al. 2017; Wu et al. 2019). Both samples also comprised undergraduate students from a single Australian institution which limits the generalisability of the findings to other countries, cultures, or samples of the general population.

In conclusion, the current study provided the first evidence that nonattachment partially mediates the relationship between mindful awareness and greater self-reported satisfaction of basic needs for autonomy, competence, and relatedness with others, as well as relative autonomous motivation for study. Nonattachment therefore appears to be worthy of consideration in future research within SDT, especially when investigating the effects of mindful attention.

Compliance with ethical standards

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

Ethical approval This study was conducted in accordance with the approved guidelines of the Swinburne University Human Research Ethics Committee, in accordance with the Australian National Health and Medical Research Council’s (NHMRC) National Statement on Ethical Conduct in Human Research.

Informed consent Informed consent was obtained from all respondents included in the current study.

Appendix

See Tables 3 and 4.

Table 3 Extended results for the mediation analyses in Sample 1

Antecedent	Consequent				Y (Autonomy)				Y (Competence)				Y (Relatedness)						
	M (Nonattachment)	M (Nonattachment)	Y (Autonomy)	Y (Competence)	Y (Autonomy)	Y (Competence)	Y (Autonomy)	Y (Competence)	Y (Autonomy)	Y (Competence)	Y (Autonomy)	Y (Competence)	Y (Autonomy)	Y (Competence)	Y (Autonomy)	Y (Competence)			
	β	SE	95% CI	<i>p</i>	β	SE	95% CI	<i>p</i>	β	SE	95% CI	<i>p</i>	β	SE	95% CI	<i>p</i>			
X (Mindful attention)	.46	.06	.43, .69	<.001	<i>c'</i>	.25	.07	.14, .42	<.001	<i>c'</i>	.33	.07	.27, .54	<.001	<i>c'</i>	.22	.07	.09, .37	.001
M (Nonattachment)	–	–	–	–	<i>b</i>	.45	.06	.30, .54	<.001	<i>b</i>	.45	.06	.33, .56	<.001	<i>b</i>	.39	.06	.22, .47	<.001
C1 (Age)	.26	.01	.02, .04	<.001		–.08	.01	–.02, .00	.15		.01	.01	–.01, .01	.91		–.19	.01	–.03, –.01	.002
C2 (Gender)	–.12	.13	–.54, –.05	.02		.02	.12	–.20, .28	.76		.05	.12	–.11, .36	.31		.09	.13	–.04, .45	.11
Constant	2.43	.29	1.87, 2.99	<.001		1.95	.31	1.35, 2.56	<.001		.94	.30	.34, 1.53	.002		2.99	.32	2.37, 3.61	<.001
	$R^2 = .37$				$R^2 = .35$					$R^2 = .46$					$R^2 = .24$				
	$F(3,243) = 48.26, p < .001$				$F(4,242) = 32.61, p < .001$					$F(4,242) = 51.71, p < .001$					$F(4,242) = 19.31, p < .001$				

X independent variable, M mediator, Y dependent variable, CI/C2 covariates, CI confidence interval, β Standardised coefficients

Table 4 Extended results for the mediation analyses in Sample 2

Antecedent	Consequent								
	M (Nonattachment)				Y (Relative Autonomy Index [RAI])				
	β	SE	95% CI	p	β	SE	95% CI	p	
X (Mindful attention)	.29	.07	.20, .35	<.001	c'	.22	.05	.77, 1.61	<.001
M (Nonattachment)	–	–	–	–	b	.23	.03	.87, 1.78	<.001
C1 (Age)	.14	.03	.01, .02	<.001		.18	.02	.05, .14	<.001
C2 (Gender)	.01	.51	-.12, .16	.76		.17	.40	.95, 2.52	<.001
Constant	3.11	.15	2.81, 3.41	<.001		– 4.84	1.10	– 6.99, – 2.68	<.001
	$R^2 = .12$					$R^2 = .23$			
	$F(3,564) = 25.50, p < .001$					$F(4,563) = 41.03, p < .001$			

X independent variable, M mediator, Y dependent variable, C1/C2 covariates, CI confidence interval, β standardised coefficients

References

- Assor, A., Vansteenkiste, M., & Kaplan, A. (2009). Identified versus introjected approach and introjected avoidance motivations in school and in sports: The limited benefits of self-worth strivings. *Journal of Educational Psychology, 101*, 482–497. <https://doi.org/10.1037/a0014236>.
- Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*(1), 27–45. <https://doi.org/10.1177/1073191105283504>.
- Bhambhani, Y., & Cabral, G. (2016). Evaluating nonattachment and decentering as possible mediators of the link between mindfulness and psychological distress in a nonclinical college sample. *Journal of Evidence-based Complementary & Alternative Medicine, 21*(4), 295–305. <https://doi.org/10.1177/2156587215607109>.
- Black, A. E., & Deci, E. L. (2000). The effects of student self-regulation and instructor autonomy support on learning in a college-level natural science course: A self-determination theory perspective. *Science Education, 84*, 740–756. [https://doi.org/10.1002/1098-237X\(200011\)84:6<740:AID-SCE4>3.0.CO;2-3](https://doi.org/10.1002/1098-237X(200011)84:6<740:AID-SCE4>3.0.CO;2-3).
- Bodhi, B. (2011). What does mindfulness really mean? A canonical perspective. *Contemporary Buddhism: An Interdisciplinary Journal, 12*, 19–39. <https://doi.org/10.1080/14639947.2011.564813>.
- Bradley, D., Noonan, P., Nugent, H., & Scales, B. (2008). *Review of Australian higher education: Final report*. Canberra: Department of Education, Employment and Workplace Relations
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*(4), 822–848. <https://doi.org/10.1037/0022-3514.84.4.822>.
- Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Addressing fundamental questions about mindfulness. *Psychological Inquiry, 18*(4), 272–281. <https://doi.org/10.1080/10478400701703344>.
- Brown, K. W., Ryan, R. M., Creswell, J. D., & Niemiec, C. P. (2008). Beyond me: Mindful responses to social threat. In H. A. Wayment & J. J. Bauer (Eds.), *Transcending self-interest: Psychological explorations of the quiet ego* (pp. 75–84). Washington: American Psychological Association.
- Chang, J. H., Huang, C. L., & Lin, Y. C. (2015). Mindfulness, basic psychological needs fulfillment, and well-being. *Journal of Happiness Studies, 16*(5), 1149–1162. <https://doi.org/10.1007/s1090-014-9551-2>.
- Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system processes. In M. Gunnar & L. A. Sroufe (Eds.), *Minnesota symposium on child psychology* (Vol. 23). Chicago: University of Chicago Press.
- Deci, E. L., & Ryan, R. M. (2000). The ‘what’ and ‘why’ of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01.
- Deci, E. L., Ryan, R. M., Schultz, P. P., & Niemiec, C. P. (2015). Being aware and functioning fully: Mindfulness and interest taking within self-determination theory. In K. W. Brown, D. Creswell, & R. M. Ryan (Eds.), *Handbook of mindfulness: Theory, research, and practice* (pp. 112–129). New York: The Guilford Press.
- Desbordes, G., Gard, T., Hoge, E. A., Hölzel, B. K., Kerr, C., Lazar, S. W., ..., & Vago, D. R. (2015). Moving beyond mindfulness: Defining equanimity as an outcome measure in meditation and contemplative research. *Mindfulness, 6*(2), 356–372. <https://doi.org/10.1007/s12671-013-0269-8>
- Decuyper, A., Audenaert, M., & Decramer, A. (2018). When mindfulness interacts with neuroticism to enhance transformational leadership: The role of psychological need satisfaction. *Frontiers in Psychology, 9*, 2588. <https://doi.org/10.3389/fpsyg.2018.02588>.
- Donald, J. N., Bradshaw, E. L., Ryan, R. M., Basarkod, G., Ciarrochi, J., Duineveld, J. J., et al. (2019). Mindfulness and its association with varied types of motivation: A systematic review and meta-analysis using self-determination theory. *Personality and Social Psychology Bulletin, 45*(10), 1177–1191. <https://doi.org/10.1177/0146167219896136>.
- Elphinstone, B., & Farrugia, M. (2016). Greater autonomous regulation, wellbeing, and adaptive learning characteristics: The benefits of an intellectual rather than default position. *Personality and Individual Differences, 99*, 94–99. <https://doi.org/10.1016/j.paid.2016.04.082>.
- Elphinstone, B., Sahdra, B. K., & Ciarrochi, J. (2015). *Living well by letting go: Reliability and validity of a brief measure of nonattachment*. Unpublished manuscript
- Elphinstone, B., & Whitehead, R. (2019). The benefits of being less fixated on self and stuff: Nonattachment, reduced insecurity, and reduced materialism. *Personality and Individual Differences, 149*, 302–308. <https://doi.org/10.1016/j.paid.2019.06.019>.
- Elphinstone, B., Whitehead, R., Tinker, S. P., & Bates, G. (2019). The academic benefits of ‘letting go’: The contribution of mindfulness and nonattachment to adaptability, engagement, and grades. *Educational Psychology An International Journal of Experimental Educational Psychology, 45*(1), 1–12. <https://doi.org/10.1080/01443410.2019.1588228>.

- Feng, X. J., Krägeloh, C. U., Billington, D. R., & Siegert, R. J. (2018). To what extent is mindfulness as presented in commonly used mindfulness questionnaires different from how it is conceptualized by senior ordained Buddhists? *Mindfulness*, 9(2), 441–460. <https://doi.org/10.1007/s12671-017-0788-9>.
- Filak, V. F., & Sheldon, K. M. (2008). Teacher support, student motivation, student need satisfaction, and college teacher course evaluations: Testing a sequential path model. *Educational Psychology*, 28(6), 711–724. <https://doi.org/10.1080/01443410802337794>.
- Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological science*, 18(3), 233–239. <https://doi.org/10.1111/j.1467-9280.2007.01882.x>.
- Fromm, E. (1976). *To have or to be?*. New York: Continuum Publishing Group.
- Gagné, M. (2003). The role of autonomy support and autonomy orientation in pro-social behavior engagement. *Motivation and Emotion*, 27, 199–223. <https://doi.org/10.1023/A:1025007614869>.
- Grouzet, F. M. E. (2013). Self-regulation and autonomy: The dialectic between organismic and sociocognitive valuing processes. In B. W. Sokol, F. M. E. Grouzet, & U. Müller (Eds.), *Self-regulation and autonomy: Social and Developmental Dimensions of Human Conduct*. New York: Cambridge University Press.
- Hanh, T. (2006). *Transformation and healing: Sutra of the four establishments of Mindfulness*. Berkeley, CA: Parallax Press.
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). New York: Guilford Publications.
- Jang, H., Kim, E. J., & Reeve, J. (2012). Longitudinal test of self-determination theory's motivation mediation model in a naturally occurring classroom context. *Journal of Educational Psychology*, 104(4), 1175–1188. <https://doi.org/10.1037/a0028089>.
- Joiner, T. (2017). *Mindlessness: The corruption of mindfulness in a culture of narcissism*. New York: Oxford University Press.
- Ju, S., & Lee, W. (2015). Mindfulness, non-attachment, and emotional well-being in Korean adults. *Advanced Science and Technology Letters*, 87, 68–72. <https://doi.org/10.14257/astl.2015.87.15>.
- Kasser, T., & Ryan, R. M. (1993). A dark side of the American dream: Correlates of financial success as a central life aspiration. *Journal of Personality and Social Psychology*, 2, 410–422. <https://doi.org/10.1037/0022-3514.65.2.410>.
- Lamis, D. A., & Dvorak, R. D. (2014). Mindfulness, nonattachment, and suicide rumination in college students: The mediating role of depressive symptoms. *Mindfulness*, 5(5), 487–496. <https://doi.org/10.1007/s12671-013-0203-0>.
- Levesque, C., & Brown, K. W. (2007). Mindfulness as a moderator of the effect of implicit motivational self-concept on day-to-day behavioral motivation. *Motivation and Emotion*, 31(4), 284–299. <https://doi.org/10.1007/s11031-007-9075-8>.
- Luhmann, M., & Hawkley, L. C. (2016). Age differences in loneliness from late adolescence to oldest old age. *Developmental Psychology*, 52(6), 943–959. <https://doi.org/10.1037/dev0000117>.
- Niemiec, C. P., Ryan, R. M., & Brown, K. W. (2008). The role of awareness and autonomy in quieting the ego: A self-determination theory perspective. In H. A. Wayment & J. J. Bauer (Eds.), *Transcending self-interest: Psychological explorations of the quiet ego* (pp. 107–116). Washington, DC: American Psychological Association.
- Purser, E. (2019). *McMindfulness: How mindfulness became the new Capitalist spirituality*. London: Repeater Books.
- Ratelle, C. F., Guay, F., Vallerand, R. J., Larose, S., & Sénécal, C. (2007). Autonomous, controlled, and amotivated types of academic motivation: A person-oriented analysis. *Journal of Educational Psychology*, 99(4), 734–746. <https://doi.org/10.1037/0022-0663.99.4.734>.
- Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology*, 43, 450–461. <https://doi.org/10.1037/0022-3514.43.3.450>.
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York: Guilford Publications.
- Ryan, R. M., & Rigby, C. S. (2015). Did the Buddha have a self? No-self, self, and mindfulness in Buddhist thought and Western psychologies. In K. W. Brown, D. Creswell, & R. M. Ryan (Eds.), *Handbook of mindfulness: Theory research and practice* (pp. 245–265). New York: The Guilford Press.
- Sahdra, B., Ciarrochi, J., & Parker, P. (2016). Nonattachment and mindfulness: Related but distinct constructs. *Psychological Assessment*, 28(7), 819–829. <https://doi.org/10.1037/pas0000264>.
- Sahdra, B. K., Ciarrochi, J., Parker, P. D., Marshall, S., & Heaven, P. (2015). Empathy and nonattachment independently predict peer nominations of prosocial behavior of adolescents. *Frontiers in Psychology*, 6, 263. <https://doi.org/10.3389/fpsyg.2015.00263>.
- Sahdra, B. K., & Shaver, P. R. (2013). Comparing attachment theory and Buddhist psychology. *International Journal for the Psychology of Religion*, 23(4), 282–293. <https://doi.org/10.1080/10508619.2013.795821>.
- Sahdra, B. K., Shaver, P. R., & Brown, K. W. (2010). A scale to measure nonattachment: A Buddhist complement to Western research on attachment and adaptive functioning. *Journal of Personality Assessment*, 92(2), 116–127. <https://doi.org/10.1080/00223890903425960>.
- Schultz, P. P., Ryan, R. M., Niemiec, C. P., Legate, N., & Williams, G. C. (2015). Mindfulness, work climate, and psychological need satisfaction in employee well-being. *Mindfulness*, 6(5), 971–985. <https://doi.org/10.1007/s12671-014-0338-7>.
- Senecal, C., Koestner, R., & Vallerand, R. J. (1995). Self-regulation and academic procrastination. *The Journal of Social Psychology*, 135(5), 607–619. <https://doi.org/10.1080/00224545.1995.9712234>.
- Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology*, 62(3), 373–386. <https://doi.org/10.1002/jclp.20237>.
- Sheldon, K. M., Osin, E. N., Gordeeva, T. O., Suchkov, D. D., & Sychev, O. A. (2017). Evaluating the dimensionality of self-determination theory's relative autonomy continuum. *Personality and Social Psychology Bulletin*, 43(9), 1215–1238. <https://doi.org/10.1177/0146167217711915>.
- Shonin, E., Van Gordon, W., & Griffiths, M. D. (2014). The emerging role of Buddhism in clinical psychology: Toward effective integration. *Psychology of Religion and Spirituality*, 6(2), 123–137. <https://doi.org/10.1037/a0035859>.
- Sulea, C., van Beek, I., Sarbescu, P., Virga, D., & Schaufeli, W. B. (2015). Engagement, boredom, and burnout among students: Basic need satisfaction matters more than personality traits. *Learning and Individual Differences*, 42, 132–138. <https://doi.org/10.1016/j.lindif.2015.08.018>.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. Boston: Pearson.
- Tran, U. S., Glück, T. M., & Nader, I. W. (2013). Investigating the Five Facet Mindfulness Questionnaire (FFMQ): Construction of a short form and evidence of a two-factor higher order structure of mindfulness. *Journal of Clinical Psychology*, 69(9), 951–965. <https://doi.org/10.1002/jclp.21996>.
- Tran, U. S., Cebolla, A., Glück, T. M., Soler, J., Garcia-Campayo, J., & Von Moy, T. (2014). The serenity of the meditating mind: A cross-cultural psychometric study on a two-factor higher order structure of mindfulness, its effects, and mechanisms related to

- mental health among experienced meditators. *PLoS ONE*, 9(10), e110192. <https://doi.org/10.1371/journal.pone.0110192>.
- Unanue, W., Dittmar, H., Vignoles, V. L., & Vansteenkiste, M. (2014). Materialism and wellbeing in the UK and Chile: Basic need satisfaction and basic need frustration as underlying psychological processes. *European Journal of Personality*, 28, 569–585. <https://doi.org/10.1002/per.1954>.
- Vallerand, R. J., & Bissonnette, R. (1992). Intrinsic, extrinsic, and amotivational styles as predictors of behavior: A prospective study. *Journal of Personality*, 60, 599–620. <https://doi.org/10.1111/j.1467-6494.1992.tb00922.x>.
- Van Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., ..., & Fox, K. C. (2018). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science*, 13(1), 36–61. <https://doi.org/10.1177/1745691617709589>
- Van Gordon, W., Shonin, E., Dunn, T. J., Garcia-Campayo, J., & Griffiths, M. D. (2017). Meditation awareness training for the treatment of fibromyalgia syndrome: A randomized controlled trial. *British Journal of Health Psychology*, 22(1), 186–206. <https://doi.org/10.1111/bjhp.12224>.
- Vinci, C., Peltier, M. R., Shah, S., Kinsaul, J., Waldo, K., McVay, M. A., et al. (2014). Effects of a brief mindfulness intervention on negative affect and urge to drink among college student drinkers. *Behaviour Research and Therapy*, 59, 82–93. <https://doi.org/10.1016/j.brat.2014.05.012>.
- Walach, H., Buchheld, N., Buttenmuller, V., Kleinknecht, N., & Schmidt, S. (2006). Measuring the Frieberg Mindfulness Inventory (FMI). *Personality and Individual Differences*, 40(8), 1543–1555. <https://doi.org/10.1016/j.paid.2005.11.025>.
- Wang, S., Wong, Y., & Yeh, K. (2016). Relationship harmony, dialectical coping, and nonattachment: Chinese indigenous well-being and mental health. *The Counselling Psychologist*, 44, 78–108. <https://doi.org/10.1177/001100001561646>.
- Warnecke, E., Quinn, S., Ogden, K., Towle, N., & Nelson, M. R. (2011). A randomised controlled trial of the effects of mindfulness practice on medical student stress levels. *Medical Education*, 45(4), 381–388. <https://doi.org/10.1111/j.1365-2923.2010.03877.x>.
- Weinstein, N., Ryan, R. M., & Deci, E. L. (2012). Motivation, meaning, and wellness: A self-determination perspective on the creation and internalization of personal meanings and life goals. In P. T. P. Wong (Ed.), *The human quest for meaning: Theories, research, and applications* (pp. 81–106). New York: Routledge.
- Whitehead, R., Bates, G., & Elphinstone, B. (2018). Stories of suffering and growth: An investigation of the lived experience of nonattachment. *Contemporary Buddhism*. <https://doi.org/10.1080/14639947.2018.1572311>.
- Whitehead, R., Bates, G., & Elphinstone, B. (2020). Growing by letting go: Nonattachment and mindfulness as a qualities of advanced adult development. *Journal of Adult Development*. <https://doi.org/10.1007/s10804-018-09326-5>.
- Whitehead, R., Bates, G., Elphinstone, B., Yan, Y., & Murray, G. (2019). Nonattachment mediates the relationship between mindfulness and psychological well-being, subjective well-being, and depression, anxiety and stress. *Journal of Happiness Studies*. <https://doi.org/10.1007/s10902-018-0041-9>.
- Wu, B. W. Y., Gao, J., Leung, H. K., & Sik, H. H. (2019). A Randomized Controlled Trial of Awareness Training Program (ATP), a Group-Based Mahayana Buddhist Intervention. *Mindfulness*, 10(7), 1280–1293. <https://doi.org/10.1007/s12671-018-1082-1>.
- Zepke, N., & Leach, L. (2005). Integration and adaptation: Approaches to the student retention and achievement puzzle. *Active Learning in Higher Education*, 6(1), 46–59. <https://doi.org/10.1177/1469787405049946>.

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