

Structural Relationship of Metacognitive Beliefs, Stress, Attachment Styles with Anorexia Nervosa Mediated by Self-Image

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Article Info

Article type:

Original Research

How to cite this article:

Kashani Vahid, S., Mohammadi Aria, A., & Abolmaali Alhosseini, K. (2024). Structural Relationship of Metacognitive Beliefs, Stress, Attachment Styles with Anorexia Nervosa Mediated by Self-Image. *Applied Family Therapy Journal*, 5(3), 66-75.
<http://dx.doi.org/10.61838/kman.aftj.5.3.7>



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ABSTRACT

Objective: The aim of this study was to determine the structural relationship between metacognitive beliefs, stress, attachment styles, and anorexia nervosa mediated by self-image.

Methods: This research is a descriptive correlational study and is a type of modeling research; the study population included female middle school students from Tehran in the 2022-2023 academic year. The research sample was collected through convenience sampling. Participants included 215 female students who completed online questionnaires on Anorexia Nervosa (Stice et al., 2004), Body Self-Image (Rue & Associates, 1999), Anxiety, Depression, Stress-21 (Lovibond & Lovibond, 1995), Metacognitive Beliefs-30 (Cartwright et al., 2004), and the Adult Attachment Styles Questionnaire (Besharat, 2005). Data were analyzed using the Partial Least Squares method in SPSS and Smart-PLS software.

Findings: The results showed that the modified structural relationship model of metacognitive beliefs, stress, and attachment styles with anorexia nervosa mediated by body self-image had the necessary fit.

Conclusion: Based on the results obtained, it can be concluded that body self-image played a mediating role in the relationship between metacognitive beliefs, stress, and attachment styles with anorexia nervosa.

Keywords: Body self-image, Metacognitive beliefs, Stress, Attachment styles, Anorexia nervosa.

1. Introduction

Anorexia nervosa is a serious mental disorder characterized by an intense fear of weight gain, significant weight loss, and a distorted body image (Farzaneh Dehkordi & Jamilian, 2022). Research indicates

that over 50% of the population regularly engages in unhealthy weight control behaviors; including skipping meals, substituting food with powders or a specific drink, and excessive smoking. Additionally, up to 20% of the population reported more severe weight control efforts, such as self-induced vomiting, fasting, taking diet pills, and using

laxatives and diuretics. Anorexia nervosa often begins during adolescence, predominantly affecting teenage girls and young women (Calzo et al., 2018; D'Anna et al., 2023). It appears that the causes of this disorder are determined by multiple developmental, cultural, social, and biological factors, with its clinical aspects well-established from both physical and psychological viewpoints (Dakanalis et al., 2017; McDermott & Rushford, 2011). In Iran, an epidemiological survey on eating disorders indicated the presence of 0.9% anorexia nervosa, 23.3% bulimia nervosa, and 63.6% mild eating disorder syndrome in a sample of 3,100 individuals (Shayeghian et al., 2011). The diagnostic features of anorexia nervosa include avoiding maintaining a minimally normal body weight, intense fear of gaining weight, and significant disturbances in the perception of body size or shape, which, if the disorder intensifies, can lead to death as the most serious consequence (D'Anna et al., 2023; Dahlenburg et al., 2019). In Western societies, the prevalence rates for various eating disorders are 6% for anorexia nervosa and 1% for bulimia nervosa (D'Anna et al., 2023), with reported prevalence rates of eating disorders being 17.1% in Hong Kong, 10.8% in China, and 17% in other studies. The prevalence of anorexia and bulimia nervosa among high school girls in Tehran was reported to be 9% and 2.3% respectively (Safarzade & Mahmoody Khorandi, 2015).

A significant factor to consider is metacognition, a multifaceted concept encompassing knowledge, processes, and strategies that control, evaluate, or monitor cognition. Theorists often distinguish between two aspects of metacognition: metacognitive beliefs and metacognitive monitoring. Metacognitive knowledge includes information that individuals have about their own cognition and learning strategies, which influences them. Metacognitive monitoring refers to executive functions such as attention, control, planning, and error detection in performance. Components of metacognition include positive beliefs about worry (beliefs that emphasize the positive aspects of worry), cognitive confidence (beliefs that emphasize weak and low cognitive confidence), cognitive self-awareness (beliefs that emphasize an individual's self-awareness), negative beliefs about uncontrollability and danger (beliefs that emphasize the uncontrollability and dangerousness of worries), and beliefs about the need to control thoughts (beliefs that emphasize the need to control thoughts) (Woolrich et al., 2008; Yousefi et al., 2008). Metacognitive beliefs common among individuals with anorexia nervosa include the suppression of thoughts related to weight and eating. Some

patients believe that worry is necessary to protect against losing control and gaining weight, while others think that excessive worry about weight makes them appear foolish (Woolrich et al., 2008). Additionally, metacognitive beliefs play a role in the persistence of distress and problematic behaviors such as frequent weighing and preoccupation with the amount of food eaten (Alavizadeh et al., 2020; Davenport et al., 2015).

Self-concept refers to an individual's understanding of themselves in terms of personality traits, abilities, and values. Research has shown that a negative self-concept is associated with the creation and maintenance of eating disorders such as anorexia nervosa, bulimia nervosa, and binge eating disorder (Fairburn et al., 2003). Individuals with eating disorders often report low self-esteem, poor body image, and dissatisfaction with their appearance (Swerdlow et al., 2024; Williams & Levinson, 2020). This negative self-perception can lead to the development of disordered eating behaviors as a tool to cope with negative emotions and manage low self-esteem (Cartwright-Hatton & Wells, 1997; Fairburn et al., 2003). Furthermore, individuals with eating disorders may engage in restrictive eating and compulsory exercise as a means to achieve an ideal body shape or weight, which can further perpetuate negative self-concept and body dissatisfaction (Simic et al., 2021). Effective treatment for eating disorders often involves addressing the negative self-concept and body image issues, along with other psychological and behavioral factors (Entezari et al., 2021).

Another factor in the occurrence of anorexia nervosa is stress, which is defined as the body's physiological response to any type of internal or physical adaptational demand, and stressors are all psychological or physical adaptational demands placed on a living organism. As Selye's definition suggests, any type of adaptational demand on a living organism creates stress. Therefore, it can be said that almost all external stimuli can cause stress, as they all require the organism to adapt (Het et al., 2015; Kolčić). Some research in the etiology of eating disorders has pointed to emotional factors such as mood, anxiety, and emotional disorders (Mason et al., 2014; Mikulincer & Shaver, 2019). One of these negative emotions is anxiety. Anxiety has a strong relationship with eating disorders and disordered eating behaviors (Chrousos, 2009; Het et al., 2015; Morton & White, 2013). Research findings also indicate a link between problems in emotion regulation, negative emotions, and disordered eating behaviors (Munguía et al., 2021).

Another significant factor in the occurrence of anorexia nervosa is how parents respond to the needs of the child

during childhood, which leads to the formation of attachment styles in the child; it can also be stated that attachment styles are related and effective variables in anorexia nervosa, attachment styles that include three main styles of secure attachment, insecure-avoidant attachment, and insecure-anxious or ambivalent attachment play a significant role in creating psychological and social adaptation in an individual (Nancarrow et al., 2018). Attachment theory refers to the nature of the relationship that forms between the child and primary caregivers and the importance of this relationship in shaping the individual's personality and worldview. According to this theory, during the repetition of experiences related to the attachment profile, the child creates mental representations or, in other words, "internal working models" of themselves and others. Once these models are formed, if the attachment system is activated, these models will also be activated and will guide the individual's behavior, it is believed that differences in attachment behaviors or attachment styles of individuals reflect differences in their underlying functional models (Parsakia et al., 2023).

Given the importance of anorexia nervosa and its impact on mental health, the present research aims to answer whether there is a structural relationship between metacognitive beliefs, stress, attachment styles, and anorexia nervosa mediated by self-perception.

2. Methods

2.1. Study design and Participant

This study is a descriptive correlational research and falls under the category of modeling studies. The study population includes female middle school students in Tehran for the academic year 2022-2023. The recommended sample size for structural equation modeling is 100 individuals (Saper, 2020). In this study, the sample size was determined using G*Power software; accordingly, the initial sample size for structural equations with an anticipated effect size of 0.1, a power of 0.95, one latent variable, six indicator variables, and a confidence level of 0.01, was found to be 204 individuals, with the actual number of participants in the study being 215. The research sample was collected through convenience sampling from the north, south, west, east, and central areas of Tehran. The data collection tools were as follows:

After the proposal was approved and permission was obtained from the university unit, 215 female middle school students from Tehran for the academic year 2022-2023 were

selected via online and convenience sampling methods. To collect data, the study questionnaires were initially uploaded to the Google Docs platform. The link was then placed in student groups, and students were asked to respond to the research questions and to send the questionnaire link to friends who belong to the study population.

2.2. Measures

2.2.1. Anorexia Nervosa

This 22-item questionnaire, designed by Stice and colleagues in 2004, has strong criterion, predictive, and convergent validity. Additionally, the reliability of this instrument has been confirmed based on the test-retest method and has acceptable internal consistency. This scale competes well with psychiatric interviews such as the Structured Clinical Interview based on the Diagnostic and Statistical Manual of Mental Disorders, with a test-retest kappa coefficient for diagnosing eating disorders ranging from 0.80 to 0.90. Cronbach's alpha in Wagner's study (2011) was reported as 0.87 for the normal weight sample and 0.83 for the overweight sample (Shayeghian et al., 2011).

2.2.2. Body Self-Image

This test, designed by Rowe (2005), is a 27-item scale that scores body self-image on a 5-point Likert scale from "never true about me" to "always true about me." This test includes subscales for overall appearance evaluation, healthy physical fitness, investment in ideals, health and fitness evaluation, attention to grooming, dissatisfaction with height, obesity evaluation, negative impact, and social dependency. The subscales of this test have acceptable validity ranging from 0.68 to 0.92. No standardization of this tool was found in Iran; therefore, in this research, the psychometric findings of this tool were also examined indirectly (Entezari et al., 2021). The internal consistency results of this questionnaire in the current study were 0.86; moreover, the two-week retest reliability coefficient for a sample of 50 participants was 0.83.

2.2.3. Stress

This questionnaire has 21 items, with 7 items specified for each of its subscales. This tool has a Cronbach's alpha validity ranging from 0.84 to 0.91 for its subscales. In Iran, Sahabi and colleagues (2005), standardized this scale. Correlations between the depression subscale and the Beck

Depression Inventory were 0.70, the anxiety subscale and the Zung Anxiety Test were 0.67, and the stress subscale with the Perceived Stress Test were 0.49 (Sahebi et al., 2005).

2.2.4. Attachment Styles

This is a 30-item self-report Iranian test designed by Besharat (2005) to identify three main attachment styles: secure, avoidant, and anxious/ambivalent. Besharat (2005) obtained Cronbach's alpha coefficients for the secure, avoidant, and anxious/ambivalent styles in a 300-person student sample from Tehran University as 0.85, 0.84, and 0.85, respectively. Retest reliability over a four-week period for the subscales was 0.87, 0.83, and 0.84, respectively, indicating good validity of this test (Parsakia et al., 2023).

2.2.5. Metacognitive Beliefs

This questionnaire, developed by Wells in 1997, is a 30-item self-report scale that measures individuals' beliefs about their thoughts. Responses are scored on a four-point Likert scale from 1 "do not agree" to 4 "completely agree." This scale has five subscales: 1- positive beliefs about worry, 2- beliefs about the uncontrollability and danger of worry, 3- beliefs about cognitive proficiency, 4- general negative beliefs (including responsibility, superstitions, etc.), and 5- cognitive self-awareness. Shirinzadeh translated and prepared this questionnaire for the Iranian population; the overall Cronbach's alpha for the Iranian sample was reported

as 0.91, and for the subscales of uncontrollability, positive beliefs, cognitive self-awareness, cognitive confidence, and the need to control negative thoughts, it was reported as 0.87, 0.86, 0.81, 0.80, and 0.71 respectively. In validity studies using factor analysis, the reliability was confirmed with a Cronbach's alpha ranging from 76% to 93%, and the validity and reliability of this questionnaire were also examined by two clinical psychologists and one psychiatrist, achieving a reliability coefficient of 79% through split-half method and Cronbach's alpha, and a reliability coefficient of 0.88 when administered to 52 individuals (Dehghani & Hekmatiyan Fard, 2020).

2.3. Data Analysis

After a sufficient sample size was reached, data collection was terminated. Data analysis methods included correlation, regression in software, and structural equation modeling using the Partial Least Squares method in the software environment.

3. Findings and Results

The demographic analysis of the study showed that the average age of the research sample was 14.01 years. The standard deviation was 0.83, with the minimum age being 13 years and the maximum age 15 years.

The minimum, maximum, mean, standard deviation, skewness, and kurtosis of the research variables and subscales are reported in Table 1.

Table 1

Descriptive Characteristics of Research Variables

Variable	Mean	Standard Deviation	Minimum	Maximum	Skewness	Kurtosis
Anorexia Nervosa	2.763	1.348	1	5	-1.204	0.141
Stress	3.935	2.015	1	7	-1.201	0.038
Positive Metacognitive Beliefs	12.600	7.189	1	24	-1.300	0.022
Negative Metacognitive Beliefs	12.660	7.080	1	24	-1.295	0.001
Controllability	6.926	3.717	1	12	-1.288	-0.183
Cognitive Proficiency	6.367	3.480	1	12	-1.178	0.084
Cognitive Self-Awareness	10.353	10.353	1	20	-1.255	0.050
Overall Appearance Evaluation	8.009	4.125	1	15	-1.084	0.083
Impact of Fitness on Health	7.837	4.339	1	15	-1.231	0.066
Investment in Ideals	8.321	4.263	1	15	-1.242	-0.117
Negative Affect	7.702	4.327	1	15	-1.183	0.034
Attention to Grooming	7.958	4.219	1	15	-1.071	0.201
Secure Attachment	21.381	8.726	7	35	-1.269	-0.122
Avoidant Attachment	22.247	8.174	7	35	-1.248	-0.098
Anxious/Ambivalent Attachment	20.572	8.308	7	35	-1.183	0.066

As can be observed in the columns for skewness and kurtosis, all variables are within the ± 2 range; thus, it can be

stated that all variables have a normal distribution, and parametric statistical tests can be used for data analysis.

Table 2

Fit Indices for the Measurement Model of Anorexia Nervosa

Fit Index	SRMR	NFI	RMS_theta
Recommended Value	<0.10	>0.80	<0.12
Observed Value - Proposed Model	0.80	-0.490	0.165
Observed Value - Modified Model	0.078	0.819	0.103

As shown in Table 2, the proposed model did not fit well. Upon determining that the proposed model did not have an adequate fit, it was modified; thereafter, the reliability (internal consistency) and validity (divergent validity) of the constructs and research tools were addressed. Fornell and Larcker (1981) suggest three criteria for examining the reliability of constructs, which include the reliability of each

item, the composite reliability of each construct, and the average variance extracted. Regarding the reliability of each item, a factor loading of 0.70 or greater in confirmatory factor analysis indicates well-defined constructs; moreover, items should not have significant factor loadings on other constructs. To examine the composite reliability of each construct, the Dillon-Goldstein's rho coefficient was used.

Table 3

Summary of Results for the Presumed Measurement Model for Predicting Anorexia Nervosa

Latent Variables	Standardized Factor Loading (λ)	p-value
Anorexia Nervosa	-	-
Stress	0.210	0.007
Metacognitive Beliefs	0.115	0.304
Positive Beliefs	0.899	0.118
Negative Beliefs	-0.049	0.865
Controllability	-0.078	0.768
Cognitive Proficiency	-0.409	0.327
Cognitive Self-Awareness	0.094	0.694
Body Self-Image	-0.069	0.490
Overall Appearance Evaluation	-0.359	0.379
Impact of Fitness on Health	0.664	0.104
Investment in Ideals	0.611	0.162
Negative Affect	0.066	0.822
Attention to Grooming	0.393	0.177
Attachment Styles	0.354	0.009
Secure	-0.563	0.034
Avoidant	0.159	0.369
Anxious/Ambivalent	0.892	0.034

The results in Table 3 indicate that the standardized factor loading (λ) for all selected indicators for the relevant constructs was greater than 0.20 and statistically significant at the 5% error level. This provides ample evidence to

confirm the unidimensionality of the selected indicators for each respective construct. Thus, it can be stated that the revised indicators for each respective construct were correctly chosen.

Table 4

Summary of Results for the Modified Measurement Model for Predicting Anorexia Nervosa

Latent Variables	λ	T-value	p-value	α	CR	AVE
Anorexia Nervosa	-	-	-	1.00	1.00	1.00
Stress	0.310	0.527	0.599	1.00	1.00	1.00
Metacognitive Beliefs	0.903	1.447	0.015	0.960	0.721	0.509
Positive Beliefs	0.920	3.166	0.002	-	-	-
Cognitive Proficiency	-0.410	1.186	0.024	-	-	-
Body Self-Image	0.370	1.789	0.041	0.700	0.761	0.572

Overall Appearance Evaluation	-0.381	1.936	0.035	-	-	-
Impact of Fitness on Health	0.652	2.056	0.040	-	-	-
Investment in Ideals	0.606	1.679	0.009	-	-	-
Attention to Grooming	0.404	1.625	0.011	-	-	-
Attachment Styles	0.351	2.051	0.041	0.731	0.822	0.568
Secure	-0.566	2.274	0.009	-	-	-
Anxious/Ambivalent	0.903	1.668	0.023	-	-	-

According to the results presented in Table 4, the composite reliability of all research constructs was greater than 0.70, and the Cronbach's alpha coefficient was also above 0.70. Therefore, all latent variables (constructs) of the research measurement model had appropriate reliability.

The results presented in Table 4 showed that the average variance extracted (AVE) for all research constructs was greater than 0.50, indicating that all constructs in the research measurement model had suitable convergent validity.

Figure 1

Model with Beta Values

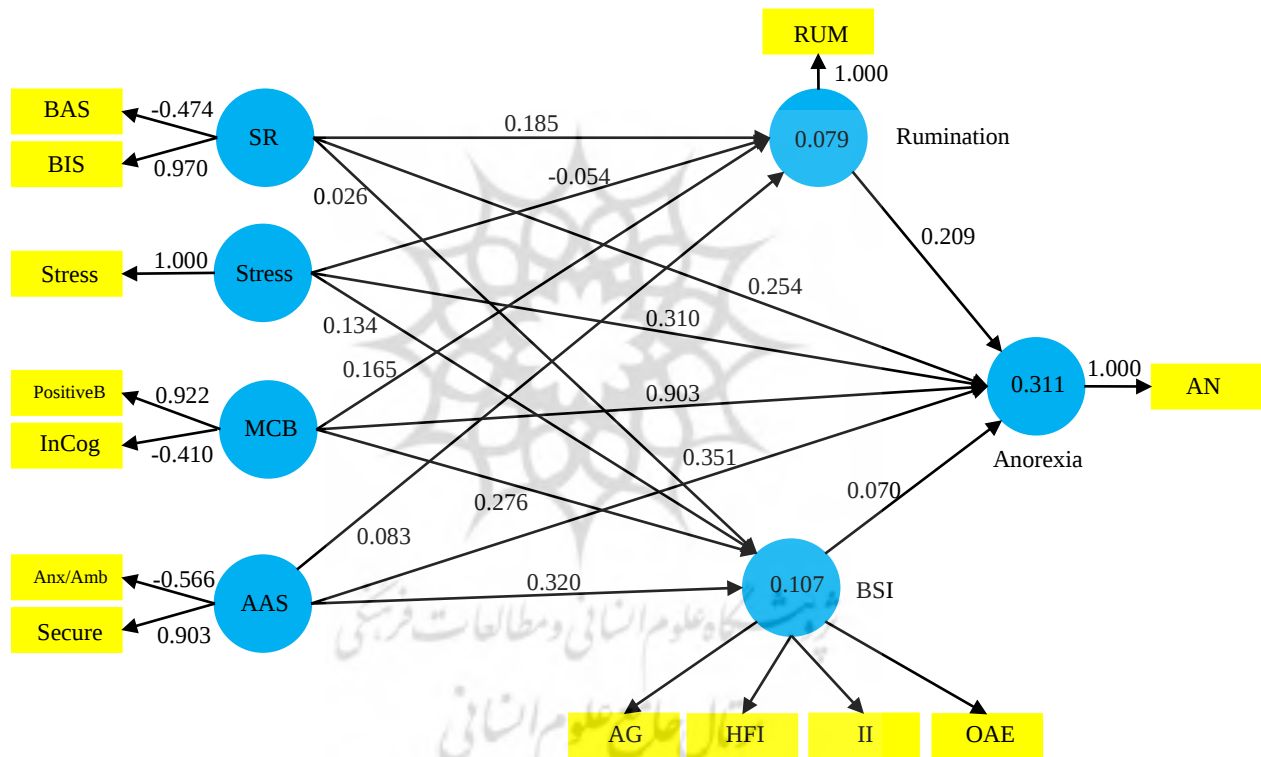


Table 5

Square Root of Average Variance Extracted and Correlation Coefficients

Latent Variable	1	2	3	4	5	6	7
1. Attachment	0.754						
2. Anorexia Nervosa	0.411	1.00					
3. Body Self-Image	0.720	0.008	0.524				
4. Metacognitive Beliefs	0.143	0.177	0.297	0.714			
5. Stress	-0.210	-0.207	-0.165	0.120	-0.049	0.670	1.00

Based on the results presented in Table 5, generally, the square root of the average variance extracted for each of the

constructs ($0.52 > AVE > 1.00$) was greater than the correlations between the constructs ($0.67 > r > 0.049$). This

result demonstrates that the selected indicators for each construct share a high percentage of common variance relative to other constructs in the measurement model, thus confirming the discriminant validity of the constructs present in the research measurement model. Given the results presented, it can be stated that the modified measurement model for predicting anorexia nervosa was an appropriate model for conducting analyses in this study. After the anorexia nervosa measurement model was validated with confirmatory factor analysis, the research

hypotheses were tested within the proposed conceptual framework using path analysis (structural model evaluation). The research path model, with standardized factor loadings (Figure 1) and a summary of the results from the evaluation of the structural model for anorexia nervosa, is presented below. According to the results presented in Table 6, the total effect of the latent variables stress, metacognitive beliefs, and attachment on the anorexia nervosa variable was statistically significant at the 0.05 error level.

Table 6

Direct, Indirect, and Total Effects of Research Variables

Endogenous Variable	Exogenous Variable	Direct Effect (T)	Direct Effect (p)	Indirect Effect 1 (T)	Indirect Effect 1 (p)	Indirect Effect 2 (T)	Indirect Effect 2 (p)	Total Effect (T)	Total Effect (p)
Anorexia Nervosa								0.31	0.258
	Stress	0.53	0.60	2.68	0.01	2.79	0.01	1.29	0.17
	Metacognitive Beliefs	2.45	0.02	2.83	0.01	2.46	0.01	2.59	0.01
	Attachment	2.05	0.04	0.21	0.84	1.03	0.30	2.02	0.04
Body Self-Image	Body Self-Image	1.97	0.05	-	-	-	-	1.97	0.05
								0.11	0.10
	Stress	2.64	0.01	-	-	-	-	2.64	0.01
	Metacognitive Beliefs	2.42	0.02	-	-	-	-	2.42	0.02
	Attachment	0.28	0.78	-	-	-	-	0.28	0.78

4. Discussion and Conclusion

The present research aimed to determine the mediating role of body self-image in the structural relationship between metacognitive beliefs, stress, and attachment styles with anorexia nervosa. The results indicated that this model has acceptable fit. The findings revealed that positive metacognitive beliefs are positively associated with anorexia nervosa. This finding is consistent with the prior research (Griffiths et al., 2015) and inconsistent with some previous findings (McDermott & Rushford, 2011). It can be explained that individuals with anorexia nervosa believe that worrying can protect them against losing control and gaining weight (Woolrich et al., 2008). Additionally, the analysis of the model data demonstrated that metacognitive thought control has a positive relationship with anorexia nervosa. This finding aligns with the prior studies (Davenport et al., 2015; McDermott & Rushford, 2011; Zeinodini et al., 2016). It can be explained that individuals try to control their thoughts to avoid the negative consequences of those thoughts. These individuals attempt to suppress or avoid thinking about their

appearance, weight, and eating. The cognitive-attentional syndrome is a repetitive thought style that can manifest as ineffective coping and avoidance behaviors, such as thought suppression, avoidance, or distraction. This syndrome has consequences that lead to the persistence of negative emotions and the reinforcement of negative thoughts (McDermott & Rushford, 2011). Typically, the cognitive-attentional syndrome causes a persistence of the feeling of threat in individuals; in other words, this feeling of threat causes the persistence of anorexia nervosa. A meticulous examination of the relationship between avoidant attachment styles in various eating disorders can provide better insights into the psychopathology of this disorder. According to the findings of this study, the avoidant coping style is the best predictor of eating disorders (Mikulincer & Shaver, 2019). Behavioral inhibition characteristics are common in eating disorders in such a way that they can lead to the onset and maintenance of abnormal eating patterns; previous studies have shown that deficits in recognizing and responding to emotional signals and avoidance of emotions are associated with anorexia nervosa and may facilitate the

course of this disorder. The results of research by Rawal and colleagues in Oxford students have indicated that the level of eating disorder has a significant and positive correlation with experiential avoidance; as experiential avoidance increases, eating disorder symptoms in students increase, which is consistent with the findings of the current study. Attachment theory suggests that early experiences with caregivers shape an individual's attachment style, which in turn affects their relationships and psychological well-being throughout their lifetime. Attachment styles are typically classified into two groups, secure or insecure, with three subgroups of insecure attachment: anxious, avoidant, and disorganized. Anxious attachment is characterized by fear of abandonment, a need for reassurance, and a tendency to overly rely on others for emotional support. Individuals with anxious attachment may be overly concerned about their relationships and may engage in behaviors aimed at maintaining closeness and security. Avoidant attachment is characterized by a reluctance to rely on others for emotional support, a tendency to avoid intimacy, and a preference for independence and self-reliance. Individuals with avoidant attachment may feel uncomfortable with emotional closeness and may struggle to express emotions or engage deeply with others. Disorganized attachment is characterized by contradictory behaviors and emotions, as well as a lack of a coherent attachment strategy. Individuals with disorganized attachment may exhibit inconsistent behavior, such as seeking intimacy with others while pushing them away, and may experience confusion and distress in their relationships (Mikulincer & Shaver, 2019).

The findings of this study indicate that there is a significant relationship between attachment styles and anorexia nervosa. Specifically, it appears that individuals with insecure attachment styles, particularly anxious and avoidant styles, are at a greater risk of developing anorexia nervosa compared to those with secure attachment styles. These results are consistent with previous research linking attachment styles to other mental health disorders such as depression and anxiety (Mikulincer & Shaver, 2019; Shanmugam et al., 2012; Spruit et al., 2020). Recent studies have also highlighted the importance of considering the role of different dimensions of attachment in the development and maintenance of anorexia nervosa. For example, one study showed that individuals with anorexia nervosa had higher levels of attachment-related anxiety and avoidance, as well as lower levels of joy and comfort related to attachment compared to healthy individuals (Rawaldi et al., 2020). Another study showed that individuals with anorexia

nervosa had more negative self-views and more negative views of others, which were associated with higher anxiety and avoidance related to attachment (Spruit et al., 2020). Attachment theory suggests that early experiences with caregivers shape an individual's attachment style, which in turn affects their functioning in adult relationships (Bowlby, 1969). Individuals with insecure attachment styles may have difficulties regulating emotions and maintaining close relationships, which can lead to increased sensitivity to the development of anorexia nervosa (Beard & Hicks, 2015). In contrast, individuals with secure attachment styles are likely to have positive self-esteem and healthy coping strategies, which may protect them from developing anorexia nervosa (Teska et al., 2016). The implications of these findings for the prevention and treatment of anorexia nervosa are important. By identifying individuals with insecure attachment styles in the early stages, healthcare providers can intervene and provide targeted interventions to help prevent the development of anorexia nervosa. Additionally, understanding the role of attachment styles in the development and maintenance of anorexia nervosa can inform therapeutic approaches, such as attachment-based psychotherapy, which aims to address attachment-related deficiencies and improve overall psychological functioning (Shanmugam et al., 2012; Spruit et al., 2020).

5. Suggestions and Limitations

The present research also faced limitations. Many studies on body dysmorphic disorder rely on self-reported measures, which may be subject to bias and inaccuracies due to participants' reluctance to disclose personal information or their tendency to overreport or underreport symptoms. This study used cross-sectional designs, which can limit the ability to establish the direction of relationships between body dysmorphic disorder and other factors. Longitudinal studies are needed to better understand the causal relationships between these variables. This study on body dysmorphic disorder was conducted on relatively homogeneous samples, which may limit the generalizability of the findings to more diverse populations. It is recommended to use other assessment tools in addition to self-report measures, such as neuropsychological assessments, to prevent biases from participants and evaluators. It is suggested to use longitudinal designs instead of cross-sectional designs to better investigate the causal relationships between these variables. It is also suggested that this research be conducted on heterogeneous and non-

student samples to allow the findings to be generalized to more diverse populations. Finally, it is recommended that psychologists and psychiatrists consider factors such as metacognitive beliefs, stress, attachment styles, and self-image in the diagnosis and treatment of anorexia nervosa and, if possible, target them as therapeutic goals.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We would like to express our gratitude to all individuals helped us to do the project.

Declaration of Interest

The authors report no conflict of interest.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

References

- Alavizadeh, S. M., Sobhi Gharamaleki, N., Mami, S., Mohammadzadeh, J., & Ahmadi, V. (2020). The comparison impact of Metacognitive Therapy-Based Group Intervention and Group Acceptance-Based Behavioral Therapy on Psychophysiological Signs of Professional Soccer Players in the U-19 League in Tehran [Research Article]. *Zahedan J Res Med Sci*, 22(2), e92514. <https://doi.org/10.5812/zjms.92514>
- Beard, J.-L., & Hicks, R. (2015). Attachment styles and maladaptive eating practices: perfectionism as a mediator.

- Journal of eating disorders*, 3(1), P19. <https://doi.org/10.1186/2050-2974-3-S1-P19>
- Calzo, J. P., Austin, S. B., & Micali, N. (2018). Sexual orientation disparities in eating disorder symptoms among adolescent boys and girls in the UK. *European Child & Adolescent Psychiatry*, 27(11), 1483-1490. <https://doi.org/10.1007/s00787-018-1145-9>
- Cartwright-Hatton, S., & Wells, A. (1997). Beliefs about Worry and Intrusions: The Meta-Cognitions Questionnaire and its Correlates. *Journal of anxiety disorders*, 11(3), 279-296. [https://doi.org/10.1016/S0887-6185\(97\)00011-X](https://doi.org/10.1016/S0887-6185(97)00011-X)
- Chrousos, G. P. (2009). Stress and disorders of the stress system. *Nature Reviews Endocrinology*, 5(7), 374-381. <https://www.nature.com/articles/nrendo.2009.106>
- D'Anna, G., Lucherini Angeletti, L., Benvenuti, F., Melani, G., Ferroli, M., Poli, F., Villano, R. G., Ricca, V., & Rotella, F. (2023). The association between sport type and eating/body image concerns in high school students: a cross-sectional observational study. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, 28(1), 43. <https://link.springer.com/article/10.1007/s40519-023-01570-3>
- Dahlenburg, S. C., Gleaves, D. H., & Hutchinson, A. D. (2019). Anorexia nervosa and perfectionism: A meta-analysis. *International Journal of Eating Disorders*, 52(3), 219-229. <https://doi.org/10.1002/eat.23009>
- Dakanalis, A., Timko, A. C., Clerici, M., Riva, G., & Carrà, G. (2017). Objectified body consciousness (OBC) in eating psychopathology: Construct validity, reliability, and measurement invariance of the 24-item OBC scale in clinical and nonclinical adolescent samples. *Assessment*, 24(2), 252-274. <https://journals.sagepub.com/doi/abs/10.1177/1073191115602553>
- Davenport, E., Rushford, N., Soon, S., & McDermott, C. (2015). Dysfunctional metacognition and drive for thinness in typical and atypical anorexia nervosa. *Journal of eating disorders*, 3(1), 24. <https://doi.org/10.1186/s40337-015-0060-4>
- Dehghani, Y., & Hekmatiyan Fard, S. (2020). Investigation Role of Educational Optimism, Metacognitive Beliefs and Cognitive Emotion Regulation in Prediction of Self-Handicapping in Students with Special Learning Disabilities. *Psychology of Exceptional Individuals*, 10(37), 135-159. <https://doi.org/10.22054/jpe.2020.50285.2112>
- Entezari, S., Taher, M., & Aghaei, H. (2021). The Comparison of the Effectiveness of Cognitive Behavioral Therapy and Metacognitive Therapy on Depression, Suicide Ideation, and Masochistic Aggression in Individuals with Subclinical Symptoms of Body Dysmorphic Disorder [Research]. *Quarterly Journal of Child Mental Health*, 7(4), 1-18. <https://doi.org/10.52547/jcmh.7.4.2>
- Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: a "transdiagnostic" theory and treatment. *Behaviour Research and Therapy*, 41(5), 509-528. [https://doi.org/10.1016/S0005-7967\(02\)00088-8](https://doi.org/10.1016/S0005-7967(02)00088-8)
- Farzaneh Dehkordi, S. S., & Jamilian, A. (2022). The Prevalence of Body Dysmorphic Disorder and Eating Disorder among Body-building and Fitness Athletes in Aarak. *Journal of Clinical Sport Neuropsychology*, 2(2), 0-0. https://jcsnp.ir/browse.php?a_id=68&sid=1&slc_lang=en
- Griffiths, S., Mond, J. M., Murray, S. B., & Touyz, S. (2015). Positive beliefs about anorexia nervosa and muscle dysmorphia are associated with eating disorder symptomatology. *Australian & New Zealand Journal of*

- Psychiatry, 49(9), 812-820.
<https://doi.org/10.1177/0004867415572412>
- Het, S., Vocks, S., Wolf, J. M., Hammelstein, P., Herpertz, S., & Wolf, O. T. (2015). Blunted neuroendocrine stress reactivity in young women with eating disorders. *Journal of psychosomatic research*, 78(3), 260-267.
<https://doi.org/10.1016/j.jpsychores.2014.11.001>
- Kolčić, I. STRESS: CAUSES, CONSEQUENCES AND MANAGEMENT OF CHRONIC PSYCHOLOGICAL STRESS. *Lifestyle Medicine: the Roadmap to Our Best Possible Health*, 143.
https://www.bib.irb.hr:8443/1257755/download/1257755.life_style_medicine_the_roadmap_to_our_best_possible_health_high_quality_1.pdf#page=146
- Mason, S. M., Flint, A. J., Roberts, A. L., Agnew-Blais, J., Koenen, K. C., & Rich-Edwards, J. W. (2014). Posttraumatic stress disorder symptoms and food addiction in women by timing and type of trauma exposure. *JAMA Psychiatry*, 71(11), 1271-1278.
<https://jamanetwork.com/journals/jamapsychiatry/article-abstract/1904804>
- McDermott, C. J., & Rushford, N. (2011). Dysfunctional metacognitions in anorexia nervosa. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*, 16(1), e49-e55. <https://doi.org/10.1007/BF03327521>
- Mikulincer, M., & Shaver, P. R. (2019). Attachment orientations and emotion regulation. *Current opinion in psychology*, 25, 6-10. <https://doi.org/10.1016/j.copsyc.2018.02.006>
- Morton, R. D., & White, M. J. (2013). Revised reinforcement sensitivity theory: The impact of FFFS and stress on driving. *Personality and individual differences*, 54(1), 57-63. <https://doi.org/10.1016/j.paid.2012.08.005>
- Munguía, L., Jiménez-Murcia, S., Granero, R., Baenas, I., Agüera, Z., Sánchez, I., Codina, E., del Pino-Gutiérrez, A., Testa, G., & Treasure, J. (2021). Emotional regulation in eating disorders and gambling disorder: A transdiagnostic approach. *Journal of Behavioral Addictions*, 10(3), 508-523. <https://akjournals.com/view/journals/2006/10/3/article-p508.xml>
- Nancarrow, A., Hollywood, A., Ogden, J., & Hashemi, M. (2018). The Role of Attachment in Body Weight and Weight Loss in Bariatric Patients. *Obesity Surgery*, 28(2), 410-414. <https://doi.org/10.1007/s11695-017-2796-1>
- Parsakia, K., Farzad, V., & Rostami, M. (2023). The mediating role of attachment styles in the relationship between marital intimacy and self-differentiation in couples. *Applied Family Therapy Journal (AFTJ)*, 4(1), 589-607. <https://doi.org/10.61838/kman.aftj.4.1.29>
- Safarzade, S., & Mahmoody Khorandi, Z. (2015). Survey on Eating Disorders (Mental Anorexia, Bulimia) among 13-18-Year-Old Adolescents of Gonabad City in 2014 [Research]. *Journal of Rafsanjan University of Medical Sciences*, 14(5), 393-404. <http://journal.rums.ac.ir/article-1-2457-en.html>
- Sahebi, A., Asghari, M. J., & Salari, R. S. (2005). Validation of Depression Anxiety and Stress Scale (DASS-21) for an Iranian Population. 1(4), 36-54. https://jip.stb.iau.ir/article_512443_a0d2c015073fc1d62ef524cc2302c4f0.pdf
- Shanmugam, V., Jowett, S., & Meyer, C. (2012). Eating psychopathology amongst athletes: Links to current attachment styles. *Eating behaviors*, 13(1), 5-12. <https://doi.org/10.1016/j.eatbeh.2011.09.004>
- Shayeghian, Z., Aguilar-Vafaie, M. E., & Rasoolzadeh Tabatabae, K. (2011). Core maladaptive schemas and parental bonding among female adolescent with normal weight, overweight and anorexia symptoms [Original]. *Pajoohande*, 16(1), 30-38. <http://pajoohande.sbmu.ac.ir/article-1-1080-en.html>
- Simic, M., Baudinet, J., Blessitt, E., Wallis, A., & Eisler, I. (2021). *Multi-family therapy for anorexia nervosa: a treatment manual*. Routledge. <https://www.taylorfrancis.com/books/mono/10.4324/9781003038764/multi-family-therapy-anorexia-nervosa-mima-simic-julian-baudinet-esther-blessitt-andrew-wallis-ivan-eisler>
- Spruit, A., Goos, L., Weenink, N., Rodenburg, R., Niemeyer, H., Stams, G. J., & Colonnaesi, C. (2020). The Relation Between Attachment and Depression in Children and Adolescents: A Multilevel Meta-Analysis. *Clinical Child and Family Psychology Review*, 23(1), 54-69. <https://doi.org/10.1007/s10567-019-00299-9>
- Swerdlow, B. A., Pearlstein, J. G., Sandel, D. B., & Johnson, S. L. (2024). 13 Negative Affect and Nonsuicidal Self-Injury. *The Oxford Handbook of Nonsuicidal Self-Injury*, 226. [https://books.google.com/books?hl=en&lr=&id=LhcBEQAAQBAJ&oi=fnd&pg=PA226&dq=23.+Claes,+L.,+Jimenez-Murcia,+S.,+Ag%C3%B3Cera,+Z.,+Castro,+R.,+S%C3%A1nchez,+I.,+Mench%C3%B3n,+J.+M.,+%26+Fern%C3%A1ndez-Aranda,+F.+\(2020\).+Mood+and+anxiety+disorders+precede+the+onset+of+an+eating+disorder:+A+longitudinal+study.+Journal+of+Clinical+Medicine,+9\(6\),+1840.&ots=hTqayuMwBO&sig=K3f2WIWdUugGnwQWl3eGeN72bs8](https://books.google.com/books?hl=en&lr=&id=LhcBEQAAQBAJ&oi=fnd&pg=PA226&dq=23.+Claes,+L.,+Jimenez-Murcia,+S.,+Ag%C3%B3Cera,+Z.,+Castro,+R.,+S%C3%A1nchez,+I.,+Mench%C3%B3n,+J.+M.,+%26+Fern%C3%A1ndez-Aranda,+F.+(2020).+Mood+and+anxiety+disorders+precede+the+onset+of+an+eating+disorder:+A+longitudinal+study.+Journal+of+Clinical+Medicine,+9(6),+1840.&ots=hTqayuMwBO&sig=K3f2WIWdUugGnwQWl3eGeN72bs8)
- Williams, B. M., & Levinson, C. A. (2020). Negative beliefs about the self prospectively predict eating disorder severity among undergraduate women. *Eat Behav*, 37, 101384. <https://doi.org/10.1016/j.eatbeh.2020.101384>
- Woolrich, R. A., Cooper, M. J., & Turner, H. M. (2008). Metacognition in patients with anorexia nervosa, dieting and non-dieting women: A preliminary study. *European Eating Disorders Review: The Professional Journal of the Eating Disorders Association*, 16(1), 11-20. <https://doi.org/10.1002/erv.802>
- Yousefi, R., JANGI, A. H., Seyvanizadeh, M., & Adhamian, E. (2008). A comparison of metacognition in patients with schizophrenia, anxiety disorder, and non-patient control. <https://www.sid.ir/paper/82991/en>
- Zeinodini, Z., Sedighi, S., Rahimi, M. B., Noorbakhsh, S., & Esfahani, S. R. (2016). Dysfunctional metacognitive beliefs in body dysmorphic disorder. *Global journal of health science*, 8(3), 10. <https://doi.org/10.5539/gjhs.v8n3p10>