Mindfulness (2019) 10:1124–1135
https://doi.org/10.1007/s12671-018-1069-y

ORIGINAL PAPER

Mindfulness and Symptoms of Depression and Anxiety: the Underlying Roles of Awareness, Acceptance, Impulse Control, and Emotion Regulation

Rebecca Y. M. Cheung [1] · Melody C. Y. Ng [2]

Published online: 27 November 2018

Abstract

The present prospective study tested the mediating processes between mindfulness and symptoms of depression and anxiety among Chinese emerging adults in Hong Kong. A total of 333 emerging adults between 18 and 26 years of age (male = 95; female = 238) completed a questionnaire for four times in two consecutive years, with each time point spanning 6 months apart. Findings based on multi-group path analysis and bootstrapping indicated that the longitudinal association between mindfulness and depressive symptoms was mediated by regulatory processes including awareness and acceptance of negative emotions, impulse control difficulties, and emotion regulation, regardless of gender. A marginal trend was also indicated for the mediation processes between mindfulness and anxiety symptoms. The present findings underscore the importance of mindfulness in mental health through a chain of longitudinal mediating mechanisms. In addition to enriching the mindfulness literature in diverse ecological contexts, evidence was advanced to inform prevention and intervention efforts in promoting mindfulness as an asset associated with mental health.

Keywords Mindfulness · Emotion regulation · Executive function · Mental health · Impulse control

The study of mindfulness and well-being has aroused an increasing scholarly interest over the last two decades (Garland et al. 2017; Keng et al. 2011). Mindfulness is a mental state of awareness, a psychological process, and a set of practices that drive individuals to directly contact with the present moment (Chambers et al. 2015; Coffey et al. 2010; Hofmann et al. 2010). Mindfulness emphasizes on paying attention to the present moment, including inner experiences such as thoughts and emotions, through a non-judgmental attitude (Hill and Updegraff 2012; Kabat-Zinn 1994). It can be defined either as a disposition or a set of meditative/therapeutic technique that requires practitioners to be aware of the present moment and to observe and accept thoughts and emotions nonjudgmentally (Kabat-Zinn 1990). Mindfulness is associated with a number of adjustment outcomes, including better well-being, better focus and attention, and fewer symptoms of depression anxiety (e.g., Baer et al. 2012; Bowlin and Baer 2012; Bränström et al. 2011; Chambers et al. 2009; Chambers et al. 2008; Hollis-Walker and Colosimo 2011; Lyvers et al. 2014; Roemer et al. 2009).

The precise mechanisms underlying the effect of mindfulness have received recent theoretical attention (e.g., Garland et al. 2015; Lindsay and Creswell 2017; Teper et al. 2013). Importantly, scholars highlighted emotion regulation as one of the core correlates of dispositional mindfulness and mental health (Chambers et al. 2009; Desrosiers et al. 2013). Emotion regulation refers to the process of modulating one or more aspects of emotional experiences and expressions in response to environmental demands (Gross 1998; Cole et al. 2004). Teper et al. (2013) proposed a conceptual model of mindfulness and emotion regulation, in that mindfulness fosters emotion regulation through the underlying pathways of cognitive and emotional processing. According to the model, the cultivation of mindfulness is associated with an open acceptance of negative experiences, as opposed to critical judgment, denial, or thought and emotion suppression.

✉ Rebecca Y. M. Cheung
rymcheung@eduhk.hk

[1] Department of Early Childhood Education, Centre for Child and Family Science, and Centre for Psychosocial Health, The Education University of Hong Kong, B2-2/F-41, 10 Lo Ping Road, Tai Po, N.T, Hong Kong

[2] Centre for Child and Family Science, The Education University of Hong Kong, Tai Po, 10 Lo Ping Road, Hong Kong

Importantly, dispositional mindfulness and experiences of meditation foster an open acceptance of errors and their associated affective response (Roemer and Orsillo 2002). Such an open acceptance facilitates non-biased awareness and observation of the experience, which makes room for cue detection (Lindsay and Creswell 2017; Teper et al. 2013). At the same time, mindfulness is directly associated with non-biased awareness, which encapsulates continuous attention of the present moment and subtle emotional changes (Cardaciotto et al. 2008). The non-biased awareness may, in turn, facilitate acceptance through individuals' attendance to and detection of affective cues (Teper et al. 2013; see also Lindsay and Creswell 2017, for a discussion of attention monitoring and acceptance as mechanisms underlying dispositional mindfulness and mindfulness training). Returning to the conceptual model proposed by Teper et al. (2013), open acceptance and non-biased awareness are integral to executive control, i.e., the ability to shift between tasks or attention, to monitor and update information, to inhibit dominant responses, and to be cognitively flexible (Miyake et al. 2000). Executive control may, in turn, facilitate emotion regulation and mental health by virtue of an increased ability to exercise self-control (Baumeister et al. 2007).

Numerous studies have lent support to the relations between mindfulness, emotional awareness, and emotional acceptance in community samples (e.g., Jha et al. 2007; Lattimore et al. 2011; Moore and Malinowski 2009; Peters et al. 2011; Thompson and Waltz 2008). Notably, individuals who received an 8-week mindfulness-based stress reduction course performed significantly better in a cognitive switching task than did the randomized control group, suggesting that mindfulness training is central to facilitating attentional processing (Jha et al. 2007). Likewise, Moore and Malinowski (2009) found that meditators participating in a 6-week mindfulness meditation course showed greater awareness and acceptance than did non-meditators. Aside from awareness and acceptance, mindfulness was also associated with executive control, which encompasses cognitive processes such as the inhibition of dominant impulses (Diamond 2013; Oberle et al. 2012; Peters et al. 2011). Notably, self-reported dispositional mindfulness was closely related to inhibitory control and impulsivity, uncontrolled eating, and alcohol consumption (e.g., Lattimore et al. 2011; Lyvers et al. 2014; Murphy and MacKillop 2012; Oberle et al. 2012; Peters et al. 2011). By acting mindlessly without full attention, individuals were more likely to experience impulse control difficulties (Peters et al. 2011). Altogether, extant findings highlighted the complex associations between mindfulness, awareness, nonjudgmental acceptance, and inhibitory control related to mental health and psychological distress.

Emotion regulation has received increasing empirical attention as a process in further linking mindfulness and mental health (Jimenez et al. 2010; Mandal et al. 2017; Roemer et al. 2015). By facilitating nonjudgmental awareness and attention in the present moment, mindfulness improves individuals' affective detection, thereby enhancing their inhibitory learning and emotion regulation (Roemer et al. 2015). Improved emotion regulation may, then, foster the reduction of the automatic self-referential processing related to emotional distress (Roemer et al. 2015). For example, in a cross-sectional study, Jimenez et al. (2010) found that the relation between college students' self-reported dispositional mindfulness and depressive symptoms was mediated by self-acceptance and emotion regulation. Specifically, greater dispositional mindfulness was associated with greater self-acceptance and emotion regulation, both of which were linked to fewer depressive symptoms. In another self-reported study, college students' emotion regulation mediated between dispositional mindfulness and mental health (Coffey et al. 2010).

Previous studies demonstrated the mediation effect of specific emotion regulation strategies, such as cognitive reappraisal, between dispositional mindfulness and mental health outcomes (e.g., Curtiss et al. 2017; Desrosiers et al. 2013; Garland et al. 2011). Notably, a study conducted by Garland et al. (2011) found that self-reported dispositional mindfulness and perceived stress were mediated by positive reappraisal in a community sample. In a randomized controlled trial of mindfulness meditation, Jain et al. (2007) also found that mindfulness meditation was associated with self-reports of reduced psychological distress through rumination. Similarly, Chambers et al. (2008) found that mindfulness mediation was associated with self-reports of reduced rumination, negative affect, and depressive symptoms. The significance of emotion regulation as a mediator between mindfulness and adjustment outcomes was also noted in clinical samples. For example, a cross-sectional study conducted with a clinical sample indicated that self-reported cognitive reappraisal mediated between dispositional mindfulness and depressive symptoms (Desrosiers et al. 2013). Specifically, mindfulness predicted better cognitive reappraisal, which in turn predicted fewer depressive symptoms. In another cross-sectional study, Curtiss et al. (2017) found that self-reported cognitive reappraisal and expressive suppression mediated between dispositional mindfulness and psychological distress symptoms. Altogether, findings accumulated to date suggested that emotion regulation serves as a core process between mindfulness and mental health.

Although mindfulness training was found to benefit Western community samples, the study of mindfulness in the Chinese context remains under-explored (Lau and Hue 2011). Among the handful of recent findings, Lau and Hue (2011) found that individuals from Hong Kong who received a 6-week mindfulness-based program revealed a significant increase in well-being and decrease in depressive symptoms and anxiety symptoms. In another study, Wong et al. (2016) found that an 8-week mindfulness-based cognitive therapy

course predicted a reduction of anxiety in a Hong Kong clinical sample. Similar findings in symptom reduction were revealed in a Chinese clinical sample that utilized compassion–mindfulness therapy (Lo et al. 2015). Although cultural similarities were observed in the association between mindfulness and mental health outcomes, there exist cultural differences in emotion regulation and its association with mental health between Chinese and Westerns samples (e.g., Matsumoto et al. 2008; Soto et al. 2011; Tsai et al. 2017). For example, Soto et al. (2011) found that emotion suppression was associated with mental health outcomes among European Americans from the USA, but not among Chinese individuals from Hong Kong. In another study, R. Y. M. Cheung and Park (2010) found that while anger suppression was associated with depressive symptoms in both Asian and European American samples, its strength of association differed across cultures.

The fact that the Chinese culture emphasizes in-group harmony (Smith 2010; Leung et al. 2002) may enhance non-judgmental acceptance towards negative emotions experienced by the self (Hall et al. 2011), such that individuals are harmonious with others or with the environment (Hall et al. 2011). Nevertheless, as discussed earlier, emotional acceptance may not be the same as emotional expression, as Chinese individuals also have a greater tendency to suppress emotions than their Western counterparts (Matsumoto et al. 2008). Importantly, although the cultural emphasis on face concern (e.g., Ho 1976; Smith 2010) may enhance interpersonal harmony, it may undermine intrapersonal harmony. Collectivism may also bring about concerns over individuals' relations with other people that may give rise to anxiety (Caldwell-Harris and Aycicegi 2006). Given the complexity of harmony in the Chinese context, understanding the relation between mindfulness, emotion regulation, and psychological symptoms is extremely important in providing culture specificity and generalizability of the conceptual model (Teper et al. 2013).

Grounded in a conceptual model of mindfulness and emotion regulation (Teper et al. 2013), the present study aims to test multiple mediating processes between mindfulness and outcome variables, including depression and anxiety symptoms, in a sample of Chinese emerging adults (see Fig. 1). Controlling for baseline measures at time 1, awareness and acceptance of negative emotions, impulse control difficulties, and limited access to emotion regulation strategies were hypothesized to mediate between mindfulness and psychological distress, as indexed by symptoms of depression and anxiety. Based on previous research showing gender differences in mindfulness, emotion regulation, and psychological distress (e.g., Soysa and Wilcomb 2015), the moderating role of gender was tested in a multi-group path model.

Method

Participants

Participants were 333 Chinese emerging adults in Hong Kong (male = 95; female = 238) recruited online and through mass e-mailing. Participants were between 18 and 26 years of age, with a mean age of 19.96 years at time 1 (SD = 1.69 years). The retention rate at each time point was fairly high. Specifically, 87.09% (n = 290) of the participants from time 1 (T1) were retained at time 2 (T2); 95.51% (n = 277) of the participants from T2 were retained at time 3 (T3); and 90.25% (n = 250) of the participants from T3 were retained at time 4 (T4).

Procedure

The study was approved by the Human Research Ethics Committee prior to its implementation. Informed consent was obtained prior to the administration of the questionnaire. Upon informed consent, participants completed baseline measures described below. They were invited to complete follow-up questionnaires for four times in two consecutive years, with each time point spanning 6 months apart. Participants received a supermarket coupon at each time point (totaling HK$250/US$32.05 for four time points) as a token of appreciation for their participation.

Measures

Mindfulness The Chinese version of the 39-item Five Facet Mindfulness Questionnaire (FFMQ, Baer et al. 2006) was used to assess mindfulness. Sample items included, "I pay

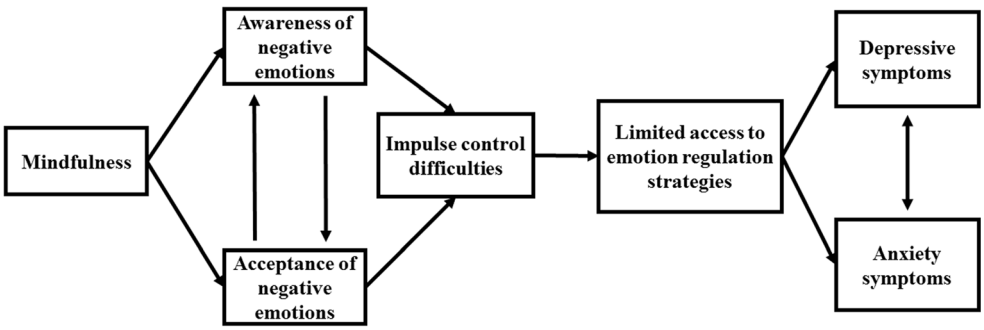

Fig. 1 Conceptual model of processes between mindfulness and symptoms of depression and anxiety

attention to sensations, such as the wind in my hair or sun on my face" and "I rush through activities without being really attentive to them." Participants rated on a 5-point scale from 1 (*never or very rarely true*) to 5 (*very often or always true*). The item scores were averaged to form a composite score of mindfulness, with higher scores indicating greater mindfulness. The FFMQ has been validated previously in Chinese community samples (Deng et al. 2011; Hou et al. 2014). The measure had adequate internal consistency with Cronbach's alpha = .83.

Awareness of Negative Emotions The 6-item Emotional Awareness subscale of the Difficulties in Emotion Regulation Scale (DERS; Gratz and Roemer 2004) was used to measure participants' awareness of emotions on a 5-point scale from 1 (*almost never*) to 5 (*almost always*). Following the back-translation procedures (Brislin 1970), the DERS was translated from English to Chinese by two independent research assistants. Discrepancies were resolved by the first author upon follow-up discussions. Sample items included, "When I'm upset, I believe that my feelings are valid and important" and "I care about what I am feeling." The item scores were reverse-coded and averaged to form a composite score of awareness of negative emotions, with higher scores indicating greater awareness. The measure had been validated in a Mainland Chinese sample (Wang et al. 2007). Confirmatory factor analysis of the present Chinese measure at T1 yielded excellent fit to the data, χ^2 (5) = 4.23, p = .52, CFI = 1.00, TLI = 1.00, RMSEA = .00, SRMR = .01. All of the factor loadings were significant at ps < .01. The measure also had adequate internal consistency with Cronbach's alpha = .71 at T1 and .74 at T2.

Acceptance of Negative Emotions The 6-item Emotional Acceptance subscale of DERS (Gratz and Roemer 2004) was used to measure participants' awareness of emotions on a 5-point scale from 1 (*almost never*) to 5 (*almost always*). Following the back-translation procedures (Brislin 1970), the DERS was translated from English to Chinese by two independent research assistants. Discrepancies were resolved by the first author upon follow-up discussions. Sample items included, "When I'm upset, I feel ashamed with myself for feeling that way" and "When I'm upset, I become irritated with myself for feeling that way." The item scores were reverse-coded and averaged, such that the composite score reflected acceptance of negative emotions, with higher scores indicating greater acceptance. Confirmatory factor analysis of the present Chinese measure at T1 yielded acceptable fit to the data, χ^2 (5) = 17.43, p = .07, CFI = .98, TLI = .95, RMSEA = .09, SRMR = .03. All of the factor loadings were significant at p < .001. The measure also demonstrated adequate internal consistency with Cronbach's alpha = .85 at T1 and .87 at T2.

Impulse Control Difficulties The 6-item Impulse Control Difficulties subscale of DERS (Gratz and Roemer 2004) was used to measure participants' awareness of emotions on a 5-point scale from 1 (*almost never*) to 5 (*almost always*). Following the back-translation procedures (Brislin 1970), the DERS was translated from English to Chinese by two independent research assistants. Discrepancies were resolved by the first author upon follow-up discussions. Sample items included "When I'm upset, I have difficulty controlling my behaviors" and "I experience my emotions as overwhelming and out of control." The item scores were averaged to form a composite score of impulse control difficulties, with higher scores indicating greater difficulties. Confirmatory factor analysis of the present Chinese measure at T1 yielded excellent fit to the data, χ^2 (5) = 9.21, p = .10, CFI = 1.00, TLI = .99, RMSEA = .05, SRMR = .02. All of the factor loadings were significant at p < .001. The measure demonstrated adequate internal consistency with Cronbach's alpha = .86 at T1 and .85 at T3.

Limited Access to Emotion Regulation Strategies The 8-item Limited Access to Emotion Regulation Strategies subscale of DERS (Gratz and Roemer 2004) was used to measure participants' awareness of emotions on a 5-point scale from 1 (*almost never*) to 5 (*almost always*). Following the back-translation procedures (Brislin 1970), the DERS was translated from English to Chinese by two independent research assistants. Discrepancies were resolved by the first author upon follow-up discussions. Sample items included, "When I'm upset, I believe that there is nothing I can do to make myself feel better" and "When I'm upset, I believe that I will remain that way for a long time." The item scores were averaged to form a composite score of limited emotion regulation strategies, with higher scores indicating greater limited strategies. Confirmatory factor analysis of the present Chinese measure at T1 yielded good fit to the data, χ^2 (16) = 29.28, p = .02, CFI = .99, TLI = .98, RMSEA = .05, SRMR = .03. All of the factor loadings were significant at p < .001. The measure demonstrated adequate internal consistency with Cronbach's alpha = .86 at T1 and .87 at T4.

Depressive Symptoms The 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff 1977) was used to measure depressive symptoms in the past week on a 4-point scale from 1 (*rarely or none of the time, less than 1 day*) to 4 (*most or all of the time, 5–7 days*). Sample items included, "I felt depressed" and "I felt sad." The item scores were summed to form a composite score of depressive symptoms, with higher scores indicating more symptoms. The measure has previously been validated in a Chinese community sample (C. K. Cheung and Bagley 1998). The measure demonstrated adequate internal consistency with Cronbach's alpha = .91 at T1 and .84 at T4.

Anxiety Symptoms The 7-item Generalized Anxiety Disorder-7 measure (GAD-7; Spitzer et al. 2006) was used to measure depressive symptoms in the past 2 weeks on a 4-point scale from 0 (*not at all*) to 3 (*nearly every day*). Sample items included "Not being able to stop or control worrying" and "Feeling nervous, anxious or on edge." The item scores were averaged to form a composite score of anxiety symptoms, with higher scores indicating more symptoms. The measure has previously been validated in a Chinese sample of hospital outpatients (He et al. 2010) and a sample of Chinese individuals with epilepsy (Tong et al. 2016). Confirmatory factor analysis for the present community sample of emerging adults at T1 yielded good fit to the data, χ^2 (10) = 26.62, p = .003, CFI = .99, TLI = .98, RMSEA = .07, SRMR = .02. All of the factor loadings were significant at p < .001. The measure demonstrated adequate internal consistency with Cronbach's alpha = .93 at T1 and .94 at T4.

Data Analysis

Zero-order correlations, means, and standard deviations were conducted as preliminary analyses for all study variables. Multi-group path analysis was then used to test the central hypotheses for this study between genders. MPLUS, Version 7 (Muthén and Muthén 2012) was used to investigate the path model of awareness, attention, impulse control difficulties, and limited access to emotion regulation strategies between mindfulness and adjustment outcomes, including depressive and anxiety symptoms, over and above the effect of baseline measures. More specifically, T1 mindfulness was entered to predict T2 awareness and T2 attention. T2 awareness and T2 attention was entered to predict each other contemporaneously. T2 awareness and T2 attention were, then, entered to predict T3 impulse control difficulties. T3 impulse control difficulties were entered to further predict T4 limited access to emotion regulation strategies, which was, then, entered to predict T4 depressive and anxiety symptoms. All measures were controlled at T1 and direct effects were included between all predictors and outcome variables (e.g., T1 mindfulness and T4 depressive symptoms; T2 awareness and T4 anxiety symptoms). Maximum likelihood method was used to investigate the model fit to the observed matrices of variance and covariance. Full information maximum likelihood estimation was used to handle missingness. Bootstrapping was used to evaluate the mediation effects, as it could yield more accurate estimates of the indirect effect standard errors than other approaches to testing mediation (Shrout and Bolger 2002).

Results

Table 1 shows the zero-order correlations, means, and standard deviations for all variables under study.

In the first step of the multi-group path analysis, all parameters were freely estimated between genders. In the next step, the unstandardized parameter estimates were constrained to be invariant between genders. A non-significant χ^2 difference between the two models infers that the simpler model with constrained paths should be selected due to parsimony. In step 1, allowing all paths to differ between gender yielded good fit to the data, $\chi^2(56) = 94.64$, p = .001, CFI = .97, TLI = .93, RMSEA = .06, SRMR = .05. In step 2, gender similarities were demonstrated through a non-significant χ^2 difference test between the models, after constraining all paths to be equal, $\Delta\chi^2(27) = 30.30$, p = .30. Therefore, the findings demonstrated universality of the model between genders, with the constrained model yielding good fit to the data, χ^2 (83) = 124.94, p = .002, CFI = .96, TLI = .95, RMSEA = .06, SRMR = .06.

Table 2 indicates the parameter estimates in the multi-group path model, with unstandardized *B*s and *SE*s constrained to be equal between genders. Controlling for T1 awareness and acceptance of negative emotions, T1 mindfulness predicted T2 awareness of negative emotions (β_{male} = .17; β_{female} = .19, ps < .01) and T2 acceptance of negative emotions (β_{male} = .13; β_{female} = .14, ps < .05). However, T2 awareness and acceptance of negative emotions did not predict each other, ps > .05. T2 awareness and acceptance of negative emotions further predicted T3 impulse control difficulties (awareness: β_{male} and β_{female} = − .14, respectively, ps < .01; acceptance: β_{male} = − .21; β_{female} = − .23, respectively, ps < .001). T2 acceptance of negative emotions and T3 impulse control difficulties, in turn, predicted T4 limited access to emotion regulation strategies (acceptance: β_{male} and β_{female} = − .30, respectively, ps < .001; impulse control: β_{male} = .19; β_{female} = .18, ps < .01). Finally, T4 limited access to emotion regulation strategies predicted T4 outcomes, including depressive symptoms (β_{male} = .52; β_{female} = .54, ps < .001) and anxiety symptoms (β_{male} and β_{female} = .33, respectively, ps < .001). In addition, T4 depressive symptoms were negatively predicted by T2 awareness to negative emotions (β_{male} = − .16; β_{female} = − .15, ps < .01). Autoregressive control variables at T1 were incorporated in the model for all study variables and the predictions were significant at ps < .001.

The mediating roles of awareness, acceptance, and impulse control difficulties between mindfulness and limited access to emotion regulation strategies were tested via bootstrapping based on 1000 bootstrap samples with replacement. Prior to bootstrapping, the indirect effects (i.e., the product of regression coefficients) between mindfulness and limited access to emotion regulation strategies were significant (β_{male} and β_{female} = − .06, respectively, ps < .01). The 95% confidence interval (CI) further indicated that the unstandardized indirect effect of mindfulness on limited access to emotion regulation strategies did not include a zero [CI: (− .11, − .02)], suggesting

Table 1 Zero-order correlations, means, and standard deviations of the study variables

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Gender	–														
(2) Age	− .08	–													
(3) T1 mindfulness	.04	.06	–												
(4) T1 awareness of negative emotions	− .04	.02	.38***	–											
(5) T1 acceptance of negative emotions	.04	.05	.34***	− .10	–										
(6) T1 impulse control difficulties	.02	− .05	− .42***	− .02	− .55***	–									
(7) T1 limited access to emotion regulation strategies	− .04	− .03	− .42***	.02	− .66***	.76***	–								
(8) T1 depressive symptoms	.01	.00	− .45***	− .05	− .55***	.57***	.66***	–							
(9) T1 anxiety symptoms	.01	.05	− .29***	.03	− .52***	.55***	.58***	.78***	–						
(10) T2 awareness of negative emotions	− .07	.05	.37***	.59***	− .02	.04	.00	− .07	− .01	–					
(11) T2 acceptance of negative emotions	− .05	.00	.33***	− .03	.66***	− .48***	− .57***	− .57***	− .53***	− .10	–				
(12) T3 impulse control difficulties	.00	.10	− .42***	− .06	− .49***	.65***	.58***	.51***	.49***	− .12*	− .49***	–			
(13) T4 limited access to emotion regulation strategies	.07	− .01	− .36***	.04	− .47***	.51***	.59***	.47***	.48***	− .05	− .55***	.53***	–		
(14) T4 depressive symptoms	.05	− .07	− .39***	− .09	− .41***	.38***	.44***	.55***	.51***	− .19**	− .47***	.45***	.69***	–	
(15) T4 anxiety symptoms	.03	.07	− .25***	.04	− .34***	.38***	.35***	.48***	.54***	− .04	− .41***	.44***	.54***	.74***	–
M	–	19.96	3.14	3.61	3.45	2.03	2.27	15.66	.87	3.60	3.47	2.01	2.27	17.52	.91
SD	–	1.68	.36	.64	.89	.79	.78	9.45	.70	.64	.90	.75	.79	10.52	.73

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

that baseline mindfulness was associated with a chain of mechanisms including greater awareness and acceptance of negative emotions at T2, lower impulse control difficulties at T3, and greater access to emotion regulation strategies at T4.

Next, the mediating roles of awareness, acceptance, impulse control difficulties, and limited access to emotion regulation strategies between mindfulness and mental health outcomes were tested via bootstrapping based on 1000 bootstrap samples with replacement. Prior to bootstrapping, the indirect effect between mindfulness and depressive symptoms was significant (β_{male} and $\beta_{female} = -.09$, respectively, $ps < .05$). The 95% CI indicated that the unstandardized indirect effect of mindfulness on depressive symptoms did not include a zero [CI: (− .16, − .02)], suggesting mediation processes, i.e., baseline mindfulness was associated with greater awareness and acceptance of negative emotions at T2, which in turn was associated with lower impulse control difficulties at T3, and was further associated with greater access to emotion regulation strategies and fewer depressive symptoms at T4. Although a trend of indirect effect between mindfulness and anxiety symptoms was found (β_{male} and $\beta_{female} = -.05$, respectively, $ps = .08$), the 95% CI indicated that the unstandardized indirect effect of mindfulness on anxiety symptoms did include a zero [CI: (− .11, .006)]. Consequently, the tested processes did not serve as mediators between mindfulness and anxiety symptoms.

Discussion

Building on a theoretical model of mindfulness and emotion regulation (Teper et al. 2013), this prospective study investigated the mediating roles of cognitive and emotional processes between mindfulness and psychological distress, including symptoms of depression and anxiety, in a Chinese emerging adult sample. Unique findings emerged to suggest that mindfulness was related to fewer symptoms of depression through a chain of underlying mechanisms, including greater awareness and acceptance of negative emotions, fewer impulse control difficulties, and more adequate use of emotion regulation strategies. Gender similarities were demonstrated to reflect homogenous pathways between genders in the path model. A marginal, though nonsignificant, trend was also indicated for the mediation effects between mindfulness and anxiety symptoms. These findings add to the accumulating evidence concerning the processes linking mindfulness and mental health (e.g., Bränström et al. 2011; Carsley et al. 2018; Chambers et al. 2009; Lyvers et al. 2014; Roemer et al. 2009). The findings also advance the extant literature by establishing the association between mindfulness and psychological distress using a longitudinal, process-oriented approach.

Table 2 Unstandardized parameter estimates, standard errors, and *p* values in the model

Parameter	Unstandardized B (SE)	Standardized β (male/**female**)
Path model parameters		
T1 mindfulness		
→ T2 awareness of negative emotions	.32 (.10)**	.16**/**.19****
→ T2 acceptance of negative emotions	.34 (.15)*	.13*/**.14***
→ T3 impulse control difficulties	.13 (.11)	−.06/−**.04**
→ T4 limited access to emotion regulation strategies	−.08 (.13)	−.04/−**.04**
→ T4 depressive symptoms	−.01 (.08)	−.01/−**.01**
→ T4 anxiety symptoms	−.04 (.12)	.02/**.02**
T2 awareness of negative emotions		
→ T2 acceptance of negative emotions	−.07 (.13)	−.05/−**.05**
→ T3 impulse control difficulties	−.16 (.06)**	−.14**/−**.14****
→ T4 limited access to emotion regulation strategies	−.02 (.06)	−.02/−**.02**
→ T4 depressive symptoms	−.12 (.04)***	−.16**/−**.15****
→ T4 anxiety symptoms	−.01 (.06)	−.01/−**.01**
T2 acceptance of negative emotions		
→ T2 awareness of negative emotions	−.07 (.13)	−.04/−**.04**
→ T3 impulse control difficulties	−.19 (.04)***	−.21***/−**.23*****
→ T4 limited access to emotion regulation strategies	−.26 (.05)***	−.30***/−**.30*****
→ T4 depressive symptoms	−.03 (.03)	−.05/−**.05**
→ T4 anxiety symptoms	−.04 (.05)	−.04/−**.04**
T3 impulse control difficulties		
→ T4 limited access to emotion regulation strategies	.19 (.06)**	.19**/**.18****
→ T4 depressive symptoms	.01 (.04)	.01/**.01**
→ T4 anxiety symptoms	.10 (.06)	.11/**.10**
T4 limited access to emotion regulation strategies		
→ T4 depressive symptoms	.35 (.04)***	.52***/**.54*****
→ T4 anxiety symptoms	.30 (.06)***	.33***/**.33*****
Autoregressive control parameters		
T1 → T2 awareness of negative emotions	.50 (.05)***	.51***/**.51*****
T1 → T2 acceptance of negative emotions	.63 (.05)***	.64***/**.61*****
T1 → T3 impulse control difficulties	.49 (.05)***	.48***/**.54*****
T1 → T4 limited access to emotion regulation strategies	.31 (.06)***	.32***/**.31*****
T1 → T4 depressive symptoms	.26 (.06)***	.25***/**.23*****
T1 → T4 anxiety symptoms	.31 (.06)***	.33***/**.30*****
Covariance		
T4 depressive symptoms ← → T4 anxiety symptoms	.10 (.02)***	.59***/**.57*****

Note. Model findings by gender are shown in plain (male) and bold (female). * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Unique to this study is the model substantiating the mediation findings over and above the effects of autoregressive control (see Fig. 2). By orienting fully to the present experience and paying attention "on purpose, in the present moment, and non-judgmentally" (Kabat-Zinn 1994; see also Bishop et al. 2004), mindfulness enhanced emerging adults' awareness of their negative emotions. The non-judgmental emphasis of mindfulness was also related to unbiased acceptance of emotions associated with upsetting experiences, such that individuals were less preoccupied with avoiding, invalidating, or rejecting these emotions. On the contrary, when individuals engaged in a state of "autopilot" condition (Germer et al. 2016), they missed invaluable opportunities to observe, understand, and accept the emotions arising in the

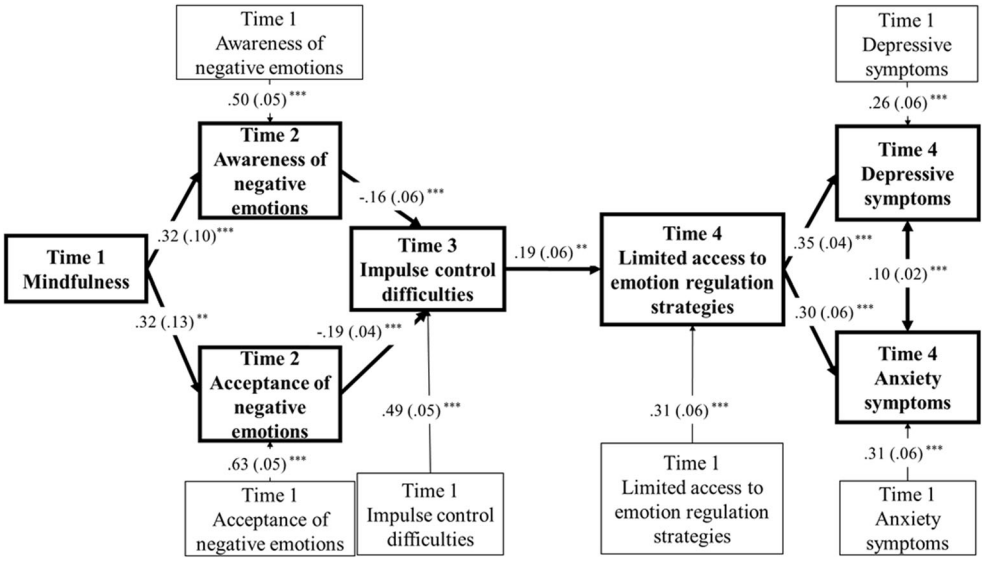

Fig. 2 Mediation findings between mindfulness and symptoms of depression and anxiety. $\chi^2(83) = 124.94$, $p = .001$, CFI = .96, TLI = .95, RMSEA = .06, SRMR = .06. $^{**}p \leq .001$, $^{***}p \leq .001$. Unstandardized parameter estimates and standard errors in parentheses are presented (see Table 2 for detailed findings). Direct effects are not included for the purpose of clarity

present moment, thereby jeopardizing their subsequent regulatory processes and mental health.

Surprisingly, although the awareness and the acceptance of negative emotions were both associated with mindfulness, they were not correlated with each other within and between T1 and T2 (see Table 1). Likewise, the path model revealed that awareness and acceptance did not predict one another. These findings were intriguing, as they indicated that attentiveness to negative emotions was not sufficient to promote non-judgmental acceptance of the emotions (Cardaciotto et al. 2008). Likewise, accepting negative emotions without judgment or prejudice did not necessarily foster greater awareness of these emotions. Previous studies conducted in Western societies indicated that acceptance and awareness of negative emotions were weakly but significantly associated (e.g., Giromini et al. 2012; Gratz and Roemer 2004), whereas other studies indicated a negligible association (e.g., Weinberg and Klonsky 2009). The present findings suggested that acceptance and awareness were not significantly related to each other over time in the Chinese context. Given the inconsistent findings in the literature, future use of multiple methods and measures is needed to decipher how emotional acceptance and awareness are associated with each other (or not) in relation to dispositional mindfulness and mental health in diverse contexts.

Returning to Fig. 2, both awareness and acceptance of negative emotions predicted impulse control difficulties, which served as an index of executive control. Although the present research did not examine momentary changes between awareness, acceptance, and impulse control difficulties, thereby precluding us from revealing causal and moment-to-moment effects, we found that attuning to the present moment was longitudinally associated with a greater opportunity for individuals to deliberately observe, attend to, and accept their upsetting emotions non-judgmentally (Kabat-Zinn 1994). The unbiased observation and open acceptance were, then, linked to individuals' efficiency in responding to affective cues (Roemer and Orsillo 2002; Teper et al. 2013) and a lower tendency to perceive that the negative emotions were overwhelming and hard to control. Altogether, these processes might lessen impulsive urges (see also Peters et al. 2011) associated with adjustment problems. With greater emotional acceptance and fewer impulse control difficulties, individuals were, in turn, more likely to gain access to emotion regulation strategies that were necessary to relieve their upsetting emotions and/or experiences. Altogether, the present findings supported Teper et al. (2013) conceptual framework, in that awareness, acceptance, and executive control served as important processes between mindfulness and emotion regulation. Regardless of gender, dwelling in the present moment purposefully and non-judgmentally predicted better emotion regulation over time. Extending Teper et al. framework, our findings also revealed that depressive symptoms and anxiety problems accrued as a result of mindlessness, impulse control difficulties, and emotion dysregulation. These findings echoed with previous evidence on the association between emerging adults' emotion dysregulation and poorer mental health (e.g., R. Y. M. Cheung and Park 2010; R. Y. M. Cheung et al. 2018; Gross 1998; Hu et al. 2014; Klemanski et al. 2017; Rodriguez et al. 2016). By providing longitudinal support for the effect of mindfulness on mental health, the present findings serve important functions to inform prevention and intervention efforts in mental health promotion.

Limitations and Future Directions

The study has several limitations that merit consideration. First of all, the autoregressive control variables were limited

to T1. In addition, the study consisted of four, instead of five, time points to demonstrate the temporal sequence among variables. According to Cole and Maxwell (2003), the rigor of longitudinal mediation models can be strengthened by including autoregressive control variables at all time points. Second, in this study, we did not measure cultural correlates of mindfulness, emotion regulation, and mental health. Given that previous research demonstrated cultural variations in the association between emotion regulation and mental health (e.g., Hu et al. 2014; Markus and Kitayama 1991; Matsumoto et al. 2008), future studies are necessary to determinate how the model is similar or different across cultures. Moreover, the emphasis of harmony in the Chinese culture (Smith 2010; Leung et al. 2002) may foster non-judgmental orientations toward negative emotions and experiences and expressive suppression at the same time. Given the relevance of culture, future work is necessary to examine the effect of cultural values on mindfulness, emotion regulation, and mental health.

In addition to culture, the gender imbalance of the present sample (male = 95; female = 238) limits generalizability of the findings, particularly to men. Consistent with previous research suggesting gender similarities of the relationship between mindfulness and mental health (e.g., Bränström et al. 2011; Carsley et al. 2018; Chambers et al. 2009; Lyvers et al. 2014; Roemer et al. 2009), future studies are necessary to examine the relation in a larger, gender-balanced sample. Fourth, the present study utilized self-report measures. Future studies may use a multi-informant and multi-method approach (e.g., physiological measures, observational measures, and questionnaires) to increase objectivity. Fifth, subscales of DERS were used as independent variables in the path model. Although previous research demonstrated differential predictability of DERS subscales on psychological outcomes (e.g., Bardeen and Stevens 2015; Bender et al. 2012; Bonn-Miller et al. 2008; Merwin et al. 2010), the subscales were generally correlated based on findings in validation studies (Bardeen et al. 2012; Weinberg and Klonsky 2009). In order to maximize independence among variables, future work should utilize different methods and multiple measures to assess each variable of interest.

Next, beyond the investigation of the purported model, it is possible that the predictions occur in a reverse order, such that psychological outcomes predict mindfulness via limited access to emotion regulation strategies, impulse control difficulties, and awareness and acceptance of negative emotions. It is also possible that multiple processes co-occur to predict well-being outcomes. Although theories are necessary to guide the hypothesized pathways, future research should collect more data to rule out reverse directionality of effects. Seventh, given the present sample of emerging adults, the degree to which the findings can be generalized to other developmental periods is uncertain, such as early adolescence or older adulthood. Also, as previous research suggested that community and clinical samples showed differences in the relationship between emotion regulation strategies and mental health (e.g., Garnefski et al. 2002; Roemer et al. 2015), future work is needed to compare and contrast the processes between community and clinical samples across developmental periods to demonstrate specificity.

Finally, the present study examined dysregulation of negative emotions as a mediating mechanism. Future studies may test competing theories to investigate how specific emotion regulation strategies (e.g., rumination, expressive suppression, and cognitive reappraisal) and specific emotions (e.g., happiness vs. anger) are associated with mindfulness and mental health. For example, Garland et al. (2015) conceptualized an upward regulation model, in that mindfulness generates positive emotion regulation that ultimately leads to meaningfulness in life, whereas Teper et al. (2013) focused on downward regulation of negative emotions via executive control using mindfulness. Testing competing models (e.g., upward vs. downward regulation of positive vs. negative emotions) can, ultimately, illuminate the determining processes between mindfulness and well-being. Notably, the up-regulation of positive emotions may serve as an important process to enhance mental health and alleviate psychological distress (e.g., R. Y. M. Cheung et al. 2018; Kiken et al. 2017).

Notwithstanding the above limitations, this study broadens the literature by providing new information about the longitudinal mediating mechanisms between mindfulness and mental health in a community context. These findings not only lend longitudinal support to the Teper et al. (2013) theoretical model, but also makes an initial effort to apply the model to an Eastern society.

This study calls attention to the relation between mindfulness and mental health through multiple underlying emotional processes, including emotional awareness and acceptance, impulse control difficulties, and emotion regulation. Grounded in a conceptual model of mindfulness and emotion regulation (Teper et al. 2013), the findings emphasized the unfolding cognitive and emotional benefits associated with mindfulness, regardless of gender. The study also underscores the longitudinal prediction of mindfulness on psychological distress in emerging adulthood, including depression and anxiety symptoms. Further to these findings, examination of competing theories of mindfulness, emotion regulation, and mental health in diverse contexts warrants future research. Psychological interventions, translational programs, and public health campaigns geared toward enhancing mindfulness in promoting mental health merits future investigation.

Authors' Contributions RYMC: conceived, designed and executed the study, conducted data analyses, and wrote the manuscript. MCYN: collaborated in the writing and editing of the final manuscript. Both authors approved the final version of the manuscript for submission.

Funding This study was funded by The Education University of Hong Kong (RG 60/2014-2015R and RG 90/2015-2016).

Compliance with Ethical Standards

The study was approved by the Human Research Ethics Committee prior to its implementation. Informed consent was obtained prior to the administration of the questionnaire.

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study was approved by the Human Research Ethics Committee of The Education University of Hong Kong.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

References

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.

Baer, R. A., Lykins, E. L., & Peters, J. R. (2012). Mindfulness and self-compassion as predictors of psychological wellbeing in long-term meditators and matched nonmeditators. *The Journal of Positive Psychology, 7*(3), 230–238. https://doi.org/10.1080/17439760.2012.674548.

Bardeen, J. R., & Stevens, E. N. (2015). Sex differences in the indirect effects of cognitive processes on anxiety through emotion regulation difficulties. *Personality and Individual Differences, 81*, 180–187. https://doi.org/10.1016/j.paid.2014.07.009.

Bardeen, J. R., Fergus, T. A., & Orcutt, H. K. (2012). An examination of the latent structure of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment, 34*(3), 382–392. https://doi.org/10.1007/s10862-012-9280-y.

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science, 16*(6), 351–355. https://doi.org/10.1111/j.1467-8721.2007.00534.x.

Bender, P. K., Reinholdt-Dunne, M. L., Esbjørn, B. H., & Pons, F. (2012). Emotion dysregulation and anxiety in children and adolescents: Gender differences. *Personality and Individual Differences, 53*(3), 284–288. https://doi.org/10.1016/j.paid.2012.03.027.

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

Bonn-Miller, M. O., Vujanovic, A. A., & Zvolensky, M. J. (2008). Emotional dysregulation: Association with coping-oriented marijuana use motives among current marijuana users. *Substance Use & Misuse, 43*(11), 1653–1665. https://doi.org/10.1080/10826080802241292.

Bowlin, S. L., & Baer, R. A. (2012). Relationships between mindfulness, self-control, and psychological functioning. *Personality and Individual Differences, 52*(3), 411–415. https://doi.org/10.1016/j.paid.2011.10.050.

Bränström, R., Duncan, L. G., & Moskowitz, J. T. (2011). The association between dispositional mindfulness, psychological well-being, and perceived health in a Swedish population-based sample. *British Journal of Health Psychology, 16*(2), 300–316. https://doi.org/10.1348/135910710X501683.

Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology, 1*(3), 185–216. https://doi.org/10.1177/135910457000100301.

Caldwell-Harris, C. L., & Aycicegi, A. (2006). When personality and culture clash: The psychological distress of allocentrics in an individualist culture and idiocentrics in a collectivist culture. *Transcultural Psychiatry, 43*(3), 331–361. https://doi.org/10.1177/1363461506066982.

Cardaciotto, L., Herbert, J. D., Forman, E. M., Moitra, E., & Farrow, V. (2008). The assessment of present-moment awareness and acceptance: The Philadelphia mindfulness scale. *Assessment, 15*(2), 204–223. https://doi.org/10.1177/1073191107311467.

Carsley, D., Khoury, B., & Heath, N. L. (2018). Effectiveness of mindfulness interventions for mental health in schools: A comprehensive meta-analysis. *Mindfulness, 9*(3), 693–707. https://doi.org/10.1007/s12671-017-0839-2.

Chambers, R., Lo, B. C. Y., & Allen, N. B. (2008). The impact of intensive mindfulness training on attentional control, cognitive style, and affect. *Cognitive Therapy and Research, 32*(3), 303–322. https://doi.org/10.1007/s10608-007-9119-0.

Chambers, R., Gullone, E., & Allen, N. B. (2009). Mindful emotion regulation: An integrative review. *Clinical Psychology Review, 29*(6), 560–572. https://doi.org/10.1016/j.cpr.2009.06.005.

Chambers, R., Gullone, E., Hassed, C., Knight, W., Garvin, T., & Allen, N. (2015). Mindful emotion regulation predicts recovery in depressed youth. *Mindfulness, 6*(3), 523–534. https://doi.org/10.1007/s12671-014-0284-4.

Cheung, C. K., & Bagley, C. (1998). Validating an American scale in Hong Kong: The Center for Epidemiological Studies Depression Scale (CES-D). *The Journal of Psychology, 132*(2), 169–186. https://doi.org/10.1080/00223989809599157.

Cheung, R. Y. M., & Park, I. J. K. (2010). Anger suppression, interdependent self-construal, and depression among Asian American and European American college students. *Cultural Diversity and Ethnic Minority Psychology, 16*(4), 517–525. https://doi.org/10.1037/a0020655.

Cheung, R. Y. M., Leung, M. C., Chiu, H. T., Kwan, J. L. Y., Yee, T. S., & Hou, W. K. (2018). Family functioning and psychological outcomes at emerging adulthood: Savoring positive experiences as a mediating mechanism. Journal of Social and Personal Relationships, 0265407518798499. doi: https://doi.org/10.1177/0265407518798499.

Coffey, K. A., Hartman, M., & Fredrickson, B. L. (2010). Deconstructing mindfulness and constructing mental health: Understanding mindfulness and its mechanisms of action. *Mindfulness, 1*(4), 235–253. https://doi.org/10.1007/s12671-010-0033-2.

Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology, 112*(4), 558. https://doi.org/10.1037/0021-843X.112.4.558.

Cole, P. M., Martin, S. E., & Dennis, T. A. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development, 75*(2), 317–333. https://doi.org/10.1111/j.1467-8624.2004.00673.x.

Curtiss, J., Klemanski, D. H., Andrews, L., Ito, M., & Hofmann, S. G. (2017). The conditional process model of mindfulness and emotion regulation: An empirical test. *Journal of Affective Disorders, 212*, 93–100. https://doi.org/10.1016/j.jad.2017.01.027.

Deng, Y. Q., Liu, X. H., Rodriguez, M. A., & Xia, C. Y. (2011). The five facet mindfulness questionnaire: Psychometric properties of the Chinese version. *Mindfulness, 2*(2), 123–128. https://doi.org/10.1007/s12671-011-0050-9.

Desrosiers, A., Vine, V., Klemanski, D. H., & Nolen-Hoeksema, S. (2013). Mindfulness and emotion regulation in depression and anxiety: Common and distinct mechanisms of action. *Depression and Anxiety, 30*(7), 654–661. https://doi.org/10.1002/da.22124.

Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135–168. https://doi.org/10.1146/annurev-psych-113011-143750.

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*(1), 59–67. https://doi.org/10.1007/s12671-011-0043-8.

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

Garland, E. L., Hanley, A. W., Goldin, P. R., & Gross, J. J. (2017). Testing the mindfulness-to-meaning theory: Evidence for mindful positive emotion regulation from a reanalysis of longitudinal data. *PLoS One, 12*(12), e0187727. https://doi.org/10.1371/journal.pone.0187727.

Garnefski, N., Van Den Kommer, T., Kraaij, V., Teerds, J., Legerstee, J., & Onstein, E. (2002). The relationship between cognitive emotion regulation strategies and emotional problems: Comparison between a clinical and a non-clinical sample. *European Journal of Personality, 16*(5), 403–420. https://doi.org/10.1002/per.458.

Germer, C., Siegel, R. D., & Fulton, P. R. (Eds.). (2016). *Mindfulness and psychotherapy*. New York: Guilford Press..

Giromini, L., Velotti, P., de Campora, G., Bonalume, L., & Zavattini, G. C. (2012). Cultural adaptation of the difficulties in emotion regulation scale: Reliability and validity of an Italian version. *Journal of Clinical Psychology, 68*(9), 989–1007. https://doi.org/10.1002/jclp.21876.

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment, 26*(1), 41–54. https://doi.org/10.1023/B:JOBA.0000007455.08539.94.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*(3), 271–299. https://doi.org/10.1037/1089-2680.2.3.271.

Hall, G. C., Hong, J. J., Zane, N. W., & Meyer, O. L. (2011). Culturally competent treatments for Asian Americans: The relevance of mindfulness and acceptance-based psychotherapies. *Clinical Psychology: Science and Practice, 18*(3), 215–231. https://doi.org/10.1111/j.1468-2850.2011.01253.x.

He, X., Li, C., Qian, J., Cui, H., & Wu, W. (2010). Reliability and validity of a generalized anxiety disorder scale in general hospital outpatients. *Shanghai Archives of Psychiatry, 22*(4), 200–203. https://doi.org/10.3969/j.issn.1002-0829.2010.04.002.

Hill, C. L., & Updegraff, J. A. (2012). Mindfulness and its relationship to emotional regulation. *Emotion, 12*(1), 81. https://doi.org/10.1037/a0026355.

Ho, D. Y. F. (1976). On the concept of face. *American Journal of Sociology, 81*(4), 867–884. https://doi.org/10.1086/226145.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*(2), 169. https://doi.org/10.1037/a0018555.

Hollis-Walker, L., & Colosimo, K. (2011). Mindfulness, self-compassion, and happiness in non-meditators: A theoretical and empirical examination. *Personality and Individual Differences, 50*(2), 222–227. https://doi.org/10.1016/j.paid.2010.09.033.

Hou, J., Wong, S. Y. S., Lo, H. H. M., Mak, W. W. S., & Ma, H. S. W. (2014). Validation of a Chinese version of the five facet mindfulness questionnaire in Hong Kong and development of a short form. *Assessment, 21*(3), 363–371. https://doi.org/10.1177/1073191113485121.

Hu, T., Zhang, D., Wang, J., Mistry, R., Ran, G., & Wang, X. (2014). Relation between emotion regulation and mental health: A meta-analysis review. *Psychological Reports, 114*(2), 341–362. https://doi.org/10.2466/03.20.PR0.114k22w4.

Jain, S., Shapiro, S. L., Swanick, S., Roesch, S. C., Mills, P. J., Bell, I., & Schwartz, G. E. (2007). A randomized controlled trial of mindfulness meditation versus relaxation training: Effects on distress, positive states of mind, rumination, and distraction. *Annals of Behavioral Medicine, 33*(1), 11–21. https://doi.org/10.1207/s15324796abm3301_2.

Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience, 7*(2), 109–119. https://doi.org/10.3758/CABN.7.2.109.

Jimenez, S. S., Niles, B. L., & Park, C. L. (2010). A mindfulness model of affect regulation and depressive symptoms: Positive emotions, mood regulation expectancies, and self-acceptance as regulatory mechanisms. *Personality and Individual Differences, 49*(6), 645–650. https://doi.org/10.1016/j.paid.2010.05.041.

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your mind to face stress, pain and illness*. New York: Dell.

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

Keng, S. L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review, 31*(6), 1041–1056. https://doi.org/10.1016/j.cpr.2011.04.006.

Kiken, L. G., Lundberg, K. B., & Fredrickson, B. L. (2017). Being present and enjoying it: Dispositional mindfulness and savoring the moment are distinct, interactive predictors of positive emotions and psychological health. *Mindfulness, 8*(5), 1280–1290. https://doi.org/10.1007/s12671-017-0704-3.

Klemanski, D. H., Curtiss, J., McLaughlin, K. A., & Nolen-Hoeksema, S. (2017). Emotion regulation and the transdiagnostic role of repetitive negative thinking in adolescents with social anxiety and depression. *Cognitive Therapy and Research, 41*(2), 206–219. https://doi.org/10.1007/s10608-016-9817-6.

Lattimore, P., Fisher, N., & Malinowski, P. (2011). A cross-sectional investigation of trait disinhibition and its association with mindfulness and impulsivity. *Appetite, 56*(2), 241–248. https://doi.org/10.1016/j.appet.2010.12.007.

Lau, N. S., & Hue, M. T. (2011). Preliminary outcomes of a mindfulness-based programme for Hong Kong adolescents in schools: Well-being, stress and depressive symptoms. *International Journal of Children's Spirituality, 16*(4), 315–330. https://doi.org/10.1080/1364436X.2011.639747.

Leung, K., Koch, P. T., & Lu, L. (2002). A dualistic model of harmony and its implications for conflict management in Asia. *Asia Pacific Journal of Management, 19*(2–3), 201–220. https://doi.org/10.1023/A:1016287501806.

Lindsay, E. K., & Creswell, J. D. (2017). Mechanisms of mindfulness training: Monitor and acceptance theory (MAT). *Clinical Psychology Review, 51*, 48–59. https://doi.org/10.1016/j.cpr.2016.10.011.

Lo, H. H., Ng, S. M., & Chan, C. L. (2015). Evaluating compassion–mindfulness therapy for recurrent anxiety and depression: A randomized control trial. *Research on Social Work Practice, 25*(6), 715–725. https://doi.org/10.1177/1049731514537686.

Lyvers, M., Makin, C., Toms, E., Thorberg, F. A., & Samios, C. (2014). Trait mindfulness in relation to emotional self-regulation and executive function. *Mindfulness, 5*(6), 619–625. https://doi.org/10.1007/s12671-013-0213-y.

Mandal, S. P., Arya, Y. K., & Pandey, R. (2017). Mindfulness, emotion regulation, and subjective well-being: Exploring the link. SIS Journal of Projective Psychology & Mental Health, 24(1). Retrieved March 5, 2018, from: https://www.researchgate.net/publication/312233871_Mindfulness_Emotion_Regulation_and_Subjective_Well-Being_Exploring_the_Link.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review, 98*(2), 224. https://doi.org/10.1037/0033-295X.98.2.224.

Matsumoto, D., Yoo, S.H., Nakagawa, S., Alexandre, J., Anguas-Wong, A. M., Arriola, M … Zengeya, A.(2008). Culture, emotion regulation, and adjustment. *Journal of Personality and Social Psychology, 94*(6), 925–937. doi:https://doi.org/10.1037/0022-3514.94.6.925.

Merwin, R. M., Zucker, N. L., Lacy, J. L., & Elliott, C. A. (2010). Interoceptive awareness in eating disorders: Distinguishing lack of clarity from non-acceptance of internal experience. *Cognition and Emotion, 24*(5), 892–902. https://doi.org/10.1080/02699930902985845.

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive Psychology, 41*(1), 49–100. https://doi.org/10.1006/cogp.1999.0734.

Moore, A., & Malinowski, P. (2009). Meditation, mindfulness and cognitive flexibility. *Consciousness and Cognition, 18*(1), 176–186. https://doi.org/10.1016/j.concog.2008.12.008.

Murphy, C., & MacKillop, J. (2012). Living in the here and now: Interrelationships between impulsivity, mindfulness, and alcohol misuse. *Psychopharmacology, 219*(2), 527–536. https://doi.org/10.1007/s00213-011-2573-0.

Muthén, L. K., & Muthén, B. O. (2012). *MPLUS Version 7 user's guide*. Los Angeles: Muthén & Muthén.

Oberle, E., Schonert-Reichl, K. A., Lawlor, M. S., & Thomson, K. C. (2012). Mindfulness and inhibitory control in early adolescence. *The Journal of Early Adolescence, 32*(4), 565–588. https://doi.org/10.1177/0272431611403741.

Peters, J. R., Erisman, S. M., Upton, B. T., Baer, R. A., & Roemer, L. (2011). A preliminary investigation of the relationships between dispositional mindfulness and impulsivity. *Mindfulness, 2*(4), 228–235. https://doi.org/10.1007/s12671-011-0065-2.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*(3), 385–401. https://doi.org/10.1177/014662167700100306.

Rodriguez, C. M., Tucker, M. C., & Palmer, K. (2016). Emotion regulation in relation to emerging adults' mental health and delinquency: A multi-informant approach. *Journal of Child and Family Studies, 25*(6), 1916–1925.

Roemer, L., & Orsillo, S. M. (2002). Expanding our conceptualization of and treatment for generalized anxiety disorder: Integrating mindfulness/acceptance-based approaches with existing cognitive-behavioral models. *Clinical Psychology: Science and Practice, 9*(1), 54–68. https://doi.org/10.1093/clipsy.9.1.54.

Roemer, L., Lee, J. K., Salters-Pedneault, K., Erisman, S. M., Orsillo, S. M., & Mennin, D. S. (2009). Mindfulness and emotion regulation difficulties in generalized anxiety disorder: Preliminary evidence for independent and overlapping contributions. *Behavior Therapy, 40*(2), 142–154. https://doi.org/10.1016/j.beth.2008.04.001.

Roemer, L., Williston, S. K., & Rollins, L. G. (2015). Mindfulness and emotion regulation. *Current Opinion in Psychology, 3*, 52–57. https://doi.org/10.1016/j.copsyc.2015.02.006.

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and non-experimental studies: New procedures and recommendations. *Psychological Methods, 7*(4), 422–445. https://doi.org/10.1037/1082-989X.7.4.422.

Smith, P. B. (2010). On the distinctiveness of Chinese psychology; or: Are we all Chinese? In M. H. Bond (Ed.), *The Oxford handbook of Chinese psychology* (pp. 699–710). New York: Oxford University Press.

Soto, J. A., Perez, C. R., Kim, Y. H., Lee, E. A., & Minnick, M. R. (2011). Is expressive suppression always associated with poorer psychological functioning? A cross-cultural comparison between European Americans and Hong Kong Chinese. *Emotion, 11*(6), 1450–1455. https://doi.org/10.1037/a0023340.

Soysa, C. K., & Wilcomb, C. J. (2015). Mindfulness, self-compassion, self-efficacy, and gender as predictors of depression, anxiety, stress, and well-being. *Mindfulness, 6*(2), 217–226. https://doi.org/10.1007/s12671-013-0247-1.

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine, 166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092.

Teper, R., Segal, Z. V., & Inzlicht, M. (2013). Inside the mindful mind: How mindfulness enhances emotion regulation through improvements in executive control. *Current Directions in Psychological Science, 22*(6), 449–454. https://doi.org/10.1177/0963721413495869.

Thompson, B. L., & Waltz, J. A. (2008). Mindfulness, self-esteem, and unconditional self-acceptance. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 26*(2), 119–126. https://doi.org/10.1007/s10942-007-0059-0.

Tong, X., An, D., McGonigal, A., Park, S. P., & Zhou, D. (2016). Validation of the generalized anxiety Disorder-7 (GAD-7) among Chinese people with epilepsy. *Epilepsy Research, 120*, 31–36. https://doi.org/10.1016/j.eplepsyres.2015.11.019.

Tsai, W., Nguyen, D. J., Weiss, B., Ngo, V., & Lau, A. S. (2017). Cultural differences in the reciprocal relations between emotion suppression coping, depressive symptoms and interpersonal functioning among adolescents. *Journal of Abnormal Child Psychology, 45*(4), 657–669. https://doi.org/10.1007/s10802-016-0192-2.

Wang, L., Liu, H., Du, W., & Li, Z. (2007). Test of difficulties in emotion regulation scale in Chinese people. *China Journal of Health Psychology, 15*, 336–340.

Weinberg, A., & Klonsky, E. D. (2009). Measurement of emotion dysregulation in adolescents. *Psychological Assessment, 21*(4), 616. https://doi.org/10.1037/a0016669.

Wong, S. Y. S., Yip, B. H. K., Mak, W. W. S., Mercer, S., Cheung, E. Y. L., Ling, C. Y. M., … & Lee, T. M. C. (2016). Mindfulness-based cognitive therapy v. group psychoeducation for people with generalised anxiety disorder: Randomised controlled trial, *The British Journal of Psychiatry*, *209*(1), 68–75. doi:https://doi.org/10.1192/bjp.bp.115.166124.