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The Moderating Effects of Gender and Dispositional Mindful Observation on the Relationship between Nature Contact and Psychological Distress: A Cross-Sectional Study in China

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Abstract: Nature conservation is an essential topic in the area of sustainability. Understanding how nature benefits humans, particularly human mental health, contributes to the awareness and promotion of nature conservation. A growing number of studies have demonstrated the positive effects of nature on human well-being. However, not all individuals derive the same benefits from engaging with nature. Dispositional mindful observation may play a significant role in the interaction between humans and nature, subsequently influencing the degree of benefit attained. In exploring an efficacious approach to amplify the benefits of nature, this study examined the moderating impact of gender and dispositional mindful observation on the association between nature contact and psychological distress. A total of 786 Chinese participants (490 females; mean age = 22.39 years) were recruited to complete an online survey regarding nature contact, dispositional mindful observation, and psychological distress. The results revealed that dispositional mindful observation significantly moderated the relationship between nature contact and psychological distress. Higher dispositional mindful observation significantly amplified the positive impact of contact with nature on mental health. Body observation showed the strongest moderating effect among the three dispositional mindful observation facets, followed by emotional awareness and external perception. No significant gender difference was found in the mental health benefits of nature contact. In conclusion, dispositional mindful observation may be a valuable focus for amplifying the mental health benefits obtained from engaging with nature.

Keywords: dispositional mindful observation; nature contact; psychological distress; mental health; body observation; emotional awareness; external perception

1. Introduction

One of the cornerstones of sustainable development is the preservation and conservation of nature. To enhance the awareness of nature protection, it is important to acknowledge the benefits of contact with nature. Mental health benefits from nature have gained increasing attention in recent decades [1,2]. Extensive cross-sectional, experimental, and longitudinal studies have provided supporting evidence indicating the positive effect of nature on human well-being [1,3,4]. Several theories, such as the biophilia hypothesis [5], attention restoration theory [6,7], and stress reduction theory [8,9], have been developed to explain the mechanism by which nature benefits mental health.

However, not all individuals obtain the equivalent benefits from engaging with nature. A review by Bratman and his colleagues pointed out that mental health benefits from engaging with nature may vary due to multiple moderators, such as personality traits, culture, occupation, gender, and age [1]. Nevertheless, research on these moderators remains limited [1]. To our knowledge, none of the available studies have been conducted within the framework of Chinese culture. Thus, this current study aimed to explore the
moderating impacts of gender and dispositional mindful observation on the correlation between contact with nature and psychological distress in Chinese populations.

1.1. The Moderating Role of Gender between Nature Contact and Psychological Distress

Gender as a potential mediator in the association between nature exposure and mental health has received a lot of discussion, but the results were inconsistent. Some studies indicated that nature had a higher impact on males than females [10–13]. For example, one nine-year longitudinal study showed that the positive association between green space and mental health was greater among men than among women when age was not considered, and men seemed to obtain greater benefits from more green space in early to mid-adulthood than in other life stages [10]. In contrast, some studies supported stronger effects in females than males [14,15]. For instance, a large-sample study from the Netherlands showed the largest effect sizes of green space on mental health for women of the lowest (18~24 years) age groups [14]. Moreover, some studies demonstrated no gender difference [16,17].

The inconsistency might be explained by the different cultural backgrounds of the samples. For example, some researchers suggested that females may not feel relaxed when entering parks or forests if they perceive these environments as unsafe [18]. However, this perception may vary across different countries. Therefore, it is necessary to examine the moderating effects of gender in diverse contexts. This study provided evidence from Chinese college students. Based on previous studies, we proposed the following:

Hypothesis 1. Nature contact is negatively associated with psychological distress.

Hypothesis 2. Gender moderates the relationship between nature contact and psychological distress.

1.2. The Moderating Role of Dispositional Mindful Observation between Nature Contact and Psychological Distress

Apart from gender and other stable demographic variables, it is critical to identify moderators that are modifiable to enable the development of related effective interventions. This means that with insights into such a variable, we could find a practicable approach to promoting their experience in nature and developing their affinity to nature. Based on previous studies, we proposed that dispositional mindful observation might be a promising approach that could enhance the mental health benefits of engaging with nature.

1.2.1. The Conception of Dispositional Mindful Observation

The concept of dispositional mindful observation was initially proposed in this study with reference to previous studies. The closest approximation to dispositional mindful observation is observing, widely acknowledged as a component of mindfulness. Specifically, mindfulness is conceptualized as “the process of observing body and mind intentionally”, moment-to-moment, and nonjudgmentally [19]. As a central [20] and essential [21] aspect of mindfulness, the practice of observing is considered fundamental to mindfulness-based interventions [22,23]. However, observing has constantly shown an unexpected association with the other four facets of mindfulness (i.e., describing, nonjudging, nonreactivity, and acting with awareness) and psychological symptoms (see the review [24]). Some researchers have even advocated for the exclusion of the observing facet [25–27]. Overall, it may be insightful to investigate the moderating role of observation in the relationship between mental health and other factors (such as contact with nature), rather than its direct association with psychological distress.

Similar to mindfulness, which could be conceptualized as a trait referred to as dispositional mindfulness [28], we suggested that observing can also be developed into a long-term tendency like a trait and thus can be referred to as dispositional mindful observation. The observing scale developed by Rudkin and his colleagues (2018) was considered to measure dispositional mindful observation in this study since this scale was aimed to measure a more trait-like construct of observing [24].
To emphasize multiple dimensions of dispositional observing, we named the concept “dispositional mindful observation” rather than “dispositional observation”. According to Rudkin et al. (2018), dispositional mindful observation involves three facets: body observation, emotional awareness, and external perception [24]. Body observation emphasizes the observation of bodily sensations; emotional awareness primarily concerns emotions; and external perception reflects the perception of external stimuli. Acquiring comprehensive effects from these dimensions holds the potential to offer valuable insights into the operation of specific interventions, consequently enhancing their overall efficacy.

1.2.2. Theoretical and Empirical Foundations of the Moderating Effects of Dispositional Mindful Observation

One of the key theoretical grounds to support dispositional mindful observation as a moderator between exposure to nature and mental health is the Dose theory [1]. Dose theory is derived from toxicology, in which exposure and dose can vary considerably. Specifically, “exposure” refers to the amount or intensity of a physical, chemical, or other environmental agent that reaches the target population or organism, whereas “absorbed (or internal) dose” refers to the amount taken up by an organism and/or delivered to the target organ [29]. Similarly, the administered dose arising from exposure to nature may vary based on the levels of awareness and perceptions concerning natural surroundings [30]. However, little is known about the duration of the effects of interacting with nature [1]. Some studies have demonstrated that short-term interventions targeting mindful observation could enhance the benefits of nature on mental health. An experimental study revealed that participants who were given verbal instructions to carefully observe greenery in images performed significantly better on an attentional test and rated the streetscapes as more restorative than participants who did not receive this instruction [30]. Another study demonstrated that mindfulness-based interventions focused on nature awareness improve outdoor experiences, foster a stronger connection with nature, and enhance emotional well-being [31]. However, it remains unknown as to whether the moderating effects of mindful observation could be accumulated in daily life. Considering the theory and empirical foundations, we proposed the following:

Hypothesis 3. Dispositional mindful observation moderates the relationship between nature contact and psychological distress.

1.3. The Gender Differences between the Moderating Effects of Dispositional Mindful Observation

Apart from the separate mediating effects of gender and dispositional mindful observation, the interaction between these two moderators may also plays a role in the relationship between contact with nature and psychological distress, since several studies have shown that women scored higher than men on the observing [32,33]. This might indicate that the different levels of dispositional mindful observation between genders could be one of the explanations for the gender differences in mental health benefits from contact with nature. The gender differences between the moderating effects of dispositional mindful observation, therefore, became necessary to investigate. From the statistical perspective, the moderating role of gender in the moderating effects of dispositional mindful observation is equivalent to examining the moderating effects of the interaction between gender and dispositional mindful observation. Thus, we examined the following hypothesis:

Hypothesis 4. The interaction between gender and dispositional mindful observation moderates the relationship between nature contact and psychological distress.

1.4. The Current Study

In summary, the primary objective of this study was to examine the moderating effects of gender and dispositional mindful observation on the relationship between contact with nature and psychological distress using a cross-sectional design. The effects of the different facets of the dispositional mindful observation were further inspected. Building upon
previous research, we put forward four hypotheses. As gender and age might impact psychological distress, they were controlled when the hypotheses were examined. Figure 1 illustrates the four models for the four hypotheses. See Supplementary Material Figure S1 for the statistical diagrams for the four models.

As research has seldom investigated the psychological moderators of the mental health benefits of nature, this study might be one of the pioneers that contribute to the interdisciplinary work in the field of psychology and ecology. Considering that the effects of gender still remain contradictory, our study could provide valuable results from Chinese background. Most importantly, we proposed and examined the concept named “dispositional mindful observation”, which might be an essential intervention target to maximize the mental well-being benefits obtained from engaging with nature and eventually promote nature protection and sustainable development.

2. Materials and Methods

2.1. Participants

According to previous studies [34,35], for a multiple regression model including an interaction term, a sample size of approximately 200 individuals would allow 80% power for the detection of an interaction with a medium effect size, assuming the probability of α error of 0.05 and scale reliability of 0.75 or better. We tried to enroll as many participants as we could to increase the reliability of the study. The inclusion criteria of the participants were as follows: (a) normal or corrected-to-normal visual acuity; (b) native Chinese speakers; and (c) no history of neurological or mental disorders.

Eight hundred and twenty-six respondents were recruited from a university in East China through the school’s online social forums. The participants accessed the questionnaires via a link or a Quick Response (QR) code that was generated by the Survey Star.
software (https://www.wjx.cn/). Survey Star automatically checks incomplete responses to guarantee the quality of the responses. A total of 40 respondents were excluded due to failing attention check items (i.e., an item with an apparent answer, such as “Please choose the ‘strongly agree’ option”; n = 26) and completing the questionnaires repeatedly (n = 14; only data from the first questionnaire were retained). The final sample included 786 participants (62.3% females; 51.3% undergraduates; mean age = 22.39 years; SD = 2.62 years).

2.2. Measures

2.2.1. Contact with Nature

Contact with nature was assessed using a scale adapted from previous studies [36] comprising two items with response options ranging from 1 (very rare, less than once a month) to 6 (very frequent, more than twice a week). The first item measures the frequency with which individuals visited natural areas (such as gardens, forests, and beaches) over the last 12 months, and the second item measures the frequency with which they engaged in recreational or leisure activity in natural areas (such as walking, camping, and fishing) in the same period. The items begin with “How often have you visited natural areas” or “How often have you engaged in recreational or leisure activity in natural areas”. Higher scores indicate more frequent contact with nature. Cronbach’s $\alpha$ was 0.88.

2.2.2. Psychological Distress

Psychological distress was measured using the Depression Anxiety Stress Scales-21 (DASS-21) [37], in which respondents rated the severity of each symptom during the previous week. The scale comprises 21 items and evaluates responses based on a four-point scale from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). Example items include “I was unable to become enthusiastic about anything” targeting depression, “I found it difficult to relax” targeting stress, and “I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)” targeting anxiety. Higher scores indicate more severe psychological distress. The scale has been validated in clinical and nonclinical settings, involving population samples across different nations [38,39]. Cronbach’s $\alpha$ was 0.93 in the current study.

2.2.3. Dispositional Mindful Observation

Dispositional mindful observation was measured using the Observing Scale developed by Rudkin et al. [24]. The scale comprises 23 items and includes three different facets: body observation (10 items), emotional awareness (6 items), and external perception (7 items). The mindful observation score was calculated by the average of the scores of the three facets, with higher scores indicating a higher tendency to observe. Example items include “Notice changes in the body—e.g., pace of breathing” for body observation, “Notice immediately my changed emotions” for emotional awareness, and “When walking out, aware of smells or air-on-face” for external perception. In the present study, Cronbach’s $\alpha$ values for the whole scale, the body observation subscale, the emotional awareness subscale, and the external perception subscale were 0.92, 0.83, 0.81, and 0.86, respectively.

2.3. Procedure

Participants were informed that their privacy and confidentiality were protected. Before enrolment, they signed electronic informed consent forms. The study was approved by the Institutional Review Board (IRB) of the Department of Psychology and Behavioral Science, Zhejiang University (IRB approval code: [2023]034).

After submitting informed consent forms, they completed the contact with nature scale, the Observing Scale, DASS-21, and a demographic questionnaire online. At the end of the survey, the participants were thanked, debriefed, and compensated with 5 RMB (approximately 0.7 USD) for their participation. The data were collected in May 2023.
2.4. Data Analyses

First, a descriptive analysis for the cross-sectional data was conducted. To examine multivariate normality, skewness and kurtosis values were used, with values <2 supporting the assumption of a normal distribution [40]. Pearson’s correlation coefficient and point-biserial correlation coefficient were calculated to evaluate the relationship between variables. Pearson’s r was calculated between two continuous variables and the point-biserial coefficient was calculated between one dichotomous variable (i.e., gender in this study) and one continuous variable. The internal consistency coefficients of the scales were analyzed by Cronbach’s α, as shown in Section 2.2.

Then, we examined the four hypotheses using multiple regressions. Psychological distress was the dependent variable in all four models. Also, the effects of gender and age on psychological distress were all controlled in the models. The independent variables and moderators in the models are illustrated in Figure 1. Model 1 was examined by SPSS version 26 (IBM Corp., Armonk, NY, USA, 2020), while Model 2, 3, and 4 involving moderators were examined using PROCESS version 3.4, a simple moderation macro for SPSS [41]. Specifically, for the moderation analysis, the control variables were first entered into the regression model, then the independent and moderation variables were entered, and finally, the interaction terms of the independent and moderation variables were calculated and entered. The moderating effects were indicated by the significance of the interaction terms. The significance was calculated through a bootstrapping procedure automatically implemented by the PROCESS. Five thousand bootstrapping samples were generated according to random sampling. Before testing, the independent and moderation variables were mean-centered based on the recommendation of Aiken and his colleagues [35].

In addition to the regression, for significant moderators, simple slope analyses were performed to examine the conditional slope of the relationship between the predictor (contact with nature) and outcome (psychological distress) at different levels of each moderator (gender, or dispositional mindful observation). The Johnson–Neyman technique was employed to calculate the cut-off points, which was a decisive score of the moderating variable to enable the predictor to significantly predict the outcome. The relative cut-off point, which was the differences between cut-off points and the mean value of the moderator, and the percentage of participants scoring higher than the cut-off point were also calculated.

Finally, the moderating effects of three dimensions of dispositional mindful observation were explored using moderation analyses via PROCESS and simple slope analyses. When interpreting the results, \( p \leq 0.05 \) was considered statistically significant.

3. Results
3.1. Descriptive Analysis and Correlations

Table 1 shows the descriptive statistics for the critical variables and the correlations between them. The skewness and kurtosis values were all lower than 2, supporting the normal distribution of the variables. The Pearson correlations indicated that contact with nature was significantly negatively correlated with psychological distress, while dispositional mindful observation and its facets showed no significant correlations with psychological distress. The point-biserial correlations suggested that gender had a significant association with psychological distress and dispositional mindful observation.

3.2. Multiple Regressions for the Four Hypotheses

The regression coefficients of the variables in the four models corresponding to the four hypotheses are shown in Table 2. Hypothesis 1 proposed a negative relationship between nature contact and psychological distress. The regression coefficient value of nature contact (\( B = -0.030; SE = 0.015; t = -2.023; p = 0.043 < 0.05 \)) showed that the variable was negatively associated with psychological distress, thereby supporting Hypothesis 1.
Table 1. Descriptive analysis and correlations.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Range</th>
<th>M</th>
<th>SD</th>
<th>SK</th>
<th>KU</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nature contact</td>
<td>1–6</td>
<td>3.01</td>
<td>1.28</td>
<td>0.20</td>
<td>−0.68</td>
<td></td>
</tr>
<tr>
<td>2. Psychological distress</td>
<td>0–3</td>
<td>0.80</td>
<td>0.53</td>
<td>0.73</td>
<td>0.03</td>
<td>−0.067 *</td>
</tr>
<tr>
<td>3. DM observation</td>
<td>1–5</td>
<td>3.75</td>
<td>0.56</td>
<td>−0.22</td>
<td>0.41</td>
<td>0.202 **</td>
</tr>
<tr>
<td>3.1 Body observation</td>
<td>1–5</td>
<td>3.97</td>
<td>0.63</td>
<td>−0.20</td>
<td>0.37</td>
<td>0.210 **</td>
</tr>
<tr>
<td>3.2 Emotional awareness</td>
<td>1–5</td>
<td>3.76</td>
<td>0.56</td>
<td>−0.22</td>
<td>0.50</td>
<td>0.062 *</td>
</tr>
<tr>
<td>3.3 External perception</td>
<td>1–5</td>
<td>3.57</td>
<td>0.73</td>
<td>−0.29</td>
<td>0.05</td>
<td>0.232 **</td>
</tr>
<tr>
<td>4. Gender</td>
<td></td>
<td>−0.064 *</td>
<td>−0.102 **</td>
<td>0.086 **</td>
<td>0.057</td>
<td>0.081 *</td>
</tr>
</tbody>
</table>

Note. M = Mean; SD = standard deviation; SK = skewness; KU = kurtosis; r = Pearson’s correlation coefficient for continuous variables and point-biserial correlation coefficient for gender. Psychological distress was measured by Depression Anxiety Stress Scales-21. DM Observation = dispositional mindful observation. *p < 0.05, **p < 0.01, for one-tailed tests.

Table 2. Regression coefficients of the models.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
<th>Model 3</th>
<th></th>
<th>Model 4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>1.255 **</td>
<td>0.178</td>
<td>0.974 **</td>
<td>0.160</td>
<td>1.179 **</td>
<td>0.173</td>
<td>0.995 **</td>
<td>0.161</td>
</tr>
<tr>
<td>Age</td>
<td>−0.008</td>
<td>0.007</td>
<td>−0.008</td>
<td>0.007</td>
<td>−0.008</td>
<td>0.007</td>
<td>−0.008</td>
<td>0.007</td>
</tr>
<tr>
<td>Gender</td>
<td>−0.116 **</td>
<td>0.039</td>
<td>−0.114 **</td>
<td>0.039</td>
<td>−0.115 **</td>
<td>0.039</td>
<td>−0.106 **</td>
<td>0.039</td>
</tr>
<tr>
<td>NC</td>
<td>−0.030 *</td>
<td>0.015</td>
<td>−0.030 *</td>
<td>0.015</td>
<td>−0.027</td>
<td>0.015</td>
<td>−0.027</td>
<td>0.015</td>
</tr>
<tr>
<td>Gender × NC</td>
<td>−0.048</td>
<td>0.030</td>
<td>−0.048</td>
<td>0.030</td>
<td>−0.048</td>
<td>0.030</td>
<td>−0.048</td>
<td>0.030</td>
</tr>
<tr>
<td>DM observation</td>
<td></td>
<td>0.009</td>
<td>0.035</td>
<td>0.011</td>
<td>0.035</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM observation × NC</td>
<td></td>
<td>−0.061 *</td>
<td>0.025</td>
<td>−0.056 *</td>
<td>0.025</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM observation × Gender</td>
<td></td>
<td>0.086</td>
<td>0.071</td>
<td>0.086</td>
<td>0.071</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM observation × Gender × NC</td>
<td>−0.039</td>
<td>0.053</td>
<td>−0.039</td>
<td>0.053</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.017</td>
<td>0.020</td>
<td>0.025</td>
<td>0.030</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>4.578</td>
<td>4.087</td>
<td>3.984</td>
<td>3.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(df1, df2)</td>
<td>(5, 782)</td>
<td>(4, 781)</td>
<td>(5, 780)</td>
<td>(8, 777)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>0.003</td>
<td>0.003</td>
<td>0.001</td>
<td>0.003</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 786. Psychological distress is the dependent variable. B = unstandardized coefficient; SE = standard error; NC = nature contact; DM observation = dispositional mindful observation. *p < 0.05, **p < 0.01. Gender was coded as 1 for men and 2 for women.

Hypothesis 2 proposed the moderating role of gender between nature contact and psychological distress. The regression coefficient value showed that gender (B = −0.114; SE = 0.039; t = −2.950; p = 0.003 < 0.01) was significantly associated with psychological distress, while the interaction term of gender and nature contact (B = −0.048; SE = 0.030; t = −1.608; p = 0.108 > 0.05) was not significant. This indicates that gender directly affected psychological distress and did not moderate the impact of nature contact. Therefore, Hypothesis 2 was not supported.

Hypothesis 3 proposed the moderating role of dispositional mindful observation between nature contact and psychological distress. The regression coefficient value showed that dispositional mindful observation (B = 0.009; SE = 0.035; t = 0.256; p = 0.798 > 0.05) did not predict psychological distress, while the interaction term of dispositional mindful observation and nature contact (B = −0.061; SE = 0.025; t = −2.425; p = 0.016 < 0.05) was significant. This indicates that although dispositional mindful observation did not affect psychological distress directly, it moderated the impact of nature contact. Thus, Hypothesis 3 was supported.

Hypothesis 4 proposed the moderating role of the interaction between gender and dispositional mindful observation in the relationship between nature contact and psychological distress. The regression coefficient value showed that the interaction between gender and dispositional mindful observation (B = 0.086; SE = 0.071; t = 1.211; p = 0.226 > 0.05) did not predict psychological distress. Neither did it play a moderating role, as the three-way interaction did not show significance (B = −0.039; SE = 0.053; t = −0.743; p = 0.458 > 0.05). In other words, it indicated that gender did not significantly impact the moderating effects of dispositional mindful observation. Therefore, Hypothesis 4 was not supported.
3.3. Simple Slope Analyses for the Moderating Effects of Dispositional Mindful Observation

As the dispositional mindful observation showed significant moderating effects in the regression models, we further conducted simple slope analyses for it. We plotted the interaction term for high (mean + 1 SD), mid (mean), and low (mean − 1 SD) moderation values, according to Model 3.

As shown in Figure 2, the unstandardized simple slope for participants with 1 SD below the mindful observation mean was not significant (\( \hat{B} = 0.007; SE = 0.022; t = 0.315; p = 0.753 > 0.05 \)) that for participants with a mean mindful observation level was marginally significant (\( \hat{B} = −0.027; SE = 0.015; t = −1.807; p = 0.071 > 0.05 \)), and that for those 1 SD above the mean was significant (\( \hat{B} = −0.061; SE = 0.019; t = −3.153; p = 0.002 < 0.01 \)). The Johnson–Neyman technique demonstrated that the relationship between contact with nature and mental health was significant when the mindful observation score was equal to or higher than 3.790 (which is a little higher than a middle level of mindful observation as the scale ranges from 1 to 5) and not significant for lower values of the mindful observation score. Among the participants, 48.09% had scores higher than this cut-off point, indicating that more than half of the participants could not benefit from nature contact, meaning that they greatly required relevant interventions.

![Figure 2](https://example.com/figure2.png)

**Figure 2.** Dispositional mindful observation as a moderator between contact with nature and psychological distress. \( M = \) mean; \( SD = \) standard deviation.

3.4. The Moderating Effects of the Dimensions of Dispositional Mindfulness Observation

We further investigated the moderating effects of the dimensions of dispositional mindfulness observation, including body observation, emotional awareness, and external perception. The regression coefficients of the models for dimensions of dispositional mindfulness observation are shown in Table 3. The multiple regression showed that the interaction term of body observation and nature contact (\( \hat{B} = −0.057; SE = 0.023; t = −2.532; p = 0.012 < 0.05 \)) and the interaction term of dispositional mindful observation and nature contact (\( \hat{B} = −0.050; SE = 0.024; t = −2.061; p = 0.040 < 0.05 \)) were significant, while the interaction term of dispositional mindful observation and nature contact (\( \hat{B} = −0.034; SE = 0.020; t = −1.734; p = 0.083 > 0.05 \)) was only marginally significant. These indicated that among the three facets of dispositional mindful observation, body observation showed the strongest moderating effect between nature contact and psychological distress, followed by emotional awareness, and external perception exhibited the lowest effect.

The results of the simple slope analyses for the moderating effects of the three facets of dispositional mindfulness observation are shown in Table 4. The association between contact with nature and mental health was nonsignificant in those with low levels of all facets of mindful observation (ps > 0.80). However, it was significant among those with high levels of all such facets (ps < 0.01). Regarding those at the mean level, only body observation in relation to contact with nature showed a significant predictive effect regarding mental health (\( p = 0.043 < 0.05 \)). The cut-off point, which was the decisive score for the ability...
of contact with nature to significantly predict mental health, was the highest for body observation and the lowest for external perception. This situation was reversed in the relative cut-off points. This finding implied that the participants mostly had high levels of body observation and could more easily benefit from this observation. Participants mostly had low levels of external perception, necessitating improvements in this facet.

Table 3. Regression coefficients of the models for dimensions of dispositional mindfulness observation.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 5 for BO</th>
<th>Model 6 for EA</th>
<th>Model 7 for EP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>B</td>
</tr>
<tr>
<td>(Intercept)</td>
<td>1.174**</td>
<td>0.172</td>
<td>1.185**</td>
</tr>
<tr>
<td>Age</td>
<td>−0.008</td>
<td>0.007</td>
<td>−0.009</td>
</tr>
<tr>
<td>Gender</td>
<td>−0.117**</td>
<td>0.039</td>
<td>−0.114**</td>
</tr>
<tr>
<td>NC</td>
<td>−0.031*</td>
<td>0.015</td>
<td>−0.026</td>
</tr>
<tr>
<td>DMO dimension</td>
<td>0.044</td>
<td>0.031</td>
<td>−0.017</td>
</tr>
<tr>
<td>DMO dimension × NC</td>
<td>−0.057*</td>
<td>0.023</td>
<td>−0.050*</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.029</td>
<td>0.023</td>
<td>0.023</td>
</tr>
<tr>
<td>( F )</td>
<td>4.650</td>
<td>3.647</td>
<td>3.352</td>
</tr>
<tr>
<td>((df_1, df_2))</td>
<td>(5, 780)</td>
<td>(5, 780)</td>
<td>(5, 780)</td>
</tr>
<tr>
<td>( p )</td>
<td>&lt;0.001</td>
<td>0.003</td>
<td>0.005</td>
</tr>
</tbody>
</table>

Note. \( N = 786. \) Psychological distress is the dependent variable. \( B = \) unstandardized coefficient; \( SE = \) standard error; \( NC = \) nature contact; \( DMO = \) dispositional mindful observation; \( BO = \) body observation; \( EA = \) emotional awareness; \( EP = \) external perception. \(* p < 0.05, \) \( ** p < 0.01. \) Gender was coded as 1 for men and 2 for women.

Table 4. Simple slope analyses of the moderating effect of mindful observation and its three facets on the relationship between contact with nature and psychological distress.

<table>
<thead>
<tr>
<th>Moderator</th>
<th>Level</th>
<th>B</th>
<th>SE</th>
<th>t</th>
<th>( p )</th>
<th>CoP</th>
<th>rCoP</th>
<th>pCoP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Observation</td>
<td>Low</td>
<td>0.005</td>
<td>0.222</td>
<td>0.248</td>
<td>0.804</td>
<td>3.922</td>
<td>−0.015</td>
<td>50.89%</td>
</tr>
<tr>
<td></td>
<td>Mid</td>
<td>−0.031</td>
<td>0.015</td>
<td>−2.026</td>
<td>0.043</td>
<td>3.922</td>
<td>−0.015</td>
<td>50.89%</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>−0.067</td>
<td>0.019</td>
<td>−3.431</td>
<td>0.001</td>
<td>3.922</td>
<td>−0.015</td>
<td>50.89%</td>
</tr>
<tr>
<td>Emotional Awareness</td>
<td>Low</td>
<td>0.002</td>
<td>0.021</td>
<td>0.092</td>
<td>0.927</td>
<td>3.810</td>
<td>0.053</td>
<td>52.80%</td>
</tr>
<tr>
<td></td>
<td>Mid</td>
<td>−0.026</td>
<td>0.015</td>
<td>−1.774</td>
<td>0.076</td>
<td>3.810</td>
<td>0.053</td>
<td>52.80%</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>−0.054</td>
<td>0.019</td>
<td>−2.847</td>
<td>0.005</td>
<td>3.810</td>
<td>0.053</td>
<td>52.80%</td>
</tr>
<tr>
<td>External Perception</td>
<td>Low</td>
<td>−0.002</td>
<td>0.022</td>
<td>−0.111</td>
<td>0.912</td>
<td>3.638</td>
<td>0.068</td>
<td>47.84%</td>
</tr>
<tr>
<td></td>
<td>Mid</td>
<td>−0.027</td>
<td>0.015</td>
<td>−1.801</td>
<td>0.072</td>
<td>3.638</td>
<td>0.068</td>
<td>47.84%</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>−0.052</td>
<td>0.020</td>
<td>−2.619</td>
<td>0.009</td>
<td>3.638</td>
<td>0.068</td>
<td>47.84%</td>
</tr>
</tbody>
</table>

Note. \( Low = M − 1SD; Mid = M; High = M + 1SD; M = mean \) of each moderator; \( SD = \) standard deviation of each moderator; \( B = \) unstandardized coefficients; \( CoP = \) cut-off point; \( rCoP = \) relative cut-off point = \( CoP − M; pCoP = \) percentage of participants scoring higher than the cut-off point.

4. Discussion

4.1. Main Findings

In this cross-sectional study, the moderating effects of gender and dispositional mindful observation on the association between contact with nature and psychological distress were examined. The three facets of mindful observation (body observation, emotional awareness, and external perception) were considered. Hypothesis 1, which proposed the association between nature contact and psychological distress, and Hypothesis 3, which proposed the moderating effect of dispositional mindful observation, were supported by the findings. The key finding was that the impact of nature contact on psychological distress was significant among participants with higher levels of dispositional mindful observation, while the relationship was no longer significant among those with lower levels of dispositional mindful observation. Hypothesis 2 and Hypothesis 4, which were related to the moderating effects of gender, were not supported, indicating no significant gender difference in the impact of nature contact among Chinese college students. Among the three facets of mindful observation, body observation was the strongest moderator of the relationship between contact with nature and mental health, followed by emotional
awareness and external perception. Cultivating protective mechanisms, such as those associated with dispositional mindful observation, that amplify the benefit of contact with nature may be a cost-effective and practical approach.

First of all, our findings highlight the importance of dispositional mindful observation. It should be mentioned that dispositional mindful observation is a long-term characteristic that involves engagement with wide aspects, such as bodily sensations, emotional awareness, and perception of the external environment. It includes a greater range of experiences than the limited concentration on nature observation. The effect on the relationship between nature contact and psychological health is one of the application scenarios of dispositional mindful observation. On the one hand, it provides further evidence for the positive effect of exposure to the natural environment. On the other hand, we should notice that the dispositional mindful observation could be cultivated independently of nature contact. Practicing mindful observation and further enhancing dispositional mindful observation could be helpful before engaging with or being exposed to the natural environment. Also, the result was consistent with the dose theory [42,43] and the existing experimental studies [30,31]. As a cross-sectional study, our findings supported that the effect of mindful observation on the relationship between contact with nature and mental health could be accumulated from a state to a disposition and affect mental health both in the short-term and long-term. Although mindful observation might not directly affect mental health in the same way as other facets of mindfulness, it is worth emphasizing, practicing, and further investigating [24].

Our findings also suggest the different moderating effects of the facets of dispositional mindful observation on the relationship between contact with nature and mental health. Body observation exerted the strongest moderating effect among the three facets of mindful observation. This finding coincides with the stress reduction theory of nature, which emphasizes recovery from physical and emotional stress via the autonomic response when in contact with nature [8,9]. Furthermore, a growing body of evidence suggests that contact with nature yields significant physiological benefits, such as improved heart rate, blood pressure, skin conductance, cortisol levels, and reduced perceived pain [44,45]. Therefore, the observation or awareness of body sensations, which might be similar to the mechanism of biological feedback, could be essential when engaging with nature. Compared with body observation, emotional awareness and external perception showed reduced moderating effects and had a higher relative cut-off point, indicating that it would be harder to reach an effective level and require greater effort to improve.

Regarding the impact of gender, the results showed the significant impact of gender on psychological distress, while no significance was found in the moderating effect of gender in the effect of nature contact on mental health or in the moderating effect of dispositional mindful observation. As previously stated in the introduction, there is disagreement and a lack of complete knowledge on the gender gap in the impact of nature on mental health [10,14]. At the least, our findings demonstrated that no significant effect of gender was found among Chinese college students. Previous studies suggested that compared to men, women may not feel the natural environment as enjoyable as men, as they may perceive the natural environment as unsafe [18]. However, it is possible that this will not occur among college students as they acquire more information and technology. Therefore, our findings suggested that contact with nature and dispositional mindful observation could be important and helpful for both males and females.

4.2. Limitations

Several limitations of this study should be acknowledged. First, the sample in the current study was homogeneous in terms of age, educational level (college students), and socioeconomic status, which may limit the generalizability of the findings. Thus, the results of this study are suggested to be considered among college students as well as under Chinese cultural background. Replication of the moderation models at different ages (e.g., middle or late adulthood), education levels (e.g., individuals with lower education
levels) groups, or other cultural contexts is recommended for future research. Second, the use of a self-report questionnaire for data collection in this study raises the possibility of common method bias [46]. Future studies could employ multiple and diverse approaches, such as daily diaries, observations, and clinician ratings of psychological symptoms to enhance validity. Third, due to the cross-sectional design, causal relationships cannot be inferred from the findings. Prospective studies are needed in order to establish a temporal relationship between nature contact, dispositional mindful observation, and mental health.

4.3. Implications

With its theoretical implications and practical implications, this study provides a significant contribution to the fields of research on nature and mental health. It holds the potential to stimulate further research and practical endeavors related to nature conservation and sustainable development.

First, our findings provide an explanation for the phenomenon of varied effects of contact with nature on mental health between individuals and indicate the significance of mindful observation in the relationship between contact with nature and mental health. It helps advance our current understanding of the mechanisms by which nature benefits mental health and can enhance educational efforts toward sustainability. By studying how nature positively impacts various aspects of our lives, such as physical and mental well-being, educators can incorporate this knowledge into curricula and educational programs. This would help create a greater awareness of the importance of sustainability and foster a sense of responsibility towards the environment.

Second, we emphasize the significance of mindful observation, a dispositional trait, in relation to contact with nature, which, in turn, could inspire further cross-disciplinary research from both psychological perspectives on individual differences and ecological perspectives on sustainability. More investigations are warranted with respect to how these traits can be harnessed to promote pro-environmental behaviors and develop a deeper connection with the natural world.

Moreover, this study explored mindful observation independently of general mindfulness, expanding our understanding of mindful observation and providing a broader perspective for research and interventions based on mindfulness. This study highlights the necessity of incorporating mindful observation practices before and during contact with nature, providing valuable insights for nature-based psychological interventions. The investigation of the facets of mindful observation further suggests the possible direction and proportion of specific practices or interventions. These attempts might magnify the health aspects of sustainability and drive efforts from individuals and communities toward nature protection.

5. Conclusions

To the authors’ knowledge, this study represents the first investigation into the potential moderating role of dispositional mindful observation in the relationship between contact with nature and mental health and provides evidence of there being no gender difference in the impact of nature contact among Chinese college students. Overall, the findings indicated that dispositional mindful observation, which did not exert a main effect on psychological distress, significantly amplified the positive impact of contact with nature on mental health. Among the three facets of mindful observation, body observation emerged as the strongest moderator of the relationship between contact with nature and mental health, followed by emotional awareness and external perception. No significant gender difference was found in the mental health benefits of nature contact. These findings deepen our understanding of the mechanisms by which contact with nature affects mental health and the mindful observation construct, offering crucial insights into the development of targeted interventions.
Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su152316457/s1, Figure S1: The Statistical Diagrams for the Four Hypotheses; Table S1: Raw Data of the Study.

Author Contributions: Conceptualization, methodology, software, validation, formal analysis, investigation, resources, data curation, writing—original draft preparation, visualization, writing—review and editing, X.W.; writing—review and editing, supervision, project administration, funding acquisition, S.C. All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement: Informed consent was obtained from all participants involved in the study.

Data Availability Statement: The datasets used and analyzed during the current study are available from the first author upon reasonable request.

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Conflicts of Interest: The authors declare no conflict of interest.

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