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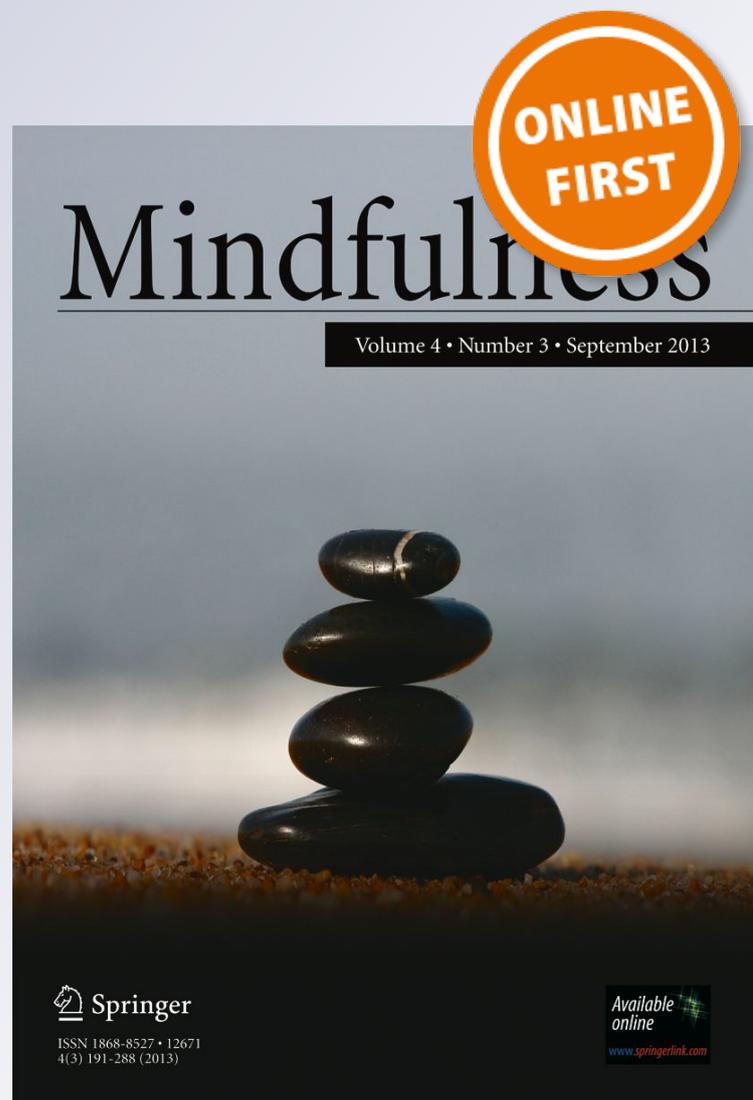
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**Mindfulness**

ISSN 1868-8527

Mindfulness

DOI 10.1007/s12671-018-1039-4



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# Mindfulness Capability Mediates the Association Between Weight-Based Stigma and Negative Emotion Symptoms

Wenjie Duan<sup>1,2</sup>  · Zhenglang Wang<sup>3</sup>

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## Abstract

A cross-sectional study was conducted to examine how mindfulness capability influences the relationship between weight-based stigma (i.e., weight stigma concerns and perceived weight discrimination) and negative emotion symptoms by using a sample of 293 with overweight and obesity (52.9% female; mean age of 22.5 years; standard deviation of 0.68). The questionnaires comprised a survey on weight-based stigma, the Short Inventory of Mindfulness Capability, and the Depression Anxiety Stress Scale, and the variables of interest were measured before data analysis. The analytical results support the hypotheses that mindfulness capability is negatively related to weight-based stigma and negative emotion symptoms, but it is positively related to negative emotion symptoms. Moreover, the results of the hierarchical regression analysis suggest additional effects of mindfulness capability on negative emotional symptoms when controlling for gender, age, body mass index (BMI), and weight-based stigma ( $B = -0.31, p < .001, R^2 = 0.32$ ). Finally, the results of the mediation effect analysis verify the significant indirect effects of weight-based stigma on negative emotion through mindfulness capability (effect = 0.0160, 95% confidence interval [0.0059, 0.0302] in model 1; effect = 0.0272, 95% confidence interval [0.0106, 0.0497] in model 2). Our findings can contribute to the theoretical literature about the salutary effects of mindfulness on attenuating the negative impacts of weight-based stigma. The research on mindfulness-based interventions targeted at weight-based stigma is expected, and future directions to improve the current study are discussed.

**Keywords** Weight-based stigma · Mindfulness capability · Overweight · Obesity · Negative emotion symptoms

Weight-based stigma is a major concern of the modern society (Hunger et al. 2015). Different kinds of weight-based stigma are negative labels attached to individuals based on their weights or shapes. Perceived weight discrimination (PWD) and weight stigma concerns (WSCs) are different kinds of weight-based stigma that are widely studied, and they have been found to be highly associated with many adverse psychological outcomes, such as depression, anxiety, poor quality of life, and suicide ideation (see Sockalingam and Hawa 2017 for review). Moreover, weight-based stigma undermines weight loss efforts

and affects an individual's self-control and self-regulation (Hunger et al. 2015; Pascoe and Richman 2009; Sockalingam and Hawa 2017). Unlike the discriminatory attitudes and behaviors of others toward the population with overweight and obesity, PWD and WSC are self-perceived subjective consciousness of one's self based on external stigmatized experiences (Pascoe and Richman 2009; Sockalingam and Hawa 2017), and they denote one's vulnerabilities to objective events and the actual impact of stigma at the personal level (Carr and Friedman 2005). The prevalence of PWD even surpasses the prevalence of obesity itself (Sockalingam and Hawa 2017).

Weight-based stigma is a stressor that can lead to negative emotional outcomes among individuals with overweight and obesity (Pascoe and Richman 2009). Drawing on stress and coping theory, given that weight loss is neither a short-term answer nor an easy-to-reach solution among the majority of the population, the individuals with overweight and obesity tend to rely on various coping strategies (Myers and Rosen 1999). The more they are exposed to weight stigma, the higher the attempt to cope with such stigma (Puhl and Brownell 2006). However, the functions of coping strategies are not

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always straightforward. In fact, some coping strategies are inversely related to negative emotion while others may even lead to their aggravation (Koball and Carels 2011). Myers and Rosen (1999) distinguished coping strategies into maladaptive and adaptive types. Their findings have shown that some maladaptive copings, such as “avoid or leave situation” and “cry, isolate myself” were inversely associated with body image and self-esteem. By contrast, adaptive coping mechanisms, such as “self-love, self-acceptance” and “refuse to hide body, be visible” were related to relatively high self-esteem and low mental health symptoms. Mindfulness is closely related to coping styles (Shallcross and Spruill 2017; Tomlinson et al. 2018), while appraisal is the core mechanism of the coping process (Folkman 1984). Mindfulness is a cognitive process in which mental resources are weighed against the perceived intensities of the stressors. Perceiving one’s resources as highly insufficient to tackle the pressure can cause maladaptive and avoidant coping and further lead to distress (Garland et al. 2009). Mindfulness shifts the way on how individuals appraise their situations (Brown-Iannuzzi et al. 2014). The adaptive influences of mindfulness in reducing negative emotion symptoms (e.g., depression and anxiety) have been widely demonstrated through clinical and non-clinical evidence (Brown et al. 2007; Tomlinson et al. 2018). For example, the protective role of mindfulness in the relationship of negative emotion and stigma was highlighted in the research on autism spectrum disorder (Chan and Lam 2017). Shallcross and Spruill (2017) recruited 97 racial and ethnic minority participants and required them to answer questionnaires with measures on PWD, mindfulness, and depression. Their results have shown that individuals high in mindfulness were less vulnerable to depression despite the high frequency of experienced discrimination (Shallcross and Spruill 2017). Thus, the robust mediational role of mindfulness should be examined when designing interventions aimed at attenuating the negative influence of weight-based stigma on psychological outcomes (Shallcross and Spruill 2017; Sockalingam and Hawa 2017).

The underlying mediational role of mindfulness between weight-based stigma and negative emotion symptoms is elaborated in the mindful coping model constructed by Garland et al. (2009). This causal model conceptualizes mindfulness as a capability component of the positive reappraisal process. Most of the coping strategies involve valuing, judging what is good or not (i.e., “see the situation as others’ problem”), or escaping from and ignoring unpleasant mental events (i.e., “avoid or leave situation”) (Myers and Rosen 1999), but these strategies and appraisals may become ineffective and even counterproductive if mindful perception and non-judgmental awareness are neglected (Shallcross and Spruill 2017). When individuals with high capacity of mindfulness encounter stigmatized experiences (i.e., those situations appraised to have exceeded their mental resources), they may decenter from the sense of incapability and re-perceive the stressors by enhancing their receptive attention and awareness. This metacognitive

process enables these individuals to pay attention to the consciousness itself rather than the unbearable contents (Garland et al. 2009), which further attenuates automatic evaluation and avoidant coping and eventually enables constructive and positive reappraisal. Negative emotion symptoms can also be reduced during the mindful coping process (Garland et al. 2009).

Mindfulness capability consists of two commonly accepted facets, namely, present-centered awareness and non-judgmental attitude (Duan and Li 2016). These capabilities serve as the principle and comprise the core components of effective interventions against depression (i.e., mindfulness-based cognitive therapy) (Brown et al. 2007). With intentional attentiveness toward external and internal experiences and non-evaluative attitude toward the relationship among thoughts, emotions, and self-value (Duan and Li 2016), mindfulness capability enables individuals to mitigate the impact of weight stigma and thus is a promising resiliency mechanism against negative emotions. Moreover, the factors of mindfulness capability were demonstrated as having a highly stable association with mental health among community and student samples. Cultivated forms of mindfulness can be improved through therapies and interventions (Duan and Li 2016) and thus have better practical implications than trait mindfulness.

In summary, mindfulness capability is a promising relational mediator between weight-based stigma and negative emotion symptoms among the overweight and obese population. However, the research on the protective role of mindfulness between stigma and negative emotion symptoms is rare (Brown-Iannuzzi et al. 2014) and even more limited for weight-based stigma issues (Lillis et al. 2009). What is more, assessing multiple kinds of weight-based stigma within one research is conducive to subsequent interpretation and understanding the effects of different stigma-related factors (Sockalingam and Hawa 2017). Nonetheless, mindfulness capability was hypothesized to mediate the relationship between WSC and negative emotion symptoms and between PWD and negative emotion symptoms. Our findings will likely contribute to the theoretical literature by highlighting the potential protective effects of mindfulness capability (i.e., alleviating the adverse influence of weight-based stigma) on the psychological health of individuals with overweight and obesity.

## Method

### Participants

A total of 293 overweight or obese students (155 females and 138 males) from 34 universities participated in the present study. At the time of the survey, the average age was 22.49 years (range from 21 to 25 years; standard deviation of 0.68), while the average BMI was 30.16 kg/m<sup>2</sup> with a standard deviation of 2.54.

## Procedures

Participants who were interested to join this study and self-identified to be overweight were enlisted from 34 universities through recruitment announcements. The participants were required to report their heights and weights for BMI calculation. According to the recommended BMI cutoff point for Asian populations (WHO 2004), the BMIs of the inclusive participants should be higher than 23. Among the initial 293 participants, 13.3% were overweight (BMI range = 23–27.49) and 86.7% were obese (BMI range  $\geq$  27.5). Then, the participants were asked to complete the questionnaires, namely, the Short Inventory of Mindfulness Capability (SIM-C), a survey on weight-based stigma (PWD and WSCs), and the Depression Anxiety Stress Scale (DASS-21). Written informed consents were obtained from all the participants prior to their recruitment. We have obtained the human ethics approval from Wuhan University.

## Measures

**Weight-Based Stigma** Two variables of weight-based stigma were measured in this study. We first used the four-item scale measure of WSC (Hunger and Major 2015). Participants were instructed to choose from “strongly disagree” (1) to “strongly agree” (7) on items (e.g., “I am worried that most people will judge me on the basis of my weight” and “I am concerned that others will not respect me because of my weight”). In addition, PWD was measured by adopting the guidelines of Hunger and Major (2015). The measure was modeled on the basis of racial discrimination assessment, and it comprised related items/questions (e.g., “In the past 12 months, how often have other people treated you unfairly because of your weight?”). Participants were required to answer items with a five-point Likert scale on 0 (never) to 5 (all the time). The reliability and convergence and the discriminant validity of the measures were  $\alpha = 0.94$  for PWD and  $\alpha = 0.92$  for WSC, respectively (Hunger and Major 2015). In the current sample, the Cronbach’s  $\alpha$  values of the PWD scale and the WSC scale were set to 0.964 and 0.939, respectively.

**Mindfulness Capability** Following the work of Duan and Li (2016), we adopted the SIM-C that comprised three subscales (act-awareness, describing, and non-judging), in which each subscale contains four items. The participants were asked to answer items with a scale ranging from 1 (never or rarely true) to 5 (very often or always true). Sample options are “I don’t pay attention to what I’m doing because I’m daydreaming, worrying, or otherwise distracted” and “I tell myself that I shouldn’t be thinking the way I’m thinking” on. The score of mindfulness capability was calculated as the average of the total score of the three subscales, in which a higher final score indicates greater mindfulness capability. The reliability and

convergent validity of the SIM-C were demonstrated (Duan and Li 2016). The Cronbach’s  $\alpha$  of the scale was 0.926 for the sample used in this study.

**Negative Emotion Symptoms** We employed the Chinese version of DASS-21 (Lovibond and Lovibond 1995; Wang et al. 2016) to measure negative emotion symptoms. The three subscales (i.e., assessments of depression, anxiety and stress in the past week) were rated by the participants with a scale from “did not apply to me at all” (0) to “applied to me very much or most of the time” (3). The higher the mean score of the 21 items, the higher the level (i.e., severity) of the negative emotion symptoms. The Cronbach’s  $\alpha$  of the scale was 0.960 for the current sample.

## Data Analyses

Data analyses were conducted by using SPSS 24.0. First, a descriptive analysis of BMI, weight-based stigma, mindfulness capability, and negative emotion symptoms was conducted. Second, Pearson correlation analysis was conducted to examine the relations. The expected relations were as follows: weight-based stigma and negative emotion symptoms are positively related, while mindfulness capability is negatively related to weight-based stigma and negative emotion symptoms. Third, hierarchical regression was performed to examine the relative contribution of mindfulness capability and weight-based stigma on negative emotion symptoms. On the basis of the scores, negative emotion symptoms were collectively set as the dependent variable. Predictor parameters were entered into the adjusted regression model in the following order: (1) gender, age, and BMI, (2) WSCs/PWD, and (3) mindfulness capability. The results are expected to confirm the incremental validity of mindfulness capability. The mediational role of mindfulness capability between weight-based stigma and negative emotion symptoms was tested using model 4 of the PROCESS macro (Hayes 2013) in SPSS. The mediation models, in which mindfulness capability links two associations (i.e., between WSC and negative emotion symptoms and between PWD and negative emotion symptoms), were examined. A total of 5000 bootstrap samples were calculated for 95% bias-corrected and accelerated (BCa) confidence intervals (CIs) and then tested for the abovementioned models. The model is significant when CI at 95% does not contain zero.

## Results

The mean and standard deviation values of the variables and the results of the correlation analyses of WSCs, PWD, mindfulness capability, and negative emotion symptoms are displayed in Table 1. As expected, weight-based stigma and negative emotion symptoms were positively related ( $r = .455$  at  $p < .001$  for WSC;  $r = .497$  at  $p < .001$  for PWD)

**Table 1** Descriptive and Pearson correlation of the researched variables ( $N = 293$ )

Variables	1	2	3	4
1 Weight stigma concerns	–			
2 Perceived weight discrimination	0.72***	–		
3 Mindfulness capability	–0.18**	–0.19***	–	
4 Negative emotion symptoms	0.46***	0.50***	–0.29***	–
Mean	2.46	0.85	2.95	0.76
SD	1.62	0.95	0.42	0.66

\*\* $p < .01$ ; \*\*\* $p < .001$

but inversely related to mindfulness capability ( $r = -.182$  at  $p < .01$  for WSCs;  $r = -.192$  at  $p < .001$  for PWD). Mindfulness capability was significantly and negatively related to negative emotion symptoms ( $r = -.291$ ,  $p < .001$ ).

Table 2 lists the results of the hierarchical regression analysis. By controlling for the demographic variables (i.e., gender, age, and BMI), the contributions were significant at  $B = 0.10$  at  $p < .01$  for WSCs and  $B = 0.25$  at  $p < .001$ ,  $R^2 = 0.28$  for PWD. Nearly 32% of the variance of negative emotional symptoms can be explained by demographic variables, weight-based stigma, and mindfulness capability. In the last step, the regression coefficients of WSC ( $B = 0.09$  at  $p < .01$ ) and PWD ( $B = 0.23$  at  $p < .001$ ) decreased but remained significant, and the  $R^2$  increased when mindfulness capability was added into the model ( $\Delta R^2 = 0.04$ ). The results indicate that mindfulness capability can explain the variances of negative emotion symptoms more thoroughly than demographic variables and weight-based stigma.

The direct and indirect mediational effects of mindfulness capability in the association between weight-based stigma and negative emotion symptoms were examined by model 4 of PROCESS (Hayes 2013). The main results are shown in Tables 3 and 4 and Fig. 1. As hypothesized, weight-based

stigma has a positive association with the negative emotion symptoms among overweight and obese populations. The direct effect was 0.17 ( $t = 8.05$  at  $p < .001$ ; 95% BCa CI = [0.13, 0.21]) for WSC and 0.32 ( $t = 9.06$  at  $p < .001$ ; 95% BCa CI = [0.25, 0.39]) for PWD. Moreover, the indirect paths were tested. The results were both significant for the indirect effects of WSCs (effect = 0.02; 95% BCa CI = [0.01, 0.03]) and PWD (effect = 0.03, 95% BCa CI = [0.01, 0.05]) on negative emotion symptoms through mindfulness capability.

## Discussion

The present study demonstrated the mediating role of mindfulness capability between the association of weight-based stigma (i.e., WSCs and PWD) and negative emotion symptoms. In other words, with the increase in mindfulness capability of individuals, they may less likely transform the weight-based stigma into negative emotion symptoms. Our findings can contribute to the theoretical literature by explaining the protective function of mindfulness in the coping against a specific stigma. Combined with the studies on the positive effects of mindfulness on the other types of

**Table 2** Hierarchical regression analysis of the weight-based stigma and mindfulness capability on negative emotion symptoms

Independent variables	Dependent variable: negative emotion symptoms					
	Step 1		Step 2		Step 3	
	<i>B</i>	$\beta$	<i>B</i>	$\beta$	<i>B</i>	$\beta$
Constant	–0.14	–	0.92	–	1.48	–
Gender	0.02	0.01	0.14	0.11	0.13	0.10
Age	–0.01	–0.01	0.001	0.001	0.02	0.02
BMI	0.03*	0.13*	–0.02	–0.09	–0.02	–0.09
Weight stigma concerns			0.10**	0.24**	0.09**	0.22**
Perceived weight discrimination			0.25***	0.36***	0.23***	0.33***
Mindfulness capability					–0.31***	–0.20***
$R^2$	0.02		0.28		0.32	
<i>F</i>	1.70		22.19***		21.91***	
$\Delta R^2$	–		0.26		0.04	
$\Delta F$	–		52.0***		15.1***	

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

**Table 3** Results of analyses testing mindfulness capability as mediators of the effects of weight stigma concerns on negative emotion symptoms ( $N = 293$ )

Outcome variables	$\beta$	SE	$t$	$p$
Mindfulness capability				
Constant	3.07	0.04	70.35	< .001
Weight stigma concerns	-0.05	0.01	-3.16	< .01
Negative emotion symptoms				
Constant	1.36	0.26	5.23	< .001
Weight stigma concerns	0.17	0.02	8.05	< .001
Mindfulness capability	-0.34	0.08	-4.17	< .001
Effects of weight stigma concerns on negative emotion symptoms				
Indirect effect	0.02	0.01	[0.0059, 0.0302]	
Direct effect	0.17	0.02	[0.1282, 0.2112]	

stigma, including those among other stigmatized populations, such as racial minorities (Shallcross and Spruill 2017), populations with AIDS (Gonzalez et al. 2016), or individuals with mental illnesses (Chan and Lam 2017), the role of mindfulness in reducing stigma can be validated in many fields. Therefore, interventions aimed to improve the mindfulness capabilities of individuals (e.g., series of training) and reduce the hazards of a stigma are operational and feasible.

The mechanisms for mindfulness capability can prevent weight stigma from developing into negative emotions, and this finding from the current study aligns with those of previous studies on mindfulness modeling and mechanisms. Shapiro et al. (2006) constructed the intention, attention, and attitude (IAA) model to illustrate the mechanisms that underlie effective mindfulness-based interventions. The IAA model comprises three core axioms of mindfulness: (1) intention, the central component, which includes “why one is practicing” (Shapiro et al. 2006, p. 4); (2) attention, which emphasizes the transition from an interpretation to an observation of what is happening; and (3) attitude toward how to pay attention, including non-judgment, acceptance, and openness. These components contribute to the shift in perspective (reperceiving). Moreover, four mechanisms (i.e., self-regulation, values clarification, flexibility, and exposure) based on reperceiving can be used to minimize the harm of weight-based stigma. Weight

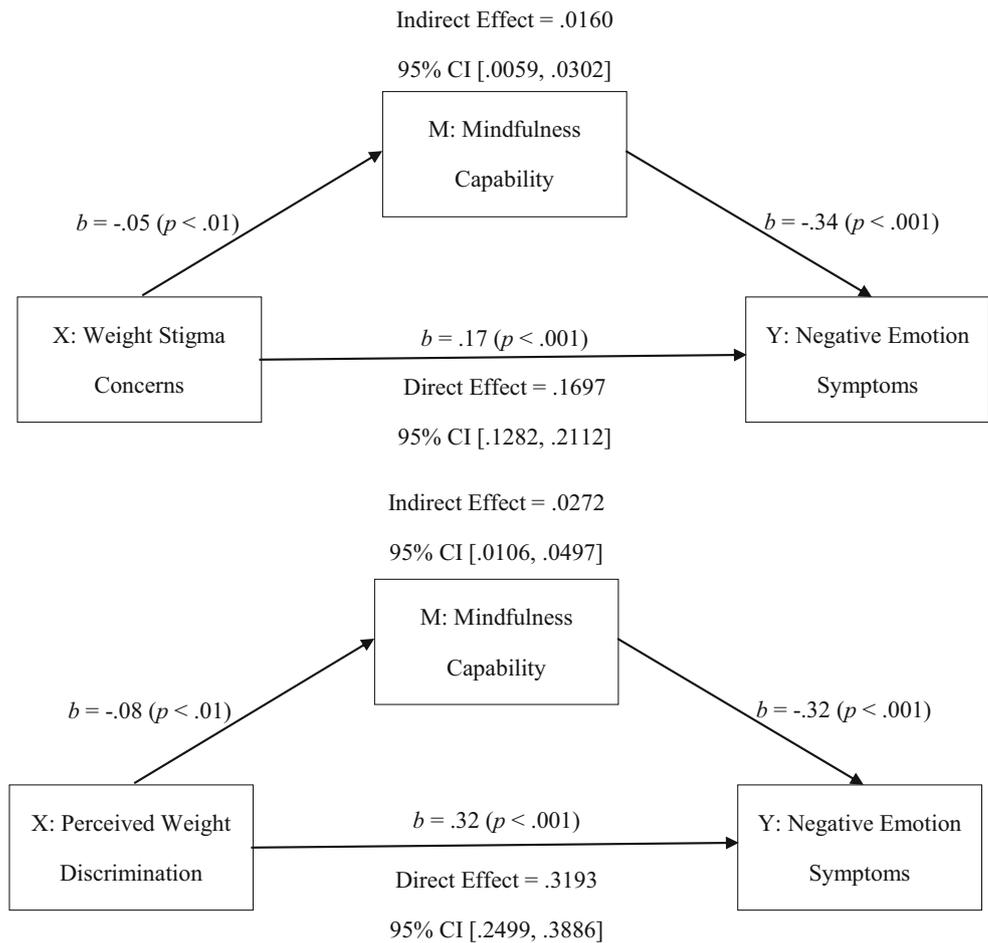
stigma can undermine an individual’s core identity, self-worth, and self-esteem and ultimately lead to helplessness, negative self-related thinking, and rumination (Shallcross and Spruill 2017). With the mechanism of values clarification, mindfulness capability enables individuals to realize what is meaningful for themselves. This aspect of mindfulness capability also helps clarify one’s self-concept (Hanley and Garland 2017) and distinguish these self-concept and self-worth from the others’ evaluation criteria (Brown et al. 2007). Given the protective effect, mindfulness can therefore significantly reduce the discriminatory perception of experiences, and the individual can reperceive what has been established in cognition (Shapiro et al. 2006). Moreover, mindfulness can enhance the adaptive and flexible reactions toward these experiences (cognitive flexibility, Shapiro et al. 2006). In this scheme, the processes of subjective cognition are reperceived; that is, rather than changing the content of cognition, the chance and the space are provided for the individual to gain higher-level initiative and consciousness. Being conscious of what has been perceived and the relation of this consciousness to the self, or the opportunity for exposure, can further minimize the automatic reactivities, such as avoidance and escaping (Shapiro et al. 2006).

Coffey and Hartman (2008) proposed three mechanisms to depict the reverse association between mindfulness and psychological distress. For instance, emotion regulation can help

**Table 4** Results of analyses testing mindfulness capability as mediators of the effects of perceived weight stigma on negative emotion symptoms ( $N = 293$ )

Outcome variables	$\beta$	SE	$t$	$p$
Mindfulness capability				
Constant	3.02	0.03	94.41	< .001
Perceived weight stigma	-0.08	0.03	-3.34	< .01
Negative emotion symptoms				
Constant	1.45	0.25	5.86	< .001
Perceived weight stigma	0.32	0.04	9.06	< .001
Mindfulness capability	-0.32	0.08	-4.02	< .001
Effects of perceived weight stigma on negative emotion symptoms				
Indirect effect	0.03	0.01	[0.0106, 0.0497]	
Direct effect	0.32	0.04	[0.2499, 0.3886]	

**Fig. 1** PROCESS results for the mediation role of mindfulness capability. Note. Indirect effects of mindfulness capability on the relationship between weight-based stigma (weight stigma concerns and perceived weight discrimination) and negative emotion symptoms. CI confidence interval



individuals surpass overwhelming WSCs; moreover, with intentional attentiveness toward one's internal experiences and the practice of non-judgment and non-attachment, the rumination on negative events and self-related valuation can be decentered (Coffey and Hartman 2008). Consequently, negative emotions can be suppressed. Taken together, the results of the present study can partly depict the underlying mechanisms of mindfulness-based stigma-reducing interventions, such as acceptance-, mindfulness-, and compassion-based group interventions for weight self-stigma reduction (Palmeira et al. 2017a, b) and mindfulness-based stress reduction for individuals with HIV stigma (Kerrigan et al. 2018). However, another study found the mediating effect of weight-based stigma as a link between mindfulness and negative emotion symptoms, in which mindfulness mitigates the effects of negative emotion symptoms by reducing PWD and WSCs (Duan and Wang 2018). The divergent findings may be due to the distinguishable forms of mindfulness. Dispositional mindfulness is a stable tendency, whereas mindfulness capability is a trainable and cultivated ability (Duan and Li 2016). The focuses of the two models differed markedly. The model proposed by Duan and Wang (2018) emphasizes the predictor effect of mindfulness on negative emotions, which indicate that people with higher-

level traits of mindfulness naturally have lower possibilities of perceiving external experiences such as stigma, and they are comparatively free from negative emotions. Meanwhile, the model proposed in this study underlines the protective role of mindfulness. When the weight-based stigma is generated internally, mindfulness skills enable the use of adaptive coping strategies. Consequently, the stigma can be perceived as less challenging, thus preventing it from developing into negative emotions. Nonetheless, the models of the two studies do not necessarily contradict one another. Instead, the two modeling approaches may indicate a reciprocal mechanism. For instance, mindfulness training activities can improve mindful skills in the short term, thereby relieving the negative emotions caused by the stigma. Meanwhile, having a mindful trait can be gradually cultivated until higher-level self-acceptance and observational abilities are achieved, thus resulting in less experiences of weight stigma. Randomized controlled intervention experiments may be conducted to test this mindfulness cycle.

### Limitations and Future Research

Several limitations exist in the current work, and thus, a number of pointers need to be considered during data interpretation.

First, the sample in this study comprised self-identified overweight and obese individuals. The study participants may be more vulnerable to weight stigma than individuals with BMI of  $\geq 23$  but do not consider themselves as overweight. The impact of weight-based stigma on psychological outcomes differs depending on an individual's cognition about his or her weight. A sample population with clinically diagnosed severe obesity should have also been recruited because they can demonstrate the relatively high risks of depressive symptoms compared with non-obese populations (Sockalingam and Hawa 2017). Second, the generalizability of the findings was exclusive to overweight and obese people only; for comparison, individuals with normal weights will likely worry about weight stigma after having witnessed the stigmatized events of other individuals (Major et al. 2014). People who were formerly overweight and return to their normal weights may also likely worry about being stigmatized (Levy and Pilver 2012). Third, the findings were based on a cross-sectional sample, but the quantity was insufficient to demonstrate causal links among mindfulness capability, weight-based stigma, and negative emotion symptoms. There may exist an alternative explanation that the effect of mindfulness on negative emotion differs in individuals suffering with different level of weight stigma. It may also be the case that the salutary effect of mindfulness on negative emotion only exists when the weight-based stigma is not so serious. Additional moderating test is required to rule out this explanation. Certain situations cannot be exempted, such as when participants with worse mental health tend to adopt mindless strategies to deal with stigma. A longitudinal sample or a randomized controlled experiment can be performed to solve these problems. Finally, most of the studies in the literature on weight stigma and mindfulness were based on Western data, but cultural factors should also be considered when interpreting the findings. Future studies thus need to be improved according to the presented limitations.

**Funding Information** The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: National Social Science Foundation—Youth Project “Research on the Construction of National Index of Sense of Gain” (17CSH073) and Wuhan University Humanities and Social Sciences Academic Development Program for Young Scholars “Sociology of Happiness and Positive Education” (WHU2016019).

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