Background. According to previous studies, eating disorders and disordered eating behaviors are associated with coping style, anxiety, and sense of security. However, the specific mechanism between them has not been elucidated. The purpose of this study was to explore whether anxiety and sense of security play mediating roles in coping style and disordered eating behaviors among Chinese female college students.

Method. Six hundred and ninety-one female college students (mean age = 19.36; SD = 1.06) completed the Simple Coping Style Questionnaire, the Eating Disorder Inventory, the Security Questionnaire, the Hospital Anxiety and Depression Scale, and a brief demographic survey. The percentage bootstrap method of deviation correction was conducted to determine the mediating effect of anxiety and sense of security on coping style and disordered eating behaviors.

Results. Coping style had direct and indirect effects on disordered eating behaviors. Anxiety and sense of security were not only independent mediators in the relationship between coping style and disordered eating behaviors but also chain mediators.

Conclusions. The results of the current study provide preliminary evidence that preventive interventions targeting anxiety and sense of security may be feasible for young women who develop disordered eating behaviors due to stress in their lives.
Based on these studies, coping style, anxiety, sense of security, and disordered eating behaviors are related. However, no study has studied all four variables simultaneously to explore the specific mechanism between them. Therefore, this study will verify the specific role of anxiety and sense of security in coping style and disordered eating behaviors and provide theoretical basis for early intervention of disordered eating behaviors and prevention of eating disorders. We hypothesized that coping style not only directly affects disordered eating behaviors but also indirectly influences disordered eating behaviors through the mediating role of anxiety and sense of security.

2. Methods

2.1. Participants. The study sample comprised 691 female college students in Eastern China. Demographic characteristics of the sample are summarized in Table 1.

2.2. Measures

2.2.1. Demographic Questionnaire. Participants completed a demographic questionnaire constructed to gather information about their age, hometown, and major.

2.2.2. Disordered Eating Behavior. The Eating Disorder Inventory (EDI) is a 64-item self-report inventory consisting of 8 subscales: (1) drive for thinness, (2) body dissatisfaction, (3) bulimia, (4) perfectionism, (5) interpersonal distrust, (6) mature fear, (7) interoceptive awareness, and (8) inefficiency. The questions are presented on a six-point Likert scale, with scores ranging from 0 to 5 for each disordered eating behavior. The 8 subscales are calculated by totaling the items on each respective scale, while the total EDI score is calculated by adding all items together. Higher total EDI scores indicate more severe disordered eating behaviors [15]. In the current study, internal consistency α = 0.903.

2.2.3. Coping Style. The Simple Coping Style Questionnaire (SCSQ) contains 20 items which effectively reflect the individual’s coping style in the context of Chinese culture. Items 1-12 belong to positive coping and 13-20 belong to negative coping. The scale of each item is from 0 (never) to 3 (always). If the Z score difference between positive coping and negative coping is greater than 0, it is positive coping; if less than 0, it is negative coping [16]. In the present study, total questionnaire internal consistency α = 0.77.

2.2.4. Sense of Security. The Security Questionnaire (SQ) consists of 16 items, including 2 subscales of interpersonal security (personal security experience in interpersonal communication) and certainty of control (personal life prediction, sense of certainty and control). Each subscale has 8 items, and the score of each item is from 1 (not consistent at all) to 5 (completely consistent). Higher total SQ scores indicate higher sense of security [11]. In the current study, internal consistency α = 0.89.

2.2.5. Anxiety. The Hospital Anxiety and Depression Scale (HADS) is a 14-item self-rating scale that measures symptoms of anxiety and depression respectively. Each item is scored from 0 to 3. The overall score for depression or anxiety can be considered the severity of the symptoms. The anxiety subscale has 7 items, and higher total scores indicate higher level of anxiety [17]. The internal consistency of this study α = 0.81.

2.3. Procedures. Participants were recruited through psychological health classes. Assessments took place in class and were supervised by members of the research team. The survey lasted half an hour, and questionnaires were collected on the spot. The effective recovery rate of the questionnaires was 97.3%. The research was approved by the Human Research Ethics Committee of NJUCM. Study information was provided directly to participants and informed consent was obtained.

2.4. Statistical Analysis. Analyses were performed using SPSS22.0. All statistical tests were two-tailed, and the significance level was set at p < 0.05. Pearson’s correlation was used to examine the correlations between coping style, disordered

| Characteristic       | N or mean | % or SD | Range          |
|----------------------|-----------|---------|----------------|
| Age (years)          | 19.36     | 1.06    | 18-22          |
| Hometown             |           |         |                |
| Urban area           | 429       | 62.1%   |                |
| Rural area           | 262       | 37.9%   |                |
| Major                |           |         |                |
| Science and engineering | 141     | 20.4%   |                |
| Medicine             | 273       | 39.5%   |                |
| Art                  | 80        | 11.6%   |                |
| Liberal arts         | 197       | 28.5%   |                |
| Eating Disorder Inventory (EDI) | | | |
| Drive for thinness   | 4.49      | 4.54    | 0-21           |
| Body dissatisfaction  | 10.65     | 6.45    | 0-27           |
| Bulimia              | 1.97      | 2.87    | 0-21           |
| Perfectionism        | 4.91      | 3.51    | 0-18           |
| Interpersonal distrust | 3.38     | 3.10    | 0-21           |
| Mature fear          | 7.72      | 4.32    | 0-24           |
| Interceptive awareness | 4.21     | 4.34    | 0-27           |
| Inefficiency         | 4.17      | 3.99    | 0-23           |
| Total                | 41.50     | 20.69   | 4-139          |
| Simple Coping Style Questionnaire (SCSQ) | | | |
| Positive coping style | 350      | 50.65%  |                |
| Negative coping style | 341      | 49.35%  |                |
| Security Questionnaire (SQ) | | | |
| Interpersonal security | 27.33   | 5.35    | 8-40           |
| Certainty of control | 25.96     | 5.68    | 8-40           |
| Total                | 53.29     | 10.30   | 16-80          |
| Hospital Anxiety and Depression Scale (HADS) | | | |
| Anxiety              | 6.71      | 3.09    | 0-19           |
eating behaviors, anxiety level, and sense of security. T-test was used to analyze the effects of coping style on anxiety, sense of security, and disordered eating behaviors. The mediation model was examined by PROCESS program developed by Preacher and Hayes [18], and the percentage bootstrap method of deviation correction was used to test the significance of mediating effect [19].

2.5. Common Method Biases. The Harman single-factor test was used to eliminate the common method deviation caused by the questionnaire survey. The results of factor analysis showed that the characteristic roots of 26 factors were greater than 1, and the explained variance percentage of the first common factor was 13.63% (less than 40%), indicating that there was no obvious method error.

3. Results

3.1. Correlations between Coping Style, Anxiety, Sense of Security, and Disordered Eating Behaviors. As shown in Table 2, coping style was negatively correlated with anxiety and disordered eating behaviors \(r = -0.418, -0.318, p < 0.001\) and was positively correlated with sense of security \(r = 0.510, p < 0.001\). Sense of security was negatively correlated with anxiety and disordered eating behaviors \(r = -0.511, -0.414, p < 0.001\). Anxiety was positively correlated with disordered eating behaviors \(r = 0.443, p < 0.001\).

3.2. Effects of Coping Style on Anxiety, Sense of Security, and Disordered Eating Behaviors. According to the score of SCSSQ, the participants were divided into positive or negative coping style. As illustrated in Table 3, there were significant differences in disordered eating behaviors, sense of security, and anxiety between positive and negative coping styles \(t(1,689) = -6.36, 11.33, -9.07; p < 0.001\).

3.3. Mediating Effect Test. Table 4 revealed that coping style had a direct negative predictive effect on anxiety \((\beta = -0.310, p < 0.001)\) and a direct positive predictive effect on sense of security \((\beta = 0.250, p < 0.001)\). Anxiety had a direct negative predictive effect on sense of security \((\beta = -0.408, p < 0.001)\). When coping style, anxiety, and sense of security predicted disordered eating behaviors simultaneously, coping style and sense of security had negative predictive effects \((\beta = -0.067, -0.207; p < 0.05, 0.001)\), and anxiety had a positive predictive effect \((\beta = 0.290, p < 0.001)\).

As shown in Table 5, analyses of total indirect effects indicated that anxiety and sense of security partially mediated the relationship between coping style and disordered eating behaviors \((\text{Effect} = -0.168, SE = 0.020, 95\% \text{ CI} (-0.208, -0.131))\). The mediating effect accounted for 71.8% of the total effect \((\text{Effect} = -0.234, SE = 0.027, 95\% \text{ CI} (-0.287, -0.182))\). In the meantime, when tested separately, three mediating paths were significant: coping style \(\rightarrow\) anxiety \(\rightarrow\) disordered eating behaviors \((\text{Effect} = -0.090, SE = 0.020, 95\% \text{ CI} (-0.131, -0.053))\), accounting for 38.5% of the total effect; coping style \(\rightarrow\) sense of security \(\rightarrow\) disordered eating behaviors \((\text{Effect} = -0.052, SE = 0.160, 95\% \text{ CI} (-0.084, -0.022))\), accounting for 22.2% of the total effect, and coping style \(\rightarrow\) anxiety \(\rightarrow\) sense of security \(\rightarrow\) disordered eating behaviors \((\text{Effect} = -0.026, SE = 0.087, 95\% \text{ CI} (-0.044, -0.010))\), accounting for 11.1% of the total effect. The specific paths are presented in Figure 1.

4. Discussion

The purpose of this study was to explore whether anxiety and sense of security play mediating roles in coping style and disordered eating behaviors among Chinese female college students. To the best of our knowledge, this is the first empirical study to evaluate these relationships in a sample of female women. Our study found that, first of all, coping style was negatively correlated with anxiety and disordered eating behaviors while positively correlated with sense of security. And there were significant differences in anxiety, sense of security, and disordered eating behaviors between positive coping style and negative coping style. These results correspond to previous research findings, which have indicated negative coping style could lead to more severe disordered eating behaviors [20], higher level of anxiety [21], and lower sense of security [22]. Next, when analyzing the mediating roles of anxiety and sense of security between coping style and disordered eating behaviors, we found an overall mediating role of 71.8%. These results revealed that coping style had both direct and indirect effects on disordered eating behaviors. Through further analysis, we found three indirect effect pathways. The first pathway was coping style \(\rightarrow\) anxiety \(\rightarrow\) disordered eating behaviors, which indicated that negative coping style could enhance anxiety level and further induced more serious disordered eating behaviors. The second pathway was coping style \(\rightarrow\) sense of security \(\rightarrow\) disordered eating behaviors, which showed that negative coping style could reduce the sense of security and led to the aggravation of eating problems. Similar findings have been observed in previous studies [23, 24]. The third pathway was coping style \(\rightarrow\) anxiety \(\rightarrow\) disordered eating behaviors, which indicated that anxiety and sense of security played a chain mediating role in the relationship between coping style and disordered eating behaviors. In other words, negative coping style enhanced anxiety level, high anxiety level reduced the sense of security, and further aggravated disordered eating behaviors. Kuipers and his colleagues have found that when the symptoms of eating disorders alleviated, patients’ anxiety and sensitivity to others were reduced, and their ability to deal with new

| Table 2: Correlations between coping style, anxiety, sense of security, and disordered eating behaviors. | 1     | 2     | 3     | 4     |
|-----------------------------------------------|-------|-------|-------|-------|
| (1) Coping style                              | 1     |       |       |       |
| (2) Anxiety                                   | -0.418*** | 1     |       |       |
| (3) Sense of security                         | 0.510*** | -0.551*** | 1     |       |
| (4) Disordered eating behaviors               | -0.318*** | 0.443*** | -0.414*** | 1     |

\*\*\*p < 0.001 (two-tailed), \*p < 0.01 (two-tailed), and \*p < 0.05 (two-tailed).
situations was enhanced [25], which well supports the existence of chain mediating role identified in our study.

Findings from the present study have clinical implications for psychologists who work with young women. The present study provides evidence that negative coping style leads to higher anxiety level, lower sense of security, and more severe disordered eating behaviors. These findings provide preliminary support for targeting anxiety and sense of security in preventative interventions, particularly for female youth that have the propensity to disordered eating behaviors in response to feelings of stressful daily life. In clinical interventions, while therapists could help clients with eating disorders or disordered eating behaviors by teaching them coping strategies, the improvement of coping skills requires long-term learning and practice. In contrast, the regulation of anxiety is flexible and diversified, such as progressive muscle relaxation, meditation, breathing exercises, and visualization [26]. Therefore, if therapists aim at anxiety, they might achieve ideal effect in reducing disordered eating behaviors in a short period of time. In addition, due to the existence of chain mediating role, reducing anxiety also helps to improve safety and further alleviate disordered eating behaviors.

There are several limitations to the present study. Considering the present sample was restricted to female college students in East China, the findings may have limited generality. Besides that, the cross-sectional nature of this study prevents us from inferring causation. Future longitudinal studies are necessary to examine what predictive roles

### Table 3: Effects of coping style on anxiety, sense of security, and disordered eating behaviors.

| Outcome variable          | Positive coping style (n = 350) | Negative coping style (n = 341) | t     |
|---------------------------|---------------------------------|---------------------------------|-------|
| Disordered eating behaviors | 36.71 ± 18.27                   | 46.48 ± 21.86                   | -6.36*** |
| Sense of security         | 57.33 ± 8.76                    | 49.16 ± 10.13                   | 11.33*** |
| Anxiety                   | 5.72 ± 2.66                     | 7.74 ± 3.17                     | -9.07*** |

*p < 0.001 (two-tailed), **p < 0.01 (two-tailed), and *p < 0.05 (two-tailed).

### Table 4: Regression analysis between variables.

| Outcome variable | Predictor variable | $R$  | $R^2$  | $F$   | $\beta$ | $t$      |
|------------------|--------------------|------|--------|-------|---------|---------|
| Anxiety          | Coping style       | 0.418| 0.175  | 145.642 | -0.310  | -12.068*** |
| Sense of security| Coping style       | 0.631| 0.399  | 228.112 | 0.250   | 10.409*** |
|                  | Anxiety            | -0.408| -0.162| 12.598** |
| Disordered eating behaviors | Anxiety   | 0.290| 0.106  | 7.194*** |
|                  | Security          | -0.207| -0.043| 4.835**  |

*p < 0.001 (two-tailed), **p < 0.01 (two-tailed), and *p < 0.05 (two-tailed).

### Table 5: The mediating effect of anxiety and sense of security between coping style and disordered eating behaviors.

| Effect value | Boot SE | Boot CI lower | Boot CI upper | Relative mediation effect |
|--------------|---------|---------------|---------------|---------------------------|
| Total effect | -0.234  | -0.287        | -0.182        | 100%                      |
| Total indirect effect | -0.168  | -0.208        | -0.131        | 71.8%                     |
| Indirect path 1 | -0.090  | -0.131        | -0.053        | 38.5%                     |
| Indirect path 2 | -0.052  | -0.084        | -0.022        | 22.2%                     |
| Indirect path 3 | -0.026  | -0.044        | -0.010        | 11.1%                     

Indirect path 1: coping style → anxiety → disordered eating behaviors; Indirect path 2: coping style → sense of security → disordered eating behaviors; Indirect path 3: coping style → anxiety → sense of security → disordered eating behaviors.

![Figure 1: Model of mediating roles of anxiety and sense of security between coping style and disordered eating behaviors.](image-url)
anxiety and sense of security play in mediating the relationship between negative coping style and disordered eating behaviors in female youth.

Data Availability
Data and questionnaires are available upon request, contact at zzdoctor@126.com.

Ethical Approval
Ethical approval of our study was given by the ethics committee of NJUCM.

Conflicts of Interest
The authors declare that they have no competing interests.

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References

[1] U. Volpe, A. Tortorella, M. Manchia, A. M. Monteleone, U. Albert, and P. Monteleone, "Eating disorders: what age at onset?,” Psychiatry Research, vol. 238, pp. 225–227, 2016.

[2] M. Galmiche, P. Dechelotte, G. Lambert, and M. P. Tavolacci, "Prevalence of eating disorders over the 2000-2018 period: a systematic literature review," The American Journal of Clinical Nutrition, vol. 109, no. 5, pp. 1402–1413, 2019.

[3] Z. J. Ward, P. Rodriguez, D. R. Wright, S. B. Austin, and M. W. Long, "Estimation of eating disorders prevalence by age and associations with mortality in a simulated nationally representative US cohort," JAMA Network Open, vol. 2, no. 10, article e1912925, 2019.

[4] L. Reba-Harrelson, A. von Holle, R. M. Hamer, R. Swann, M. L. Reyes, and C. M. Bulik, "Patterns and prevalence of disordered eating and weight control behaviors in women ages 25-45," Eating and Weight Disorders, vol. 14, no. 4, pp. 190–198, 2009.

[5] N. T. Godart, F. Perdereau, Z. Rein et al., "Comorbidity studies of eating disorders and mood disorders. Critical review of the literature," Journal of Affective Disorders, vol. 97, no. 1-3, pp. 37–49, 2007.

[6] A. E. Lee-Winn, L. Townsend, S. P. Reinblatt, and T. Mendelson, "Associations of neuroticism-impulsivity and coping with binge eating in a nationally representative sample of adolescents in the United States," Eating Behaviors, vol. 22, pp. 133–140, 2016.

[7] A. Ribadier and L. Varescon, “Anxiety and depression in alcohol use disorder individuals: the role of personality and coping strategies,” Substance Use & Misuse, vol. 54, no. 9, pp. 1475–1484, 2019.

[8] R. Trigueros, I. Mercader, J. J. González-Bernal et al., “The influence of the trainer’s social behaviors on the resilience, anxiety, stress, depression and eating habits of athletes,” Nutrients, vol. 12, no. 8, p. 2405, 2020.

[9] M. T. Allen and C. E. Myers, “A computer-based avatar task can differentiate avoidant and non-avoidant coping styles,” Anxiety, Stress, and Coping, vol. 32, no. 5, pp. 477–483, 2019.

[10] K. E. Giel, A. Hermann-Werner, J. Mayer et al., “Eating disorder pathology in elite adolescent athletes,” The International Journal of Eating Disorders, vol. 49, no. 6, pp. 553–562, 2016.

[11] C. Zhong and A. Lijuan, "Developing of security questionnaire and its reliability and validity," Chinese Mental Health Journal, vol. 18, no. 2, pp. 97–99, 2004.

[12] T. Yang, J. Liu, Y. Zhang et al., “Coping style predicts sense of security and mediates the relationship between autistic traits and social anxiety: moderation by a polymorphism of the FKBP5 gene,” Behavioural Brain Research, vol. 404, p. 113142, 2021.

[13] T. J. Core, M. M. Price, J. L. Alquist, R. F. Baumeister, and D. M. Tice, "Life is uncertain, eat dessert first: uncertainty causes controlled and unemotional eaters to consume more sweets," Appetite, vol. 131, pp. 68–72, 2018.

[14] A. Faber, L. Dubé, and B. Knäuper, "Attachment and eating: a meta-analytic review of the relevance of attachment for unhealthy and healthy eating behaviors in the general population," Appetite, vol. 123, pp. 410–438, 2018.

[15] D. M. Garner, M. P. Olmstead, and J. Polivy, “Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia,” The International Journal of Eating Disorders, vol. 2, no. 2, pp. 15–34, 1983.

[16] X. Yaning, "Preliminary study on the reliability and validity of the Simplified Coping Style Questionnaire," Chinese Journal of Clinical Psychology, vol. 6, no. 2, pp. 114-115, 1998.

[17] A. S. Zignond and R. P. Snaith, "The hospital anxiety and depression scale," Acta Psychiatr. Scand., vol. 67, no. 6, pp. 361–370, 1983.

[18] K. J. Preacher and A. F. Hayes, "SPSS and SAS procedures for estimating indirect effects in simple mediation models," Behavior Research Methods, Instruments, & Computers, vol. 36, no. 4, pp. 717–731, 2004.

[19] A. F. Hayes, Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach, The Guilford Press, New York, NY, USA, 2012.

[20] C. M. M. Polhuiss, L. Vaandrager, S. S. Soedamah-Muthu, and M. A. Koelen, “Salutogenic model of health to identify turning points and coping styles for eating practices in type 2 diabetes mellitus,” International Journal for Equity in Health, vol. 19, no. 1, p. 80, 2020.

[21] S. C. Segerstrom and G. T. Smith, “Personality and coping: individual differences in responses to emotion,” Annual Review of Psychology, vol. 70, no. 1, pp. 651–671, 2019.

[22] M. Movahed Abtahi and K. A. Kerns, “Attachment and emotion regulation in middle childhood: changes in affect and vagal tone during a social stress task,” Attachment & Human Development, vol. 19, no. 3, pp. 221–242, 2017.

[23] C. E. Richardson, N. R. Magson, J. Fardouly et al., “Longitudinal associations between coping strategies and psychopathology in pre-adolescence,” Journal of Youth and Adolescence, vol. 50, no. 6, pp. 1189–1204, 2021.

[24] C. Munro, L. Randell, and S. M. Lawrie, “An integrative biopsychosocial theory of anorexia nervosa,” Clinical Psychology & Psychotherapy, vol. 24, no. 1, pp. 1–21, 2017.
[25] G. S. Kuipers, S. D. Hollander, L. A. van der Ark, and M. H. J. Bekker, "Recovery from eating disorder 1 year after start of treatment is related to better mentalization and strong reduction of sensitivity to others," *Eating and Weight Disorders*, vol. 22, no. 3, pp. 535–547, 2017.

[26] L. Toussaint, Q. A. Nguyen, C. Roettger et al., "Effectiveness of progressive muscle relaxation, deep breathing, and guided imagery in promoting psychological and physiological states of relaxation," *Evidence-Based Complementary and Alternative Medicine*, vol. 2021, Article ID 5924040, 8 pages, 2021.