Mindfulness, Psychological Distress, and Somatic Symptoms Among Women Engaged in Sex Work in China

Cheuk Chi Tam

Yuejiao Zhao

Shan Qiao

University of South Carolina, shanqiao@mailbox.sc.edu

Xiaoming Li

University of South Carolina, xiaoming@mailbox.sc.edu

Zhiyong Shen

Follow this and additional works at: https://scholarcommons.sc.edu/sph_health_promotion_education_behavior_facpub

Part of the Public Health Education and Promotion Commons

Publication Info

Published in Health and Well-Being, Volume 14, Issue 3, 2022, pages 967-986. © 2022 The Authors. Applied Psychology: Health and Well-Being published by John Wiley & Sons Ltd on behalf of International Association of Applied Psychology. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

This Article is brought to you by the Health Promotion, Education, and Behavior at Scholar Commons. It has been accepted for inclusion in Faculty Publications by an authorized administrator of Scholar Commons. For more information, please contact digres@mailbox.sc.edu.
Mindfulness, psychological distress, and somatic symptoms among women engaged in sex work in China

Cheuk Chi Tam¹ | Yuejiao Zhou² | Shan Qiao¹ | Xiaoming Li¹ | Zhiyong Shen²

¹South Carolina SmartState Center for Healthcare Quality, Department of Health Promotion, Education, and Behavior, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA
²Guangxi Zhuang Autonomous Region Center for Diseases Prevention and Control, Nanning, China

Abstract
Women engaged in sex work (WSW) in China encounter numerous disadvantages (e.g., exposure to violence) and have substantial risk for psychological distress and somatic symptoms. Intervention literature has attended to mindfulness, which is a protective factor for psychological outcomes, and its influences can further improve physical health. However, mindfulness has not been well studied in WSW. We aimed to examine the association among mindfulness, psychological distress, and somatic symptoms among Chinese WSW. Data were collected from 410 WSW in Guangxi, China, using an anonymous, self-administered survey evaluating demographics, mindfulness, psychological distress (i.e., depression, loneliness, and perceived stress), and somatic symptoms (i.e., pain, cardiopulmonary, and gastrointestinal/fatigue symptoms). Structural equation modeling was utilized for data analyses. Mindfulness was negatively associated with psychological distress and somatic symptoms. Psychological distress was positively associated with somatic symptoms. Psychological distress mediated the association between mindfulness...
Mindfulness appears to be a protective factor for psychological distress among WSW, and such an effect is further influential to their somatic symptoms. Our findings add to the growing literature on mindfulness, suggesting that mindfulness-based interventions could be beneficial for WSW. Future research should explore other cognitive factors underlying the psychosomatic mechanism of mindfulness.

**KEYWORDS**
depression, loneliness, mindfulness, pain, perceived stress, psychological distress, somatic symptoms, women engaged in sex work

**INTRODUCTION**

Along with open policies, rapid economic growth and internal immigration (floating population from rural to urban areas for better income and job opportunities) since 1980, commercial sex trade reoccurred and has flourished in mainland China for decades (Zhang et al., 2020). Women engaged in sex work (WSW) account for a substantial population in China (e.g., an estimation of 1.8 to 3.8 million in 2007) (Wang et al., 2009) and suffer from health threats from multiple aspects. Since commercial sex is viewed as immoral and illegal in China, WSW encounter numerous structural or social challenges, such as police harassment, exposure to violence (e.g., from clients and partners), stigma, poor living conditions, and unhealthy lifestyles (e.g., hazardous alcohol use) (Fang et al., 2007; Huang & Pan, 2014; Zhang et al., 2017). As a result, psychological and physical well-being among Chinese WSW is concerning. WSW has been a key population susceptible to sexual transmitted infections (STIs), including human immunodeficiency virus (HIV) infection (Zhang et al., 2020). Psychological distress is common among WSW with a high prevalence of depressive symptoms (22–63%) and loneliness (44–50%) (Chen et al., 2017; Hong et al., 2013; Zhang et al., 2014). Importantly, psychological distress can increase vulnerability to somatic symptoms in WSW. Systematic review and meta-analysis studies have revealed a robust association between psychological distress (e.g., depression and anxiety) and somatic symptoms (e.g., fatigue, pain, and musculoskeletal complaints) (Hassan & Ali, 2011; Henningsen et al., 2003). Unfortunately, most WSW apply maladaptive ways in coping with psychosocial stress and somatic symptoms. Previous research has found a high rate of prescription drug misuse (46.6%) among WSW in China, and a majority of WSW reported using drugs for managing somatic symptoms, such as “relieve pain symptoms” (69%) and “help me sleep” (27%) (Tam et al., 2021). Such multiple vulnerabilities of psychological distress, somatic symptoms, and substance abuse problems underlie the needs of effective health promotion interventions for WSW in China to promote positive coping and enhance psychosomatic outcomes.

Health promotion literature has paid increasing attention to mindfulness (Logsdon-Conradsen, 2002). Mindfulness refers to the state of mind in which attention ifocused on what
is taking place in the present (Brown & Ryan, 2003). Mindfulness researchers believe that such a present-oriented mindset could facilitate non-judgment and acceptance of moment-to-moment experiences, thus alleviating intensive emotion states (Keng et al., 2011; Spijkerman et al., 2016). Several mindfulness-based intervention approaches (e.g., body awareness meditation and mindful appreciation) are developed for health management and are found to be significantly beneficial to psychological health (Bluth & Eisenlohr-Moul, 2017; de Jong et al., 2016). Previous meta-analysis studies in various populations, including working adults, people with a clinical condition, and people living with HIV, found that mindfulness-based interventions had significant effects for psychological distress reduction at immediate post-intervention (small-to-medium effect sizes for working adults and medium-to-large effect sizes for people with a clinical condition or living with HIV), and such effects largely maintained at 5-month or longer follow-ups (Goyal et al., 2014; Scott-Sheldon et al., 2019; Virgili, 2015). Notably, the positive effects of mindfulness could be beyond psychological outcomes. Extant evidence has shown that mindfulness-based interventions have efficacy on alleviating somatic symptoms (e.g., pain and gastrointestinal symptoms) and improving immune indicators (e.g., C-reactive protein) among individuals with clinical conditions, including patients with chronic pain, rheumatoid arthritis patients, fibromyalgia patients, individuals at risk for diabetes, and people living with HIV (Creswell et al., 2019, 2009; Davis et al., 2015; Garland et al., 2014; Gonzalez-Garcia et al., 2014; Jedel et al., 2014; Malarkey et al., 2013; van Gordon et al., 2017). These robust findings imply that mindfulness would be an essential factor for psychosomatic health promotion.

In addition, mindfulness intervention literature postulates a psychological pathway linking mindfulness with physical health (Creswell et al., 2019). This model suggests that mindfulness can enhance cognitive skills, such as stress appraisal, and this can facilitate psychological distress management and, in turn, decrease physiological stress reactivity and alleviate physical symptoms (Creswell et al., 2019). Following this rationale, psychological and physical influences of mindfulness would be depicted by an indirect relationship, in which mindfulness would reduce psychological distress, and this would subsequently alleviate somatic symptoms. Indeed, a recent mindfulness-based intervention study among persons with multiple sclerosis has supported this indirect model, showing that the association between mindfulness and fatigue symptoms was mediated by depression (Sauder et al., 2021). Such an indirect model can contribute to scientific knowledge of a mindfulness-based intervention for promoting psychological and physical health in marginal populations suffering from multiple vulnerabilities, such as WSW in China.

Despite the potential psychosomatic benefits, no mindfulness-based interventions are available for WSW in China. This may be due to the lack of mindfulness studies among WSW. To our knowledge, there is only one WSW study that has examined psychological influences of mindfulness, showing that mindfulness is negatively associated with depression, anxiety, and perceived stigma among WSW living with HIV in Dominican Republic and Tanzania (Kerrigan et al., 2021). It is worth noting that, as suggested by the psychological pathway of mindfulness, mindfulness can contribute to adaptive coping skills (e.g., emotional regulation and self-compassion) (Garland et al., 2015), which have been the protective factors for stress management and health promotion among people engaged in sex work (Dalla et al., 2003; Mumey et al., 2021). However, a scarcity of empirical studies has examined the model of mindfulness on psychological and somatic outcomes among WSW in China. To fill this knowledge gap, guided by the psychological pathway model of mindfulness (Creswell et al., 2019), the present study aimed to examine a hypothesized model among mindfulness, psychological distress (i.e., depression, loneliness, and perceived stress), and somatic symptoms (i.e., pain, cardiopulmonary, and gastrointestinal symptoms) in WSW in China (see Figure 1). Specifically, it was
FIGURE 1 Hypothesized model among mindfulness, psychological distress, and somatic symptoms
hypothesized that (1) mindfulness would be negatively associated with psychological distress and somatic symptoms; (2) psychological distress would be positively associated with somatic symptoms; and (3) psychological distress would mediate the association between mindfulness and somatic symptoms.

**METHOD**

**Participants and procedure**

The present study utilized cross-sectional data collected from WSW from five regions (Guilin, Guigang, Beihai, Baise, and Hezhou) in Guangxi, China (n = 424), between September 2019 to December 2019. Guangxi is located at the center of southwest China and has historically been an essential province for commerce, trade, and tourism in southern China and South East Asia. Increased tourism in Guangxi has contributed to a market for sex work. Guangxi Centers for Disease Prevention and Control (CDC) personnel who were responsible for outreach services with WSW approached participants in sex work venues and invited them to complete an anonymous, self-administered survey. The sex work venues covered different levels of commercial sex hierarchy according to their average payment per service, including the low-level venues (<50 RMB [China’s currency, equivalent to 7.3 USD at the time of the survey]; e.g., streets and mini-hotels), middle-level venues (50–150 RMB; e.g., hairdressing rooms and massage parlors), and high-level venues (>150 RMB; e.g., karaoke and night clubs). A total of 106 (25%) WSW from the low-level venues, 162 (38%) from the middle-level venues, and 156 (37%) from the high-level venues participated in the present study. The eligibility criteria for participation included (1) women who provided commercial sex; (2) 18 years of age or older; and (3) able to independently complete the survey.

Before starting the survey, Guangxi CDC personnel provided informed consent form which showed information regarding voluntary nature, confidentiality, study purposes, and researchers’ contact information. After signing the informed consent form, participants were invited to complete an anonymous and self-administered survey. Participants were allowed to withdraw from the study at any time. Upon completion of the survey, participants were provided with monetary incentives of 50 RMB. After removing respondents (n = 14) with careless responses (e.g., 50% of missing values or more in the survey), the total sample size of the present study was 410. The study protocol was approved by the Guangxi CDC Institutional Review Board.

**Measures**

**Demographics**

Participants were asked to provide demographic information including age (years), ethnicity (i.e., Han, Zhuang, Yao, Miao, or other), marital status (i.e., unmarried, unmarried and cohabitation, married, married but separate, and divorce/widowed), and education (i.e., no formal education, some elementary school, some middle school, some high school or occupational school, and junior college and above). Han ethnicity accounts for the largest population in China, but Guangxi is inhabited by more residents in ethnic minority (Zhuang, Yao, and Miao; 37.52%) than the national average (8.89%) (Guangxi Zhuang Autonomous Region Bureau of
Participants also answered the number of working venues in the past year. Due to non-normality (kurtosis or skewness > 3.0) and small sizes in certain categories (<5% of n), several variables (i.e., ethnicity, marital status, and education) were dichotomized for data analysis.

Mindfulness

Participants completed a Chinese version of Mindfulness Attention Awareness Scale (MAAS) (Brown & Ryan, 2009; Deng et al., 2012). MAAS was composed of 15 items including both general (e.g., I find it difficult to stay focused on what's happening in the present) and situation-specific statements (e.g., I snack without being aware that I'm eating) about mindful states. Items were rated on a 5-point scale, ranging from never (1) to very often (5). A sum score was calculated, with a higher score indicating a greater level of mindfulness. MAAS had good internal consistency in the present study (α = .96).

Psychological distress

Depression

A Chinese version of the Center for Epidemiologic Studies Depression Scale Revised (CESD-R-10) (Cheung & Bagley, 1998; Radloff, 1977) was used to assess depression in WSW. This scale included 10 items asking if a particular depressive symptom occurred in the past week (e.g., I was bothered by things that usually do not bother me). Participants rate each item on a 4-option scale (0 = less than 1 day to 3 = 5–7 days). A sum score was calculated, with a higher score showing a higher level of depression. Cronbach's alpha of this scale was .71 in the current study. In line with previous research (Andresen et al., 1994), a diagnostic cutoff score of 10 was utilized to indicate the presence of high depressive symptoms.

Loneliness

A Chinese version of the short-form UCLA Loneliness scale (ULS-8) (Hays & DiMatteo, 1987; Wu & Yao, 2008) was utilized to evaluate loneliness among WSW. This scale was composed of eight items assessing whether a participant had scarcity of social contact compared to what was desired (e.g., I feel isolation from others). All items were rated on a 4-point scale ranging from 1 (never) to 4 (always). We deleted one item (I am an outgoing person) since it deteriorated internal consistency of the scale (Xu et al., 2018). A sum score was generated among remaining items, with a higher score indicating a greater level of loneliness. This scale was internally consistent in the current study (α = .70).

Perceived stress

A Chinese version of the Perceived Stress Scale (PSS) (Cohen et al., 1994; Lu et al., 2017) was used to measure perceived stress level among WSW. The PSS had 10 items assessing the degree to which situations occurred in the past month were appraised as stressful (e.g., “How often have you been upset because something that happened unexpectedly?”). Participants replied on each item with five response options (1 = never to 5 = very often). A sum score was generated, with a higher score representing a greater level of perceived stress. Cronbach’s alpha of this scale was .72 in the current study.
Somatic symptoms

Participants completed a Chinese version of the Patient Health Questionnaire-15 (PHQ-15) (Kroenke et al., 2002; Zhang et al., 2016). This scale listed a total of 15 somatic symptoms and asked participants to rate these items on a three-option scale (0 = not bothered at all, 1 = bothered a little, and 2 = bothered a lot) for indicating whether they experienced any of 15 symptoms in the past 30 days. According to results of exploratory factor analysis (EFA), somatic symptoms were categorized into three types, including pain (e.g., Back pain), cardiopulmonary (e.g., Dizziness), and gastrointestinal or fatigue symptoms (e.g., Nausea, gas, or indigestion and Feeling tired or having low energy). The validation of this three-factor structure was tested using confirmatory factor analysis (CFA). Study sample was randomly split into two groups for factor analyses. Three sum scores were generated for pain, cardiopulmonary, and gastrointestinal or fatigue symptoms, with higher scores indicating higher levels of corresponding somatic symptoms. According to previous Chinese research (Zhang et al., 2016), a total score among 15 items was also calculated to indicate overall somatic symptom severity (0–4, minimal; 5–9, mild; 10–14, moderate; and 15–30, severe). We also dichotomized responses for each item (0 = not bothered at all and 1 = bother a little or a lot) to indicate prevalence of 15 individual symptoms.

Data analysis

Prior to data analyses, data were screened in terms of missing, outliers (e.g., z scores), and normality (i.e., skewness and kurtosis). Descriptive statistics were performed on demographic variables, mindfulness, psychological distress (i.e., depression, loneliness, and perceived stress), and somatic symptoms (i.e., pain, cardiopulmonary, and gastrointestinal or fatigue symptoms). We then used multiple statistical analysis approaches to analyze the hypothesized associations. First, Pearson’s correlations were performed to examine the bivariate relationship among mindfulness, psychological distress, and somatic symptoms. Second, we used structural equation modeling (SEM) to examine the hypothesized model. In line with Anderson and Gerbing (1988), the SEM analysis was performed by a two-step approach. In step one, confirmatory factor analysis (CFA) was utilized to evaluate a measurement model, in which two latest variables (i.e., psychological distress and somatic symptoms) and one manifest variable (i.e., mindfulness) were intercorrelated (Figure 2). Three psychological measures (i.e., depression, loneliness, and perceived stress) were entered as manifest variables, loading into a latent variable of psychological distress. Similarly, mean scores of three factors in PHQ-15 (i.e., pain, cardiopulmonary, and gastrointestinal or fatigue symptoms) were loaded into a latent variable of somatic symptoms. In step two, a SEM was performed to examine the hypothesized structural model (Figure 1), controlling for demographic factors and venue types (low-, middle-, or high-level). Standardized factor loadings were estimated for each manifest variables, and standardized regression coefficients were calculated for each prediction relationship between study constructs. The SEM analysis was tested using maximum likelihood (ML) estimation. As suggested by Hu and Bentler (1999), the goodness of model fit was examined using several indices (with their suggested cutoff values) including the root mean square of approximation (RMSEA; .06), the comparative fit index (CFI; .95), the Tucker-Lewis index (TLI; .95), and the standardized root mean square residual (SRMR; .05). The lower values of RMSEA
FIGURE 2  Measurement model among mindfulness, psychological distress, and somatic symptoms ($n = 410$)

Model-fit indicator: $\text{Chi-square} = 37.06, df = 12, p < .001; \text{CFI} = .98; \text{TLI} = .96; \text{RMSEA} = .07; \text{SRMR} = .03$. 
and SRMR or the higher values of CFI and TLI indicate a greater model fit to data. The quotient of Chi-square value and degrees of freedom (df) was also used, with the number lower than five indicating a good model fit.

Third, the indirect effect in the relationship among mindfulness, psychological distress, and somatic symptoms was examined using the delta z score (or Sobel test) (Muthén & Muthén, 2019; Sobel, 1982). This test uses the magnitude of an indirect effect, which is the product of two regression coefficients (i.e., the coefficient from mindfulness to psychological distress and the coefficient from psychological distress to somatic symptoms) and compares it to its estimated standard errors based on a z statistic (Sobel, 1982). A significant delta z score indicates a significant mediation relationship. The indirect effect analysis also identified a full or partial mediation. Full mediation means the direct effect between the independent variable (mindfulness) and criterion variable (somatic symptoms) reduces to zero (non-significant) after accounting for the mediation variable (psychological distress). Partial mediation occurs when a mediation variable reduces the direct effect, but it remains significant (Baron & Kenny, 1986).

Bivariate analyses were employed in SPSS software version 28, while SEM analysis and the mediation test were performed in Mplus version 8.

In addition to the hypothesized model, we also ran an alternative model in which mindfulness mediated the linkage between psychological distress and somatic symptoms in consideration of the potentially bidirectional association between psychiatric symptoms and dispositional mindfulness (Gómez-Odriozola & Calvete, 2020). The evaluation of this alternative model followed the identical analytic procedures to these for the hypothesized model (i.e., SEM and indirect effect).

RESULTS

Descriptive statistics

As shown in Table 1, the average age of the study sample was 33.58 years (SD = 9.93). The majority of WSW were Han ethnicity (59%), followed by Zhuang (27%), Yao (9%), and Miao (2%). Most WSW were married (43%), following by unmarried (35%), divorce/widowed (15%), and unmarried or cohabiting (2%). More than one in three WSW reported their education attainment was middle school (36%), followed by elementary school (24%), high school or occupational school (20%), no formal education (14%), and junior college or above (6%). WSW reported an average working venue number of 1.46 in the past year (SD = .88).

In terms of psychological measures, the mean score was 76.63 (SD = 15.40) for mindfulness, 4.18 (SD = 3.11) for depression, 15.78 (SD = 3.37) for loneliness, and 15.00 (SD = 5.67) for perceived stress. Eight percent of WSW had high depressive symptoms. In terms of somatic symptoms, the mean scores were 1.74 (SD = 1.73) for pain symptoms, 1.11 (SD = 1.88) for cardiopulmonary symptoms, and 2.13 (SD = 2.22) for gastrointestinal or fatigue symptoms. Nearly 60% of WSW had a minimal level of somatic symptoms, followed by a mild level (21%) and moderate (10%) or severe levels (10%). Most common somatic problems in WSW were pain symptoms (e.g., “stomach pain,” 46%; “headaches,” 41%), followed by fatigue symptoms (i.e., “feeling tired or having low energy,” 38%), gastrointestinal symptoms (e.g., “constipation, loose bowels or diarrhea,” 31%; “nausea, gas, or indigestion,” 28%), and cardiopulmonary symptoms (e.g., “feeling your heart pound or race,” 19%; “shortness of breath,” 16%).
TABLE 1  Descriptive statistics among Chinese women engaged in sex work \((n = 410)\)

| Demographics | Mean or \(n\) | SD or % |
|--------------|--------------|---------|
| Age (mean, SD) | 33.58 | 9.94 |
| Race/ethnicity (n, %) | | |
| Han | 241 | 58.78% |
| Zhuang | 110 | 26.83% |
| Miao | 8 | 1.95% |
| Yao | 38 | 9.27% |
| Other | 13 | 3.17% |
| Marital status (n, %) | | |
| Unmarried | 145 | 35.37% |
| Unmarried and cohabitation | 10 | 2.44% |
| Married | 178 | 43.42% |
| Married but separated | 15 | 3.65% |
| Divorce/widowed | 62 | 15.12% |
| Education (n, %) | | |
| No formal education | 56 | 13.66% |
| Some elementary school | 98 | 23.90% |
| Some middle school | 148 | 36.10% |
| Some high school or occupational school | 84 | 20.49% |
| Junior college and above | 24 | 5.85% |
| Number of working venues in the past year (mean, SD) | 1.46 | 0.88 |

Psychological and physical measures

| Mindfulness (mean, SD) | 76.63 | 15.40 |
| Psychological distress (mean, SD) | | |
| Depression | 4.18 | 3.11 |
| Loneliness | 15.78 | 3.37 |
| Perceived stress | 25.00 | 5.67 |
| Somatic symptoms (mean, SD) | | |
| Pain | 1.74 | 1.73 |
| Cardiopulmonary | 1.11 | 1.88 |
| Gastrointestinal or fatigue | 2.13 | 2.22 |
| Prevalence (n, %) | | |
| Psychological distress | | |
| Depression (cutoff score = 10) | 33 | 8.05% |
| Severity of somatic symptoms | | |
| Minimal (scores = 0–4) | 244 | 59.51% |
| Mild (scores = 5–9) | 88 | 21.46% |
| Moderate (scores = 10–14) | 39 | 9.51% |
| Severe (scores = 15–30) | 39 | 9.51% |
Bivariate analyses

Results of correlation tests are present in Table 2. Mindfulness was negatively correlated with depression \( (r = -.39) \), loneliness \( (r = -.31) \), perceived stress \( (r = -.31) \), pain symptoms \( (r = -.26) \), cardiopulmonary symptoms \( (r = -.24) \), and gastrointestinal or fatigue symptoms \( (r = -.36) \). Depression was positive correlated with other two psychological distress measures (i.e., loneliness \( [r = .48] \) and perceived stress \( [r = .45] \)) and three somatic symptom factors (i.e., pain \( [r = .42] \), cardiopulmonary \( [r = .39] \), and gastrointestinal or fatigue symptoms \( [r = .50] \)). Similarly, loneliness was positive correlated with perceived stress \( (r = .50) \) and three somatic symptom factors (i.e., pain \( [r = .28] \), cardiopulmonary \( [r = -.28] \), and gastrointestinal or fatigue symptoms \( [r = .28] \)). Perceived stress was positively correlated with pain \( (r = .24) \), cardiopulmonary \( (r = .27) \), and gastrointestinal or fatigue symptoms \( (r = .30) \). Three somatic symptom factors were positively intercorrelated \( (rs = .60-.68) \). All correlation coefficients were statistically significant at the .001 level.

Measurement model

Measurement model results among study variables were shown in Figure 2. All factor loadings of each manifest variable on corresponding latent variables were substantially and statistically significant \( (p < .001) \). Mindfulness was significantly and negatively correlated with psychological distress \( (r = -.50, p < .001) \) and somatic symptoms \( (r = -.37, p < .001) \). Psychological distress was significantly and positively correlated with somatic symptoms \( (r = .63, p < .001) \). CFA
indicated a generally good fit to data with $\text{CFI} = .98$, $\text{TLI} = .96$, $\text{RMSEA} = .07$, and $\text{SRMR} = .03$. The $\text{chi-square}$ value divided by $df$ was 3.08. These results suggested that the latent constructs were adequately operationalized by their manifest variables.

**Structural model**

As presented in Figure 3, SEM results indicated a good model fit to data ($\text{Chi-square}/df = 2.36$, $\text{CFI} = .95$, $\text{TLI} = .93$, $\text{RMSEA} = .06$, $\text{SRMR} = .04$). The structural model explained 44% of variances in somatic symptoms and 29% in psychological distress. Regression coefficients suggested that mindfulness was negatively and significantly associated with psychological distress ($\beta = -0.46$, $p < .001$). Psychological distress was positively and significantly associated with somatic symptoms ($\beta = 0.55$, $p < .001$). The association between mindfulness and somatic symptoms was not statistically significant ($\beta = 0.06$, $p = .32$).

**Indirect effects**

The indirect effect in the hypothesized model is presented in Table 3. As hypothesized, results suggested a significant indirect effect ($\beta = -0.25$, $\text{delta } z = -6.06$, $p < .001$) in the association among mindfulness, psychological distress, and somatic symptoms. However, the direct effect of mindfulness on somatic symptoms was not statistically significant ($\beta = -0.06$, $\text{delta } z = -0.99$, $p = .32$), after accounting for psychological distress. These results suggested that psychological distress fully mediated the association between mindfulness and somatic symptoms among WSW in China.

**Alternative model**

An alternative model on the mediation of mindfulness in the association between psychological distress and somatic symptoms was also tested using SEM. Results suggested a generally good fit to data ($\text{Chi-square}/df = 2.99$; $\text{CFI} = .93$; $\text{TLI} = .90$; $\text{SRMR} = .07$; $\text{RMSEA} = .07$).
Model-fit indicator: $\chi^2 = 84.95, df = 36, p < .001; CFI = .95; TLI = .93; RMSEA = .06; SRMR = 0.04.$

The model controlled for age, ethnicity, education, marital status, number of working venues in the past year, and venue types.

Explained variances: somatic symptoms (44%), psychological distress (29%)

**FIGURE 3** SEM analysis of the indirect model among mindfulness, psychological distress, and somatic symptoms among WSW in China ($n = 410$)
Psychological distress was negatively and significantly associated with mindfulness ($\beta = -.46$, $p < .001$) and was positively and significantly associated with somatic symptoms ($\beta = .54$, $p < .001$). However, the regression coefficient between mindfulness and somatic symptoms did not reach the statistical significance ($\beta = -.07$, $p = .21$). Results did not suggest a significant indirect effect of mindfulness in the model ($\beta = .03$, $\delta z = 1.27$, $p = .20$).

### DISCUSSION

The present study examined somatic symptoms and psychological distress in WSW in China and investigated the role of mindfulness in these health outcomes. Our findings indicated mindfulness could have positive effects on somatic symptoms, and such effects seem to occur through psychological distress among WSW. To the best of our knowledge, the present study was one of the first attempts to examine mindfulness and its impacts on psychological and somatic health outcomes among WSW who are significantly vulnerable to psychosomatic problems.

Our findings suggested that about 40% of WSW in China reported mild to severe somatic symptoms. Such a high rate of physical illness is in line with previous WSW studies from multiple places, showing that 36% to 60% WSW in Israel (Cwikel et al., 2004) and 35% WSW in India (Pandiyan et al., 2012) suffered from somatic symptoms, and 43% WSW in the US reported fair or poor health (Varga & Surratt, 2014). In terms of individual symptoms, our results showed that majority of WSW suffered from pain symptoms (e.g., stomach pain or headaches), which is consistent with previous findings in Israeli WSW showing high prevalence of headaches (60%) and stomachache (53%) (Cwikel et al., 2004). The high prevalence of pain symptoms may be related to hazardous alcohol use. Drinking is encouraged in commercial sex venues since WSW’s income are strongly dependent on liquor consumptions (Li et al., 2010; Wang et al., 2010). Therefore, WSW are at very high risk for harmful drinking, which could lead to hangover symptoms including headaches and stomach pain (National Institute on Alcohol Abuse and Alcoholism, 2021). As such, somatic symptoms appear to be a concern in Chinese WSW and interventions that promote physical health management in WSW are warranted.

Consistent with previous studies (Hassan & Ali, 2011; Henningsen et al., 2003), our results indicated that psychological distress was positively associated with somatic symptoms, suggesting that mental health problems can worsen physical symptoms among WSW in China. The negative influences of distress could be explained by maladaptive coping. According to transactional model of stress and coping (Lazarus & Folkman, 1984), individuals who are

| Effects                          | B   | S.E. | Delta $z$ | p value |
|---------------------------------|-----|------|-----------|---------|
| From mindfulness to somatic symptoms |     |      |           |         |
| Total effect                    | -.31| .05  | -6.48     | < .001  |
| Total indirect effect           | -.25| .04  | -6.06     | < .001  |
| Specific indirect effect        |     |      |           |         |
| Mindfulness $\rightarrow$ distress $\rightarrow$ somatic symptoms | -.25| .04  | -6.06     | < .001  |
| Direct effect                   |     |      |           |         |
| Mindfulness $\rightarrow$ somatic symptoms | -.06| .06  | -.99      | .32     |

Note: Delta $z = -6.06$
situated in a threatening context and have limited coping resources would be likely to experience a high level of distress, and this could induce the adoption of maladaptive behaviors to cope, such as avoidance, self-blame, and substance use, which would lead to or worsen physical symptoms. Indeed, extant evidence has revealed that somatic symptoms are common for people who use maladaptive coping (Compas et al., 2006; Hassan & Ali, 2011; Mark & Smith, 2018). It is important to note that, as a marginal population who face numerous social challenges (e.g., stigma), WSW in China are at high risk for psychological distress but have limited interpersonal coping resources (e.g., social support) and, thus, are likely to adopt maladaptive coping. Although mental health services could provide in-person psychological support and coping skill trainings, WSW are hesitant to utilize the services because of their concern on minority identity disclosure (She et al., 2021; Zehnder et al., 2019). As such, innovative mental health intervention strategies that address factors associated with coping and account for disclosure concern become important for health promotion among WSW in China.

Our findings regarding mindfulness add to literature on health promoting factors in WSW. Our results suggested that mindfulness was a protective factor for somatic symptoms, and such a positive association was indirectly influenced by psychological distress. This supported the psychological pathway model of mindfulness, indicating that WSW who exhibited higher mindfulness state experienced a lower burden of psychological distress, and this was associated with lower somatic symptoms. As suggested by the psychological pathway model, mindfulness is such a psychological factor contributing to adaptive coping process, enhancing cognitive qualities (e.g., emotional regulation, self-compassion, and positive appraisal of stress) beneficial to psychological and physical health management (Creswell et al., 2019; Garland et al., 2015). The cognitive benefits of mindfulness for marginal populations have been documented in a recent study among sexual minorities, which revealed that mindfulness was positively associated with positive reappraisal, and this was negatively associated with self-stigma and disempowerment (Chan & Leung, 2021). Building on our findings, future research would benefit from exploring cognitive factors associated with psychological mechanism of mindfulness and examining their influences on physical health among WSW in China.

The positive findings of mindfulness imply that health promotion interventions for WSW could benefit from using mindfulness enhancement strategies. In addition to its potential psychosomatic effects, it is noteworthy that mindfulness-based interventions are particularly favorable to hard-to-reach populations owing to its promising features. For example, mindfulness-based interventions have found to be easily adopted to online settings with strong privacy protection and flexible schedule (Spijkerman et al., 2016). This is important for WSW given their identity disclosure concern and unstable working patterns (e.g., different working schedule and daily routine compared to other occupation). The digitally delivered intervention with limited interaction between participants and the facilitators could also address the lack of intervention resources (e.g., facilitators, trainers, location, and appropriate settings) in low- and middle-income countries. Future research should examine the potential role of mindfulness-based interventions in reducing psychological distress and somatic symptoms among WSW in China.

The current study had several methodological limitations. First, this study was based on a convenience sample of WSW in Guangxi. Our findings may be subject to selection bias and may not be generalized to other Chinese regions (e.g., a study sample with a relatively higher proportion of ethnic minority than the national average). Second, measures were all self-reported so that data may be affected by participants’ response bias such as social desirability. Third, our findings would be confounded by other factors that were not measured in the present study,
such as the participation in a psychological intervention. Fourth, our mediation model was examined using cross-sectional data. The association between mindfulness, psychological distress, and somatic symptoms cannot draw conclusions about causality. Although our results did not support the alternative model, the causal relationships in the mediation model remained unclear without using longitudinal analyses. Future research using a stratified sampling and longitudinal design across different regions and employing advanced modeling methods (e.g., cross-lagged panel model) would be beneficial.

Despite these limitations, as one of the first attempt to explore the mindfulness influences among WSW in China, the current study offered valuable insights for health promotion interventions. We found that mindfulness appeared to be a protective factor for psychological distress, and such a positive effect could expand to somatic symptoms. This supported the psychological model of mindfulness, suggesting that mindfulness could promote physical health through the improvement of distress management, such as adaptive coping and positive reappraisal. Notably, our findings revealed that the psychological and physical benefits of mindfulness were applied to WSW in China, who suffer from multiple vulnerabilities of psychological distress and somatic symptoms. With flexibility of online delivery, mindfulness-based intervention may be an effective strategy to help marginal populations, such as WSW, promote their psychological and physical health outcomes.

ACKNOWLEDGMENTS
Research reported in this manuscript was supported by the National Institute of Mental Health of the National Institute of Health under Award Number R01MH112376-05. The content is solely the responsibility of the authors and does not necessary represent the official views of the National Institute of Health.

CONFLICT OF INTEREST
The authors have no conflicts of interest to report.

ETHICS STATEMENT
The study protocol was approved by the Institutional Review Board at the Guangxi Center for Diseases Prevention and Control.

DATA AVAILABILITY STATEMENT
The datasets generated and/or analyzed in the current study are available from the corresponding author on reasonable request.

ORCID
Cheuk Chi Tam https://orcid.org/0000-0003-2612-0564
Shan Qiao https://orcid.org/0000-0003-1834-1834
Xiaoming Li https://orcid.org/0000-0002-5555-9034

REFERENCES
Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*(3), 411–423. https://doi.org/10.1037/0033-2909.103.3.411
Andresen, E. M., Malmgren, J. A., Carter, W. B., & Patrick, D. L. (1994). Screening for depression in well older adults: Evaluation of a short form of the CES-D. *American Journal of Preventive Medicine, 10*(2), 77–84. https://doi.org/10.1016/S0749-3797(18)30622-6
Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182. https://doi.org/10.1037/0022-3514.51.6.1173

Bluth, K., & Eisenlohr-Moul, T. A. (2017). Response to a mindful self-compassion intervention in teens: A within-person association of mindfulness, self-compassion, and emotional well-being outcomes. *Journal of Adolescence, 57*, 108–118. https://doi.org/10.1016/j.adolescence.2017.04.001

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*(4), 822–848. https://doi.org/10.1037/0022-3514.84.4.822

Brown, K. W., & Ryan, R. M. (2009). The mindfulness attention awareness scale (MAAS). *Acceptance and Commitment Therapy. Measures Package, 82.*

Chan, K. K. S., & Leung, D. C. K. (2021). The impact of mindfulness on self-stigma and affective symptoms among sexual minorities. *Journal of Affective Disorders, 286*, 213–219. https://doi.org/10.1016/j.jad.2021.02.057

Chen, H., Li, X., Li, B., & Huang, A. (2017). Negative trust and depression among female sex workers in Western China: The mediating role of thwarted belongingness. *Psychiatry Research, 256*, 448–452. https://doi.org/10.1016/j.psychres.2017.06.031

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

Cohen, S., Kamarck, T., & Mermelstein, R. (1994). *Perceived stress scale. Measuring stress: A guide for health and social scientists* (pp. 235–283). Mind Garden Inc.

Compas, B. E., Boyer, M. C., Stanger, C., Colletti, R. B., Thomsen, A. H., Dufton, L. M., & Cole, D. A. (2006). Latent variable analysis of coping, anxiety/depression, and somatic symptoms in adolescents with chronic pain. *Journal of Consulting and Clinical Psychology, 74*(6), 1132–1142. https://doi.org/10.1037/0022-006X.74.6.1132

Creswell, J. D., Myers, H. F., Cole, S. W., & Irwin, M. R. (2009). Mindfulness meditation training effects on CD4+ T lymphocytes in HIV-1 infected adults: A small randomized controlled trial. *Brain, Behavior, and Immunity, 23*(2), 184–188. https://doi.org/10.1016/j.bbi.2008.07.004

Cwikel, J., Chudakov, B., Paikin, M., Agmon, K., & Belmaker, R. H. (2004). Trafficked female sex workers awaiting deportation: Comparison with brothel workers. *Archives of Women's Mental Health, 7*(4), 243–249. https://doi.org/10.1007/s00737-004-0062-8

Dalla, R. L., Xia, Y., & Kennedy, H. (2003). “You just give them what they want and pray they don’t kill you” street-level sex workers’ reports of victimization, personal resources, and coping strategies. *Violence Against Women, 9*(11), 1367–1394. https://doi.org/10.1177/1077802103255679

Davis, M. C., Zautra, A. J., Wolf, L. D., Tennen, H., & Yeung, E. W. (2015). Mindfulness and cognitive–behavioral interventions for chronic pain: Differential effects on daily pain reactivity and stress reactivity. *Journal of Consulting and Clinical Psychology, 83*(1), 24–35. https://doi.org/10.1037/a0038200

Deng, Y.-Q., Li, S., Tang, Y.-Y., Zhu, L.-H., Ryan, R., & Brown, K. (2012). Psychometric properties of the Chinese translation of the mindful attention awareness scale (MAAS). *Mindfulness, 3*(1), 10–14. https://doi.org/10.1007/s12671-011-0074-1

Fang, X., Li, X., Yang, H., Hong, Y., Zhao, R., Dong, B., Liu, W., Zhou, Y., Liang, S., & Stanton, B. (2007). Profile of female sex workers in a Chinese county: Does it differ by where they come from and where they work? *World Health & Population, 9*(1), 46–64. https://doi.org/10.12927/whp.2007.18695

Garland, E. L., Farb, N. A., R. Goldin, P., & 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., Manusov, E. G., Froeliger, B., Kelly, A., Williams, J. M., & Howard, M. O. (2014). Mindfulness-oriented recovery enhancement for chronic pain and prescription opioid misuse: Results from an early-stage...
randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 82(3), 448–459. https://doi.org/10.1037/a0035798

Gómez-Odriozola, J., & Calvete, E. (2020). Longitudinal bidirectional associations between dispositional mindfulness, maladaptive schemas, and depressive symptoms in adolescents. *Mindfulness*, 11, 1943–1955. https://doi.org/10.1007/s12671-020-01402-w

Gonzalez-Garcia, M., Ferrer, M. J., Borras, X., Muñoz-Moreno, J. A., Miranda, C., Puig, J., Perez-Alvarez, N., Soler, J., Feliu-Soler, A., & Clotet, B. (2014). Effectiveness of mindfulness-based cognitive therapy on the quality of life, emotional status, and CD4 cell count of patients aging with HIV infection. *AIDS and Behavior*, 18(4), 676–685. https://doi.org/10.1007/s10461-013-0612-z

Goyal, M., Singh, S., Sibinga, E. M., Gould, N. F., Rowland-Seymour, A., Sharma, R., Berger, Z., Sleicher, D., Maron, D. D., Shihab, H. M., Ranasinghe, P. D., Linn, S., Saha, S., Bass, E. B., & Haythornthwaite, J. A. (2014). Meditation programs for psychological stress and well-being: A systematic review and meta-analysis. *JAMA Internal Medicine*, 174(3), 357–368. https://doi.org/10.1001/jamainternmed.2013.13018

Guangxi Zhuang Autonomous Region Bureau of Statistics. (2021). Main Data of the Seventh National Population Census in Guangxi. Retrieved January 10 from http://tjj.gxzf.gov.cn/zxfb/t8851187.shtml

Hassan, I., & Ali, R. (2011). The association between somatic symptoms, anxiety disorders and substance use. A literature review. *Psychiatric Quarterly*, 82(4), 315–328. https://doi.org/10.1007/s11126-011-9174-2

Hays, R. D., & DiMatteo, M. R. (1987). A short-form measure of loneliness. *Journal of Personality Assessment*, 51(1), 69–81. https://doi.org/10.1207/s13277520jpa5101_6

Henningsen, P., Zimmermann, T., & Sattel, H. (2003). Medically unexplained physical symptoms, anxiety, and depression: A meta-analytic review. *Psychosomatic Medicine*, 65(4), 528–533. https://doi.org/10.1097/01.PSY.0000075977.90337.E7

Hong, Y., Zhang, C., Li, X., Liu, W., & Zhou, Y. (2013). Partner violence and psychosocial distress among female sex workers in China. *PLoS ONE*, 8(4), e62290. https://doi.org/10.1371/journal.pone.0062290

Hu, L. t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. https://doi.org/10.1080/10705519909540118

Huang, Y., & Pan, S. (2014). Government crackdown of sex work in China: Responses from female sex workers and implications for their health. *Global Public Health*, 9(9), 1067–1079. https://doi.org/10.1080/17441692.2014.954592

Jedel, S., Hoffman, A., Merriman, P., Swanson, B., Voigt, R., Rajan, K., Shaikh, M., Li, H., & Keshavarzian, A. (2014). A randomized controlled trial of mindfulness-based stress reduction to prevent flare-up in patients with inactive ulcerative colitis. *Digestion*, 89(2), 142–155. https://doi.org/10.1159/000356316

de Jong, M., Lazar, S. W., Hug, K., Mehling, W. E., Hölzel, B. K., Sack, A. T., Peeters, F., Ashih, H., Mischoulon, D., & Gard, T. (2016). Effects of mindfulness-based cognitive therapy on body awareness in patients with chronic pain and comorbid depression. *Frontiers in Psychology*, 7, 967. https://doi.org/10.3389/fpsyg.2016.00967

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

Kerrigan, D., Karver, T. S., Barrington, C., Donastorg, Y., Perez, M., Gomez, H., Mbwambo, J., Likindikoki, S., Davis, W., Wilson Beckham, S., Mantsios, A., Galai, N., & Sibinga, E. (2021). Mindfulness, Mental Health and HIV Outcomes Among Female Sex Workers in the Dominican Republic and Tanzania. *AIDS and Behavior*, 25(9), 2941–2950. https://doi.org/10.1007/s10461-021-03168-1

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2002). The PHQ-15: Validity of a new measure for evaluating the severity of somatic symptoms. *Psychosomatic Medicine*, 64(2), 258–266. https://doi.org/10.1097/00006842-200203000-00008

Lazarus, R., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer.

Li, Q., Li, X., & Stanton, B. (2010). Alcohol use among female sex workers and male clients: An integrative review of global literature. *Alcohol and Alcoholism*, 45(2), 188–199. https://doi.org/10.1093/alc/alg095

Logsdon-Conradsen, S. (2002). Using mindfulness meditation to promote holistic health in individuals with HIV/AIDS. *Cognitive and Behavioral Practice*, 9(1), 67–72. https://doi.org/10.1016/S1077-7229(02)80042-6
Lu, W., Bian, Q., Wang, W., Wu, X., Wang, Z., & Zhao, M. (2017). Chinese version of the perceived stress Scale-10: A psychometric study in Chinese university students. PLoS ONE, 12(12), e0189543. https://doi.org/10.1371/journal.pone.0189543

Malarkey, W. B., Jarjoura, D., & Klatt, M. (2013). Workplace based mindfulness practice and inflammation: A randomized trial. Brain, Behavior, and Immunity, 27, 145–154. https://doi.org/10.1016/j.bbi.2012.10.009

Mark, G., & Smith, A. P. (2018). Coping and its relation to gender, anxiety, depression, fatigue, cognitive difficulties and somatic symptoms. Journal of Education, Society and Behavioural Science, 25, 1–22. https://doi.org/10.9734/JESBS/2018/41894

Mumey, A., Sardana, S., Richardson-Vejlgaard, R., & Akinsulure-Smith, A. M. (2021). Mental health needs of sex trafficking survivors in new York City: Reflections on exploitation, coping, and recovery. Psychological Trauma Theory Research Practice and Policy, 13(2), 185–192. https://doi.org/10.1037/tra0000603

Muthén, L., & Muthén, B. (2019). Mplus users guide. 1998–2019. Muthén and Muthén.

National Bureau of Statistics of China. (2021). Main Data of the Seventh National Population Census. Retrieved January 10 from http://www.stats.gov.cn/english/PressRelease/202105/t20210510_1817185.html

National Institute on Alcohol Abuse and Alcoholism. (2021). Hangovers. Retrieved October 4 from https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/hangovers

Pandiyan, K., Chandrasekhar, H., & Madhusudhan, S. (2012). Psychological morbidity among female commercial sex workers with alcohol and drug abuse. Indian Journal of Psychiatry, 54(4), 349–351. https://doi.org/10.4103/0019-5545.104822

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/10.1177/0166608677001000306

Sauer, T., Hansen, S., Bauswein, C., Müller, R., Jaruszowic, S., Keune, J., Schenk, T., Oschmann, P., & Keune, P. M. (2021). Mindfulness training during brief periods of hospitalization in multiple sclerosis (MS): Beneficial alterations in fatigue and the mediating role of depression. BMC Neurology, 21(1), 1–15. https://doi.org/10.1186/s12883-021-02390-7

Scott-Sheldon, L. A., Balletto, B. L., Donahue, M. L., Feulner, M. M., Cruess, D. G., Salmoirago-Blotcher, E., Wing, R. R., & Carey, M. P. (2019). Mindfulness-based interventions for adults living with HIV/AIDS: A systematic review and meta-analysis. AIDS and Behavior, 23(1), 60–75. https://doi.org/10.1007/s10461-018-2236-9

She, R., Mo, P. K. H., Cai, Y., Ma, T., Liu, Y., & Lau, J. T. F. (2021). Mental health service utilisation among transgender women sex workers who are at risk of mental health problems in Shenyang, China: An application of minority stress theory. Health & Social Care in the Community, n/a(n/a). https://doi.org/10.1111/hsc.13501

Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. Sociological Methodology, 13, 290–312. https://doi.org/10.2307/270723

Spijkerman, M., Pots, W. T. M., & Bohlmeijer, E. T. (2016). Effectiveness of online mindfulness-based interventions in improving mental health: A review and meta-analysis of randomised controlled trials. Clinical Psychology Review, 45, 102–114. https://doi.org/10.1016/j.cpr.2016.03.009

Tam, C. C., Zhou, Y., Benotsch, E. G., Li, X., Qiao, S., & Zhao, Q. (2021). Nonmedical use of prescription drugs and biopsychosocial correlates among females who are sex workers in China. Substance Abuse, 1–7.

van Gordon, W., Shonin, E., Dunn, T. J., Garcia-Campayo, J., & Griffiths, M. D. (2017). Meditation awareness training for the treatment of fibromyalgia syndrome: A randomized controlled trial. British Journal of Health Psychology, 22(1), 186–206. https://doi.org/10.1111/bjhp.12224

Varga, L. M., & Surratt, H. L. (2014). Predicting health care utilization in marginalized populations: Black, female, street-based sex workers. Women’s Health Issues, 24(3), e335–e343. https://doi.org/10.1016/j.whi.2014.02.001

Virgili, M. (2015). Mindfulness-based interventions reduce psychological distress in working adults: A meta-analysis of intervention studies. Mindfulness, 6(2), 326–337. https://doi.org/10.1007/s12671-013-0264-0

Wang, B., Li, X., Stanton, B., Zhang, L., & Fang, X. (2010). Alcohol use, unprotected sex, and sexually transmitted infections among female sex workers in China. Sexually Transmitted Diseases, 37(10), 629–636. https://doi.org/10.1097/OLQ.0b013e3181e2118a
Wang, L., Wang, N., Wang, L., Li, D., Jia, M., Gao, X., Qu, S., Qin, Q., Wang, Y., & Smith, K. (2009). The 2007 estimates for people at risk for and living with HIV in China: Progress and challenges. *JAIDS Journal of Acquired Immune Deficiency Syndromes, 50*(4), 414–418. https://doi.org/10.1097/QAI.0b013e3181958530

Wu, C.-h., & Yao, G. (2008). Psychometric analysis of the short-form UCLA loneliness scale (ULS-8) in Taiwanese undergraduate students. *Personality and Individual Differences, 44*(8), 1762–1771. https://doi.org/10.1016/j.paid.2008.02.003

Xu, S., Qiu, D., Hahne, J., Zhao, M., & Hu, M. (2018). Psychometric properties of the short-form UCLA loneliness scale (ULS-8) among Chinese adolescents. *Medicine, 97*(38), e12373. https://doi.org/10.1097/MD.0000000000012373

Zehnder, M., Mutschler, J., Rössler, W., Rufer, M., & Rüsch, N. (2019). Stigma as a barrier to mental health service use among female sex workers in Switzerland. *Frontiers in Psychiatry, 10*, 32. https://doi.org/10.3389/fpsyt.2019.00032

Zhang, C., Li, X., Chen, Y., Hong, Y., Shan, Q., Liu, W., & Zhou, Y. (2014). Alcohol and other drug use, partner violence, and mental health problems among female sex workers in Southwest China. *Health Care for Women International, 35*(1), 60–73. https://doi.org/10.1080/07399332.2012.757317

Zhang, H., Hsieh, E., Wang, L., & Liao, S. (2020). HIV/AIDS among female sex workers in China: Epidemiology and recent prevention strategies. *Current HIV/AIDS Reports, 17*(2), 151–160. https://doi.org/10.1007/s11904-019-00477-y

Zhang, L., Fritzsche, K., Liu, Y., Wang, J., Huang, M., Wang, Y., Chen, L., Luo, S., Yu, J., Dong, Z., Mo, L., & Leonhart, R. (2016). Validation of the Chinese version of the PHQ-15 in a tertiary hospital. *BMC Psychiatry, 16*(1), 1–9. https://doi.org/10.1186/s12888-016-0798-5

Zhang, L., Li, X., Wang, B., Shen, Z., Zhou, Y., Xu, J., Tang, Z., & Stanton, B. (2017). Violence, stigma and mental health among female sex workers in China: A structural equation modeling. *Women & Health, 57*(6), 685–704. https://doi.org/10.1080/03630242.2016.1186781

**How to cite this article:** Tam, C. C., Zhou, Y., Qiao, S., Li, X., & Shen, Z. (2022). Mindfulness, psychological distress, and somatic symptoms among women engaged in sex work in China. *Applied Psychology: Health and Well-Being, 14*(3), 967–986. https://doi.org/10.1111/aphw.12362