



## Relationship between mindfulness for physical activity and aggression: Self-compassion and psychological resilience as mediators

Pengfei Wen<sup>1</sup>, Yuan Zheng<sup>2</sup>, Jinsong Wu<sup>1</sup>, Dongbin Lai<sup>2</sup>, Haobo Jia<sup>2</sup>, Menghua Wang<sup>3</sup>, Huan Luo<sup>4</sup>

<sup>1</sup>School of Physical Education, Guangzhou Sport University, People's Republic of China

<sup>2</sup>Graduate School, Guangzhou Sport University, People's Republic of China

<sup>3</sup>School of Physical Education and Health, Zhaoqing University, People's Republic of China

<sup>4</sup>Sports Department, Shenzhen Polytechnic University, People's Republic of China

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We explored the relationship between mindfulness for physical activity and aggression in college students, and analyzed the independent and chain mediating effect of self-compassion and psychological resilience. We used a questionnaire to measure mindfulness for physical activity, aggression, self-compassion, and psychological resilience in a sample of 994 college students. Results showed that mindfulness for physical activity significantly and negatively predicted aggression in college students, and self-compassion and psychological resilience mediated this connection. There were three specific mediation paths: self-compassion as an independent mediator, psychological resilience as an independent mediator, and self-compassion and psychological resilience as chain mediators. These findings enrich the field of personality psychology and offer important practical guidelines for preventing and intervening in the internalizing problems of college students.

### Keywords

mindfulness for physical activity, aggression, self-compassion, psychological resilience, college students

### Article Highlights

- Exercising mindfulness for physical activity was found to be a significant negative predictor of aggression in college students.
- Self-compassion mediated the relationship between mindfulness for physical activity and aggression.
- Psychological resilience mediated the relationship between mindfulness for physical activity and aggression.
- Self-compassion and psychological resilience acted as chain mediators of the relationship between mindfulness for physical activity and aggression.

“Aggression refers to any behavior or tendency that intentionally harms others, including both physical and psychological harm” (Anderson & Bushman, 2002, p. 28). “College students, whose minds are not yet fully mature, face various pressures related to employment, life, and family, which can easily trigger various irrational behaviors, such as aggression” (Wei et al., 2014, p. 357). This reaction seriously threatens an individual’s physical and mental health (Gini et al., 2014) and undermines social stability (Hj Ramli et al., 2018). Several theories and hypotheses have been applied to explain the factors influencing aggression among college students (C. Chen, 2011; Zhu et al., 2022). However, the

**CORRESPONDENCE** Menghua Wang, School of Physical Education and Health, Zhaoqing University, No. 55 Zhaoqing Avenue, Duanzhou District, Zhaoqing City, Guangdong Province, People’s Republic of China. Email: [287920530@qq.com](mailto:287920530@qq.com), or Huan Luo, Sports Department, Shenzhen Polytechnic University, No. 7098 Liuxian Avenue, Nanshan District, Shenzhen City, Guangdong Province, People’s Republic of China. Email: [409840414@qq.com](mailto:409840414@qq.com)

mechanism behind aggression in college students is complex, and there is a need to explore the potential influencing factors and internal mechanisms of aggression in this population from multiple perspectives.

*Mindfulness* is defined as the psychological trait of paying attention to and being aware of present experiences and thoughts in a nonreactive, nonjudgmental, and open-hearted manner (Kabat-Zinn, 2003), including both trait mindfulness and state mindfulness. With the development of personality psychology, researchers have applied mindfulness as an influencing factor in the field of physical exercise (Tsafou et al., 2017; Ulmer et al., 2010). In the context of this study, *mindfulness for physical activity* is considered to be the awareness of internal stimuli (thoughts, bodily sensations) and external stimuli (physical and social environments) formed by individuals while participating in physical exercise, as well as a nonjudgmental and accepting attitude toward thoughts, emotions, and events experienced.

Therefore, we explored the mechanism of the relationship between mindfulness for physical activity and aggression in college students, as well as the mediating roles of self-compassion and psychological resilience in this relationship. We investigated the influencing factors and operational mechanisms of aggression in college students from multiple perspectives, thereby promoting the healthy development of contemporary college students' personalities.

In daily life, most acts of aggression are impulsive (S. Yu et al., 2022). However, in aggressive situations individuals with high levels of mindfulness do not succumb to negative emotions such as anger and hostility, and avoid verbal or physical aggression. Instead, they maintain a clear awareness of their internal and external experiences, and are not hindered by adverse emotions triggered spontaneously (Ulmer et al., 2010). Empirical studies have shown a negative correlation between mindfulness and aggression, indicating that higher levels of mindfulness are associated with lower impulsivity and hostility (e.g., Heppner et al., 2008). Additionally, research from the perspective of physical exercise influencing aggression indicates that physical exercise effectively prevents and intervenes in aggressive and irrational behaviors among adolescents (Han & Zheng, 2018; Kelly, 2013; Ma, 2019). Given these findings, both mindfulness and physical exercise can effectively reduce aggression. Mindfulness for physical activity, as a form of state mindfulness within physical exercise, embodies the characteristics of both mindfulness and physical exercise. Therefore, we proposed our first hypothesis:

**Hypothesis 1:** Mindfulness for physical activity will negatively predict aggression in college students.

*Self-compassion* is defined as an open, accepting, egalitarian, nonjudgmental, and nonreactive cognitive form toward one's internal and external experiences (Bluth & Blanton, 2014). This cognitive approach promotes individual self-awareness, encouraging individuals to pay attention to their current feelings with a peaceful and friendly attitude. Mindfulness can enhance an individual's sense of self-worth, protect against the harmful effects of negative feelings and emotions, enhance self-esteem and sense of meaning, and alleviate and reduce negative cognitions and emotions, thereby increasing one's level of self-compassion (Ge et al., 2019). Additionally, existing research has shown that self-compassion can have a positive impact on individual psychological health, being positively correlated with positive emotions and negatively correlated with negative emotions (Neff & Vonk, 2009). Self-compassion is a positive self-resource (Cohen & Wills, 1985) and an effective self-regulation strategy that helps reduce self-criticism and rumination, thus decreasing the vicious cycle of negative cognitions and emotional feelings (Neff, 2003a), and enabling one to better face negative situations because it is negatively correlated with hostility, anger, and sadness (Neff et al., 2007). Therefore, we proposed our second hypothesis:

**Hypothesis 2:** Self-compassion will mediate the relationship between mindfulness for physical activity and aggression in college students.

*Psychological resilience* refers to an individual having the ability or trait to adapt effectively in the face of stress, setbacks, trauma, and other life adversities (Connor & Davidson, 2003). Research has indicated that a higher level of mindfulness is associated with reduced emotional responses and a more comprehensive set of positive cognitions (Good et al., 2016). Studies have shown that mindfulness is one of the personal factors affecting psychological resilience (e.g., Epstein & Krasner, 2013), with both mindfulness training and trait mindfulness having a positive predictive effect on psychological resilience (Senders et al., 2014). Additionally, researchers have found that individuals with high, compared to low, levels of psychological resilience exhibit lower levels of violent aggressive behaviors (Hollister-Wagner et al., 2001). When investigating factors affecting aggression in college students, researchers discovered

that students with high aggression scored significantly lower on various dimensions of psychological resilience compared to those with low aggression (Liu & Gao, 2013). In the context of physical activity, Zhang and Qui (2019) found that psychological resilience mediated the impact of physical activity on aggression. Thus, we proposed our third hypothesis:

**Hypothesis 3:** Psychological resilience will mediate the relationship between mindfulness for physical activity and aggression in college students.

The higher the level of self-compassion in an individual, the more intense will be their experience of subjective well-being, the greater their perception of positive emotions in daily life, and the better their coping with difficulties, stress, and setbacks encountered (Zhao & Lei, 2014). Regarding the two mediating variables of self-compassion and psychological resilience in this study, Kemper et al. (2015) found a strong and significant positive correlation between psychological resilience and self-compassion, and showed that increasing training in self-compassion can effectively enhance psychological resilience. In an empirical study, Neff and McGehee (2010) found that individuals who accept themselves more readily have stronger adaptability and better psychological resilience than do those who do not readily accept themselves. McArthur et al. (2017) also demonstrated that students with higher, compared to lower, levels of mindfulness and self-compassion have good adaptability and a higher level of psychological resilience. Therefore, self-compassion and psychological resilience constitute a mutually interconnected and influencing synergistic relationship. Thus, we proposed the following hypothesis:

**Hypothesis 4:** Self-compassion and psychological resilience will have a chain mediating effect on the relationship between mindfulness for physical activity and aggression in college students.

Our research model is shown in Figure 1.

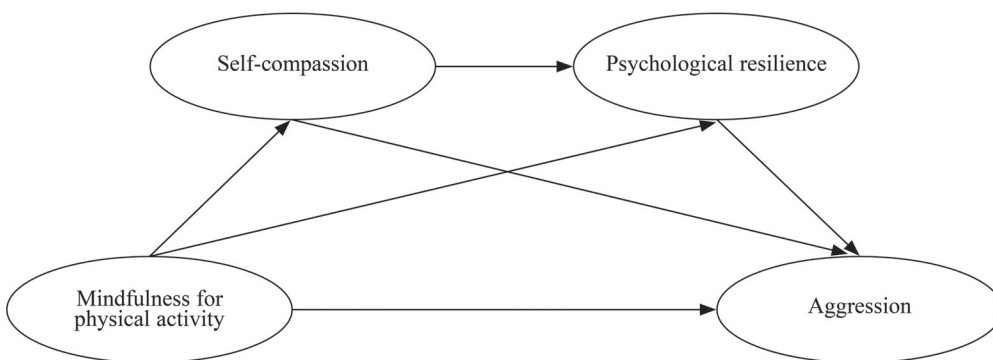


Figure 1. *Conceptual Framework Diagram*

## Method

### Participants and Procedure

In June and July 2023, we randomly distributed 1,056 surveys at universities located in four provinces of China: Guangdong, Hunan, Hebei, and Shaanxi. Of these, 994 valid questionnaires were obtained from 490 men and 504 women, resulting in an effective recovery rate of 94.1%. The mean age of the participants was 20.16 years ( $SD = 0.31$ ). Participants including undergraduates and postgraduates studying education, literature, management, science, art, economics, engineering, biology, law, chemistry, and medicine. The research design was approved by the Human Research Ethics Committee of Guangzhou Sport University (approval number = 2023LCLL-64).

Surveys were distributed through the Questionnaire Star platform on WeChat. The introduction to the survey emphasized that it was anonymous, there were no right or wrong answers, and it was solely for scientific research

purposes, along with informing students of the time it would take to complete. Participants gave informed consent. After collecting the responses, we removed forms with highly repetitive answers and other invalid samples, and all data were rigorously verified.

## Measures

### **Mindfulness Scale for Physical Activity**

The Mindfulness Scale for Physical Activity, developed by Cox et al. (2016), was revised to suit the context of Chinese college students (Jin et al., 2022). This scale consists of 12 items divided across two dimensions: state psychological factors (e.g., “I noticed emotions come and go”) and physical factors (e.g., “I felt present in my body”). Each dimension has six items rated on a 5-point Likert scale (1 = *never* to 5 = *always*), with higher scores indicating stronger mindfulness for physical activity. This scale has demonstrated high reliability and validity among Chinese adolescent college student participants (Jin et al., 2022). Cronbach’s alpha in this study was .94.

### **Aggression Scale**

We used the Aggression Scale, developed by Buss and Perry (1992), and revised to be suitable for use with Chinese college students (Lv et al., 2013). The scale comprises 22 items across four dimensions: hostility (eight items, e.g., “I feel scared without any reason”), physical aggression (five items, e.g., “I might hit someone if provoked”), impulsivity (six items, e.g., “If someone hits me, I will hit back”), and irritability (three items, e.g., “Sometimes I flare up for no reason”). Items are rated on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*), with higher scores indicating stronger aggression. This scale has demonstrated high reliability and validity among Chinese college student participants (S. Yu et al., 2022). Cronbach’s alpha in this study was .89.

### **Self-Compassion Scale**

We used the Self-Compassion Scale (Neff, 2003b), revised by J. Chen et al. (2015), which consists of 26 items across six dimensions: common humanity (four items, e.g., “I try to see my failings as part of the human condition”), self-judgment (five items, e.g., “When times are really difficult, I tend to be tough on myself”), self-kindness (five items, e.g., “I’m kind to myself when I’m experiencing suffering”), isolation (four items, e.g., “When I fail at something that’s important to me, I tend to feel alone”), mindfulness (four items, e.g., “When something upsets me I try to keep my emotions in balance”), and over-identification (four items, e.g., “When something upsets me I get carried away with my feelings”). The dimensions of self-judgment, isolation, and over-identification consist of reverse-scored items. Items are rated on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*), with higher scores indicating higher levels of self-compassion. This scale has demonstrated high reliability and validity among Chinese college students (X. Chen et al., 2022). Cronbach’s alpha in this study was .76.

### **Connor–Davidson Resilience Scale**

We measured psychological resilience using the Connor–Davidson Resilience Scale, revised for suitability for Chinese college students by X. Yu and Zhang (2007). The scale comprises 25 items across three dimensions: tenacity (13 items, e.g., “I like challenge”), strength (eight items, e.g., “Able to adapt to change”), and optimism (four items, e.g., “Can deal with whatever comes”). Items are rated on a 4-point Likert scale (0 = *never* to 4 = *always*), with higher scores indicating stronger psychological resilience. This scale has demonstrated high reliability and validity among Chinese college students (X. Chen et al., 2022). Cronbach’s alpha in this study was .92.

## Data Analysis

We used SPSS 26.0 and Amos 23.0 to test for common method bias, and SPSS 26.0 for Pearson correlation analysis. The PROCESS macro for SPSS was employed to test for mediation effects.

## Results

### Common Method Bias Test

To assess common method bias we used Harman’s single-factor test. An unrotated exploratory factor analysis extracted 13 factors with eigenvalues greater than 1, where the largest factor explained 24.43% of the variance (less than the common cut-off of 40%). Using confirmatory factor analysis, we extracted a common factor from the multiple variables involved in the study, and loaded all items onto this factor. The results indicated a poor model fit to the data,  $\chi^2/df = 6.41$ , comparative fit index = .38, Tucker–Lewis index = .37, incremental fit index = .39, root-mean-square error of approximation = .10, standardized root-mean-square residual = .16. This suggests that no one factor explained a majority of the variance in this study. Therefore, common method bias was not a significant concern.

### Descriptive Statistics and Correlation Analysis

As shown in Table 1, the correlation coefficients between mindfulness for physical activity, self-compassion, psychological resilience, and aggression were all statistically significant. Mindfulness for physical activity, self-compassion, and psychological resilience were negatively correlated with aggression, suggesting that higher levels of mindfulness for physical activity, self-compassion, and psychological resilience were associated with lower levels of aggression. Furthermore, there were positive correlations between mindfulness for physical activity and self-compassion, between mindfulness for physical activity and psychological resilience, and between self-compassion and psychological resilience, indicating that increases in one variable were associated with increases in the other.

Table 1. *Descriptive Statistics and Correlation Coefficients for Study Variables*

|                                      | <i>M</i> | <i>SD</i> | 1      | 2      | 3     | 4 |
|--------------------------------------|----------|-----------|--------|--------|-------|---|
| 1. Mindfulness for physical activity | 52.87    | 6.40      | 1      |        |       |   |
| 2. Aggression                        | 41.90    | 12.10     | -.31** | 1      |       |   |
| 3. Self-compassion                   | 85.53    | 10.72     | .17**  | -.31** | 1     |   |
| 4. Psychological resilience          | 72.37    | 9.86      | .47**  | -.42** | .36** | 1 |

Note. *N* = 994.

\*\* *p* < .01.

### The Mediating Effects of Self-Compassion and Psychological Resilience

We conducted a mediation effect test using a bootstrapping analysis via the SPSS macro developed by Hayes and Scharkow (2013), specifically employing Model 6 for testing chain mediation models. As can be seen in Table 2, before the inclusion of the mediating variables, mindfulness for physical activity significantly and negatively predicted aggression in college students; thus, Hypothesis 1 was supported. Furthermore, after incorporating self-compassion and psychological resilience into the regression equation, mindfulness for physical activity significantly and positively predicted self-compassion and psychological resilience; self-compassion significantly and positively predicted psychological resilience, and significantly and negatively predicted aggression; psychological resilience significantly and negatively predicted aggression; and, as previously, mindfulness for physical activity significantly and negatively predicted aggression.

**Table 2. Analysis of Regression Relationships Between Variables**

| Effect          | Item   | Coefficient | SE   | t     | 95% CI |       |
|-----------------|--|-------------|------|-------|--------|-------|
|                 |  |             |      |       | LL     | UL    |
| Direct effects  | Mindfulness for physical activity → Aggression               | -.27**      | 0.09 | -3.08 | -0.45  | -0.10 |
|                 | Mindfulness for physical activity → Self-compassion          | .28**       | 0.08 | 3.66  | 0.13   | 0.44  |
|                 | Mindfulness for physical activity → Psychological resilience | .64**       | 0.06 | 10.45 | 0.52   | 0.76  |
| Indirect effect | Self-compassion → Psychological resilience                   | .26**       | 0.04 | 7.09  | 0.19   | 0.33  |
|                 | Self-compassion → Aggression                                 | -.21**      | 0.05 | -4.18 | -0.31  | -0.11 |
|                 | Psychological resilience → Aggression                        | -.35**      | 0.06 | -5.70 | -0.47  | -0.23 |
| Total effect    | Mindfulness for physical activity → Aggression               | -.58**      | 0.08 | -6.88 | -0.75  | -0.42 |

Note. CI = confidence interval; LL = lower limit; UL = upper limit.

\*\*  $p < .01$ .

The mediation effect analysis results (seen in Table 3 and Figure 2) show that self-compassion and psychological resilience significantly mediated the relationship between mindfulness for physical activity and aggression in college students, with a total standardized mediation effect value of  $-.31$ , accounting for 53.45% of the total effect ( $-.58$ ). The mediation effect was specifically constituted by the indirect effects of three pathways: the pathway of mindfulness for physical activity → self-compassion → aggression in college students creating indirect effect 1 (effect value  $-.06$ ), the pathway of mindfulness for physical activity → psychological resilience → aggression in college students creating indirect effect 2 (effect value  $-.03$ ), and the pathway of mindfulness for physical activity → self-compassion → psychological resilience → aggression in college students creating indirect effect 3 (effect value  $-.22$ ). The proportions of these three indirect effects in the total effect were 10.34%, 5.17%, and 37.93%, respectively, and the 95% confidence intervals for these indirect effects did not include zero, indicating that all three indirect effects were significant. Therefore, Hypotheses 2, 3, and 4 were supported.

**Table 3. Mediation Effect Analysis of Mindfulness for Physical Activity on Aggression**

| Items   | Effect | SE   | 95% CI |       | RME (%) |
|---|--------|------|--------|-------|---------|
|   |        |      | LL     | UL    |         |
| Mindfulness for physical activity → Self-compassion → Aggression                            | -.06   | 0.02 | -0.10  | -0.21 | 10.34   |
| Mindfulness for physical activity → Psychological resilience → Aggression                   | -.03   | 0.01 | -0.05  | -0.01 | 5.17    |
| Mindfulness for physical activity → Self-compassion → Psychological resilience → Aggression | -.22   | 0.05 | -0.32  | -0.02 | 37.93   |
| Total mediation effect  | -.31   | 0.05 | -0.41  | -0.21 | 53.45   |

Note. CI = confidence interval; LL = lower limit; UL = upper limit; RME = relative mediation effect.

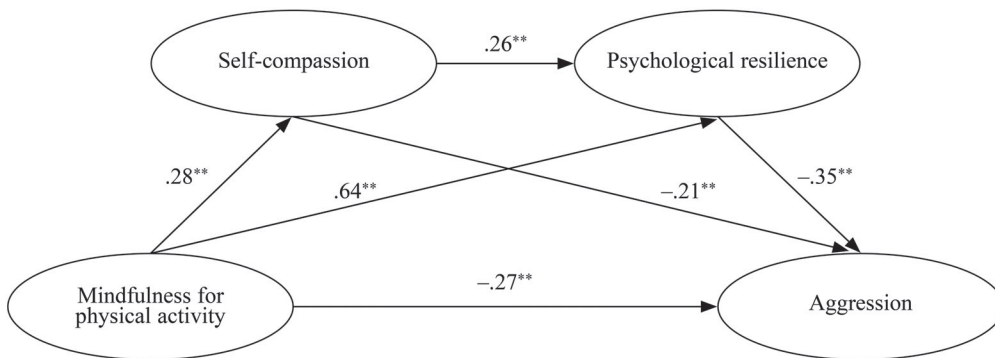


Figure 2. *Chain Mediation Model of Mindfulness for Physical Activity on Aggression*  
 Note. \*\*  $p < .01$ .

## Discussion

### Mindfulness for Physical Activity and Aggression in College Students

In this study we found that mindfulness for physical activity significantly and negatively predicted aggression in college students, which is consistent with existing research findings (Y. Chen, 2015) and supported Hypothesis 1. Mindfulness for physical activity, as a state of mindfulness held during physical exercise scenarios, encourages individuals to shift from an action-oriented mode of thinking to a “being” mode of thinking (Cox et al., 2016). This further explains the relationship between mindfulness and behavior in personality psychology, suggesting that mindfulness for physical activity can provide guidance and motivation for the everyday behavior of college students. Through the analysis of the re-perceiving model of mindfulness, referring to a change in mental state that can be achieved through mindfulness practice, Shapiro et al. (2006) found that mindfulness for physical activity helps individuals to re-perceive every moment of experience more objectively, breaking free from unconscious patterns of behavior and emotion, and promoting adaptive responses to negative stimuli (Shapiro et al., 2006). Additionally, individuals with high levels of mindfulness for physical activity, when facing troubles or anxiety, focus on problem solving rather than being distracted by external influences (Jin et al., 2022). Therefore, continuously improving the level of mindfulness in physical exercise among college students plays a crucial role in reducing aggression, as mindfulness for physical activity can negatively influence aggression in college students.

### The Independent Mediating Role of Self-Compassion

In addition, we discovered that self-compassion played a partial mediating role between mindfulness for physical activity and aggression in college students, thereby supporting Hypothesis 2. This result is consistent with previous studies showing the positive impact of mindfulness on self-compassion (Neff, 2011) and also confirms the close relationship between self-compassion and aggression (Sijwali & Sharma, 2023). In this study we also examined the relationships among these three variables, revealing that mindfulness for physical activity enhanced self-compassion in college students and reduced their aggression. This may be due to the components and operating mechanisms of mindfulness, which include four effective behavioral intervention mechanisms: attention regulation, body awareness, emotion regulation, and self-affirmation (Wang & Huang, 2011). College students are more likely to focus on their own perceptions and awareness during physical exercise, concentrating on themselves rather than external factors, and through the secretion of various beneficial hormones during exercise, for example, dopamine and vitamin D (Luo & Yang, 2020), they maintain a positive and optimistic mindset (Ge et al., 2019). This, in turn, improves self-awareness and regulation abilities, leading to a more compassionate attitude toward oneself. Self-compassion inherently implies a

positive self-regard (Bishop et al., 2004), which could influence individuals' cognitive and emotional states, increasing positive experiences and reducing negative emotional experiences. Individuals with high self-compassion often possess more positive emotions and self-awareness, and fewer negative emotions (Neff & Faso, 2015). Therefore, mindfulness for physical activity can reduce aggression by increasing the level of self-compassion in college students.

### **The Independent Mediating Role of Psychological Resilience**

We also found that psychological resilience played a partial mediating role in the relationship between mindfulness for physical activity and aggression in college students, thereby supporting Hypothesis 3. This is consistent with research suggesting that mindfulness promotes resilience (Kumpfer, 2002) and that psychological resilience has a negative predictive effect on aggression (S. Yu et al., 2022). Mindfulness for physical activity, as an effective self-regulation capability, can protect against both internal and external problems in individuals by enhancing levels of psychological resilience (S. Yu et al., 2022). On one hand, a high level of mindfulness helps to foster an individual's psychological resilience. Mindfulness training aids in emotional regulation (Hülshager et al., 2013), alleviates negative emotions, and enhances positive emotions (Foureur et al., 2013), thereby promoting psychological resilience (Garland et al., 2015). In addition, a high level of psychological resilience helps to reduce aggressive behavior in individuals. Resilience is the ability of an individual to successfully cope and adapt well when facing difficulties or adversities. Individuals with high psychological resilience prefer using a variety of problem-solving strategies such as humor, flexibility, and relaxation (Cui et al., 2012). Therefore, good psychological resilience will inevitably help to mitigate psychological and behavioral adaptation problems (e.g., anxiety and aggression).

### **The Chain Mediating Effect of Self-Compassion and Psychological Resilience**

In this study we further discovered that self-compassion and psychological resilience played a chain mediating role in the relationship between mindfulness for physical activity and aggression in college students, thereby supporting Hypothesis 4. This finding aligns with existing research that suggests self-compassion influences resilience (McArthur et al., 2017). It indicates that forming a psychological state during physical exercise makes it easier for individuals to keep their attention on current experiences or sensations, allowing them to feel safe and relaxed, maintain emotional balance (Neff, 2016), and retain good self-regulation and adaptability in the face of stress, setbacks, and other adversities (S. Yu et al. 2022). This, in turn, has a positive impact on psychological and behavioral adaptation issues, reducing aggression. Therefore, for college students, forming a special awareness of their physical and mental changes during physical exercise, along with an attitude of nonjudgment toward internal and external environments, is beneficial in reducing aggressive behaviors. The chain mediating effect of self-compassion and psychological resilience on the relationship between mindfulness for physical activity and aggression in college students is feasible.

### **Limitations and Future Research Directions**

This study has certain limitations. First, we employed a cross-sectional research design, which prevents us from establishing causal relationships between variables. Future research could use longitudinal tracking or experimental interventions for further analysis. Second, we considered only the mediating effects of self-compassion and psychological resilience, but other potential mediating variables such as emotions, thoughts, and self-esteem warrant further investigation. Third, we used self-report measures, which introduces a degree of subjectivity. Future research could collect data using a combination of other-evaluations and self-reports. Fourth, the participants in this study were Chinese, which may affect the generalizability of the findings.

### **Conclusion**

Mindfulness for physical activity can significantly and negatively predict aggression in college students, with self-compassion and psychological resilience playing significant mediating roles in this link. The specific mediating pathways we identified were as follows: the individual mediating effect of self-compassion, the individual mediating effect of psychological resilience, and the chain mediating effect of self-compassion and psychological resilience.

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Yuan Zheng was responsible for data collation, Jinsong Wu and Huan Luo conducted the formal analysis, Dongbin Lai and Haobo Jia were responsible for investigation, Pengfei Wen wrote the draft manuscript, and Menghua Wang reviewed and edited the final manuscript.

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The data that support the findings of this study are available on request from the corresponding authors.

## References

- Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology*, *53*(1), 27–51.  
<https://doi.org/10.1146/annurev.psych.53.100901.135231>
- Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., ... Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*, *11*(3), 230–241.  
<https://doi.org/10.1093/clipsy.bph077>
- Bluth, K., & Blanton, P. W. (2014). Mindfulness and self-compassion: Exploring pathways to adolescent emotional well-being. *Journal of Child and Family Studies*, *23*, 1298–1309.  
<https://doi.org/10.1007/s10826-013-9830-2>
- Buss, A. H., & Perry, M. (1992). Personality processes and individual differences. *Journal of Personality and Social Psychology*, *63*(3), 452–459.
- Chen, C. (2011). *Attentional bias toward aggressive scenes in sandplay among hostile college students and the effectiveness of sandplay therapy intervention on it* (Unpublished master's thesis) [In Chinese]. Zhangzhou Normal University.
- Chen, J., Yan, L., & Zhou, L. (2015). Reliability and validity of the Chinese version of the Self-Compassion Scale [In Chinese]. *Chinese Journal of Clinical Psychology*, *19*(6), 734–736.  
<https://doi.org/10.16128/j.cnki.1005-3611.2011.06.006>
- Chen, X., Sheng, R., Zhang, C., & Xu, W. (2022). Resilience as a mediator of the longitudinal effect of self-compassion on anxiety and aggressiveness in college students with left-behind experience [In Chinese]. *China Journal of Health Psychology*, *30*(2), 243–247.  
<https://doi.org/10.13342/j.cnki.cjhp.2022.02.017>
- Chen, Y. (2015). *Research on the relationships among college students' mindfulness, self-control, and aggression* (Unpublished bachelor's thesis) [In Chinese]. Minnan Normal University.
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, *98*(2), 310–357.  
<https://doi.org/10.1037/0033-2909.98.2.310>
- Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety*, *18*(2), 76–82.  
<https://doi.org/10.1002/da.10113>

- Cox, A. E., Ullrich-French, S., & French, B. F. (2016). Validity evidence for the State Mindfulness Scale for Physical Activity. *Measurement in Physical Education and Exercise Science*, 20(1), 38–49.  
<https://doi.org/10.1080/1091367X.2015.1089404>
- Cui, L. X., Yin, L., & Lei, L. (2012). The relationship between resilience and adaptation to stress: An experiment on the mediating effect of positive affect [In Chinese]. *Psychological Development and Education*, 28(3), 308–313.
- Epstein, R. M., & Krasner, M. S. (2013). Physician resilience: What it means, why it matters, and how to promote it. *Academic Medicine*, 88(3), 301–303.  
<https://doi.org/10.1097/ACM.0b013e318280cff0>
- Foureur, M., Besley, K., Burton, G., Yu, N., & Crisp, J. (2013). Enhancing the resilience of nurses and midwives: Pilot of a mindfulness-based program for increased health, sense of coherence and decreased depression, anxiety and stress. *Contemporary Nurse*, 45(1), 114–125.  
<https://doi.org/10.5172/conu.2013.45.1.114>
- Garland, E. L., Geschwind, N., Peeters, F., & Wichers, M. (2015). Mindfulness training promotes upward spirals of positive affect and cognition: Multilevel and autoregressive latent trajectory modeling analyses. *Frontiers in Psychology*, 6, Article 15.  
<https://doi.org/10.3389/fpsyg.2015.00015>
- Ge, J., Zheng, Y., Jiang, G., & Song, J. (2019). Effect of mindfulness on time perspective: The chain mediating role of self-compassion and time pressure [In Chinese]. *Journal of Southwest University (Natural Science Edition)*, 41(12), 93–100.  
<https://doi.org/10.13718/j.cnki.xdzk.2019.12.013>
- Gini, G., Pozzoli, T., Lenzi, M., & Vieno, A. (2014). Bullying victimization at school and headache: A meta-analysis of observational studies. *Headache: The Journal of Head and Face Pain*, 54(6), 976–986.  
<https://doi.org/10.1111/head.12344>
- Good, D. J., Lyddy, C. J., Glomb, T. M., Bono, J. E., Brown, K. W., Duffy, M. K., ... Lazar, S. W. (2016). Contemplating mindfulness at work: An integrative review. *Journal of Management*, 42(1), 114–142.  
<https://doi.org/10.1177/0149206315617003>
- Han, H., & Zheng, J. (2018). A review of sports and adolescent risky behavior intervention in foreign countries [In Chinese]. *Journal of Shanghai University of Sport*, 42(5), 45–52 + 60.
- Hayes, A. F., & Scharkow, M. (2013). The relative trustworthiness of inferential tests of the indirect effect in statistical mediation analysis: Does method really matter? *Psychological Science*, 24(10), 1918–1927.  
<https://doi.org/10.1177/0956797613480187>
- Heppner, W. L., Kernis, M. H., Lakey, C. E., Campbell, W. K., Goldman, B. M., Davis, P. J., & Cascio, E. V. (2008). Mindfulness as a means of reducing aggressive behavior: Dispositional and situational evidence. *Aggressive Behavior: Official Journal of the International Society for Research on Aggression*, 34(5), 486–496.  
<https://doi.org/10.1002/ab.20258>
- Hj Ramli, N. H., Alavi, M., Mehrinezhad, S. A., & Ahmadi, A. (2018). Academic stress and self-regulation among university students in Malaysia: Mediator role of mindfulness. *Behavioral Sciences*, 8(1), Article 12.  
<https://doi.org/10.3390/bs8010012>
- Hollister-Wagner, G. H., Foshee, V. A., & Jackson, C. (2001). Adolescent aggression: Models of resiliency. *Journal of Applied Social Psychology*, 31(3), 445–466.  
<https://doi.org/10.1111/j.1559-1816.2001.tb02050.x>
- Hülshager, U. R., Alberts, H. J. E. M., Feinholdt, A., & Lang, J. W. B. (2013). Benefits of mindfulness at work: The role of mindfulness in emotion regulation, emotional exhaustion, and job satisfaction. *Journal of Applied Psychology*, 98(2), 310–325.  
<https://doi.org/10.1037/a0031313>

- Jin, M., Jin, Y., Pan, L., & Feng, L. (2022). The influence and internal mechanism of exercise mindfulness on exercise persistence in adolescents [In Chinese]. *Journal of Capital University of Physical Education and Sports*, 34(6), 679–687. <https://doi.org/10.14036/j.cnki.cn11-4513.2022.06.011>
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10(2), 144–156. <https://doi.org/10.1093/clipsy/bpg016>
- Kelly, L. (2013). Sports-based interventions and the local governance of youth crime and antisocial behavior. *Journal of Sport and Social Issues*, 37(3), 261–283. <https://doi.org/10.1177/0193723512467193>
- Kemper, K. J., Mo, X., & Khayat, R. (2015). Are mindfulness and self-compassion associated with sleep and resilience in health professionals? *The Journal of Alternative and Complementary Medicine*, 21(8), 496–503. <https://doi.org/10.1089/acm.2014.0281>
- Kumpfer, K. L. (2002). Factors and processes contributing to resilience: The resilience framework. In M. D. Glantz & J. L. Johnson (Eds.), *Resilience and development: Positive life adaptations* (pp. 179–224). Springer. <https://doi.org/10.1007/0-306-47167-19>
- Liu, X., & Gao, Z. (2013). Analysis of the current situation and influencing factors of college students' aggressive behavior [In Chinese]. *Chinese Journal of School Health*, 34(3), 353–354. <https://doi.org/10.16835/j.cnki.1000-9817.2013.03.035>
- Luo, D., & Yang, J. (2020). Research on prevention and control of myopia in adolescents by outdoor physical activity based on the health belief model: Mechanism, approach and effect [In Chinese]. *Journal of Harbin Sport University*, 38(4), 90–96.
- Lv, L., Takami, K., Dong, D., Wong, L., & Wang, X. (2013). Development of the Chinese college students' version of the Buss-Perry Aggression Questionnaire [In Chinese]. *Chinese Mental Health Journal*, 27(5), 378–383. <https://doi.org/10.1037/t72064-000>
- Ma, P. (2019). Effects of school sports on adolescent students' aggressive behavior intervention [In Chinese]. *Sports Science Research*, 23(1), 66–69. <https://doi.org/10.19715/j.tiyukexueyanjiu.2019.01.013>
- McArthur, M., Mansfield, C., Matthew, S., Zaki, S., Brand, C., Andrews, J., & Hazel, S. (2017). Resilience in veterinary students and the predictive role of mindfulness and self-compassion. *Journal of Veterinary Medical Education*, 44(1), 106–115. <https://doi.org/10.3138/jvme.0116-027R1>
- Neff, K. D. (2003a). Self-compassion: An alternative conceptualization of a healthy attitude toward oneself. *Self and Identity*, 2(2), 85–101. <https://doi.org/10.1080/15298860309032>
- Neff, K. D. (2003b). The development and validation of a scale to measure self-compassion. *Self and Identity*, 2(3), 223–250. <https://doi.org/10.1080/15298860309027>
- Neff, K. D. (2011). Self-compassion, self-esteem, and well-being. *Social and Personality Psychology Compass*, 5(1), 1–12. <https://doi.org/10.1111/j.1751-9004.2010.00330.x>
- Neff, K. D. (2016). Does self-compassion entail reduced self-judgment, isolation, and over-identification? A response to Muris, Otgaar, and Petrocchi (2016). *Mindfulness*, 7(3), 791–797. <https://doi.org/10.1007/s12671-016-0531-y>
- Neff, K. D., & Faso, D. J. (2015). Self-compassion and well-being in parents of children with autism. *Mindfulness*, 6, 938–947. <https://doi.org/10.1007/s12671-014-0359-2>

- Neff, K. D., Kirkpatrick, K. L., & Rude, S. S. (2007). Self-compassion and adaptive psychological functioning. *Journal of Research in Personality, 41*(1), 139–154.  
<https://doi.org/10.1016/j.jrp.2006.03.004>
- Neff, K. D., & McGehee, P. (2010). Self-compassion and psychological resilience among adolescents and young adults. *Self and Identity, 9*(3), 225–240.  
<https://doi.org/10.1080/15298860902979307>
- Neff, K. D., & Vonk, R. (2009). Self-compassion versus global self-esteem: Two different ways of relating to oneself. *Journal of Personality, 77*(1), 23–50.  
<https://doi.org/10.1111/j.1467-6494.2008.00537.x>
- Senders, A., Bourdette, D., Hanes, D., Yadav, V., & Shinto, L. (2014). Perceived stress in multiple sclerosis: The potential role of mindfulness in health and well-being. *Journal of Evidence-Based Complementary & Alternative Medicine, 19*(2), 104–111.  
<https://doi.org/10.1177/2156587214523291>
- Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*(3), 373–386.  
<https://doi.org/10.1002/jclp.20237>
- Sijwali, S., & Sharma, S. (2023). A comparative study of self-compassion, mindfulness and aggression among meditator and non-meditator young adults. *Indian Journal of Positive Psychology, 14*(2), 202–206.
- Tsafou, K.-E., Lacroix, J. P. W., van Ee, R., Vinkers, C. D. W., & De Ridder, D. T. D. (2017). The relation of trait and state mindfulness with satisfaction and physical activity: A cross-sectional study in 305 Dutch participants. *Journal of Health Psychology, 22*(10), 1221–1232.  
<https://doi.org/10.1177/1359105315624748>
- Ulmer, C. S., Stetson, B. A., & Salmon, P. G. (2010). Mindfulness and acceptance are associated with exercise maintenance in YMCA exercisers. *Behaviour Research and Therapy, 48*(8), 805–809.  
<https://doi.org/10.1016/j.brat.2010.04.009>
- Wang, F., & Huang, Y.-X. (2011). Psychological and neural mechanisms of mindfulness [In Chinese]. *Advances in Psychological Science, 19*(11), 1635–1644.  
<https://doi.org/10.27363/d.cnki.gtsfu.2021.000541>
- Wei, H., Zhou, Z., Li, X., Luo, Q., & Gao, J. (2014). The relationship between internet addiction and life events of college students: The mediating effect of escape motivation [In Chinese]. *Studies of Psychology and Behavior, 12*(3), 357–361.
- Yu, S., Zhang, C., & Xu, W. (2022). The relationship of dispositional mindfulness to anxiety and aggressiveness among college students: The mediating effect of resilience and moderating effect of left-behind experience [In Chinese]. *Psychological Development and Education, 38*(5), 711–719.  
<https://doi.org/10.16187/j.cnki.issn1001-4918.2022.05.12>
- Yu, X., & Zhang, J. (2007). A comparison between the Chinese versions of the Ego Resiliency Scale and the Connor-Davidson Resilience Scale. *Journal of Psychological Science, 5*, 1169–1171.  
<https://doi.org/10.1037/t60027-000>
- Zhang, X. Q., & Qiu, F. (2019). The influence of physical exercise on aggressiveness of adolescents—The chain mediating effect of coping style and psychological elasticity [In Chinese]. *Journal of Harbin Sport University, 37*(5), 85–91.
- Zhao, Z., & Lei, X. (2014). Analysis and prospect of self-compassion [In Chinese]. *Journal of Shaanxi Xueqian Normal University, 30*(1), 25–29.
- Zhu, F., Wang, Y., Zheng, Y., Zhu, H., Cai, X., & Chen, T. (2022). Effect of a basketball intervention on college students' aggressive behavior: Mediating effect of interpersonal relationships [In Chinese]. *China Journal of Health Psychology, 30*(3), 457–465.