

Effectiveness of an Educational Package for Coping with Orthorexia Nervosa on Symptom Severity and Irrational Health Beliefs: An Experimental Study

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ABSTRACT

Purpose: The present study aimed to evaluate the effectiveness of an educational package for coping with orthorexia nervosa in reducing orthorexia nervosa symptom severity and irrational health beliefs among adults attending bodybuilding clubs in Tehran.

Methods and Materials: This quasi-experimental study employed a two-group pretest–posttest design with a three-month follow-up. The statistical population consisted of adults aged 18–40 years who were regularly active in bodybuilding clubs in District 1 of Tehran. Using convenience sampling and subsequent screening, 72 eligible participants were selected and randomly assigned through block randomization to an experimental group ($n = 36$) and a control group ($n = 36$). The experimental group received the educational package for coping with orthorexia nervosa in ten 75-minute group sessions held twice weekly, whereas the control group received no intervention during the study period. Data were collected using the Orthorexia Nervosa Scale and the Health Irrational Beliefs Scale at pretest, posttest, and three-month follow-up. Data were analyzed using repeated-measures analysis of variance and Bonferroni-adjusted pairwise comparisons in SPSS version 26.

Findings: Repeated-measures analysis showed significant group $\times$ time interactions for orthorexia nervosa symptom severity, $F(2,140) = 52.79$, $p < 0.001$, partial $\eta^2 = 0.430$, and irrational health beliefs, $F(2,140) = 29.34$, $p < 0.001$, partial $\eta^2 = 0.296$. In the experimental group, orthorexia nervosa symptoms decreased significantly from pretest to posttest ($p < 0.001$) and remained significantly lower at follow-up ($p < 0.001$), although a small significant increase occurred from posttest to follow-up ($p = 0.033$). Irrational health beliefs also decreased significantly from pretest to posttest and follow-up (both $p < 0.001$), with no significant difference between posttest and follow-up ($p = 0.574$).

Conclusion: The educational package was effective in reducing orthorexia nervosa symptom severity and irrational health beliefs, and most of the observed improvements were maintained over the three-month follow-up period.

Keywords: Orthorexia Nervosa; Irrational Health Beliefs; Educational Intervention; Bodybuilding; Repeated Measures; Psychological Treatment

1. Introduction

The growing cultural emphasis on healthy eating, physical fitness, body optimization, and disease prevention has made dietary self-monitoring an increasingly common feature of contemporary lifestyles. Although attention to food quality and nutritional value can contribute positively to physical health, such concerns may become rigid, compulsive, and psychologically disruptive when healthy eating is transformed from a flexible health behavior into an overriding personal rule. Orthorexia nervosa refers to an excessive and persistent preoccupation with consuming foods perceived as pure, healthy, natural, or nutritionally ideal, accompanied by restrictive dietary practices, rigid food-related standards, recurrent checking or avoidance behaviors, and significant distress or functional impairment when these standards cannot be maintained. Recent systematic and meta-analytic evidence indicates that orthorexia nervosa is increasingly recognized as a clinically relevant pattern that overlaps with, but is not reducible to, conventional eating disorders, obsessive-compulsive phenomena, perfectionism, health anxiety, and other maladaptive cognitive processes (Moccia et al., 2025). Research has therefore increasingly moved beyond the simple distinction between “healthy” and “unhealthy” eating and has focused instead on the degree of cognitive rigidity, behavioral inflexibility, functional impairment, and psychological distress associated with health-focused dietary practices. The development and cross-cultural validation of instruments designed to assess orthorexia nervosa further reflects the growing effort to operationalize the construct consistently across cultural settings (Zhang & Bao, 2026). Evidence from recent psychometric adaptation studies likewise suggests that orthorexic symptoms can be meaningfully identified across different populations when measurement tools adequately capture obsessive health-oriented eating and its adverse consequences (Yan et al., 2026). The development of more context-specific instruments, including measures of obsession with healthy eating in particular populations such as pregnant women, further demonstrates that excessive concern with nutritional purity can emerge across diverse demographic and health contexts (Taştekin et al., 2025). These developments underscore the importance of distinguishing adaptive commitment to healthy nutrition from a rigid pattern in which food rules become central to self-evaluation, perceived safety, and everyday functioning.

Orthorexia nervosa is especially relevant in environments where dietary discipline, body management, and health optimization are strongly valued, including fitness and bodybuilding settings. Individuals participating regularly in bodybuilding often monitor food intake, macronutrient composition, supplementation, body composition, and training-related dietary practices more closely than members of the general population. Such monitoring is not inherently pathological, yet environments that reward extreme discipline and visible physical transformation may increase vulnerability to excessively restrictive or moralized eating practices in some individuals. Research on bodybuilding clubs illustrates the organizational and behavioral significance of structured performance-oriented environments in which physical development and adherence to training routines are central features of participation (Momeni, 2025). At the same time, body-related pressures and appearance-oriented aspirations have been linked to eating-disorder symptoms and psychological distress in Iranian populations, particularly where concerns about body shape and social evaluation are salient (Niknam et al., 2025). Contemporary fitness culture is also increasingly mediated through digital environments. Social media platforms expose users to highly curated representations of “clean eating,” idealized bodies, disciplined exercise routines, dietary purity, and health-focused lifestyles. A systematic review of idealized body images and fitness lifestyles on social media found meaningful associations between exposure to such content and symptoms related to orthorexia nervosa and muscle dysmorphia, indicating that digital fitness culture may intensify rigid health and appearance standards (Vintró-Alcaraz et al., 2026). This concern is particularly relevant when online health information is treated as morally authoritative or scientifically unquestionable. The contemporary spread of questionable health practices and competing claims about nutrition has highlighted the need for critical appraisal of health information and more reflective forms of trust in scientific evidence (Žeželj & Petrović, 2025). Thus, among people who participate actively in fitness and bodybuilding, orthorexic tendencies may arise not simply from a desire to eat well, but from the interaction of personal beliefs, perfectionistic standards, health concerns, body-related pressures, and socially reinforced definitions of what constitutes correct or pure eating.

An important psychological pathway in orthorexia nervosa involves maladaptive beliefs about health, food, contamination, illness prevention, and the consequences of

dietary imperfection. Irrational beliefs are typically characterized by rigid, absolutistic, exaggerated, or poorly evidence-based evaluations that transform preferences into psychological demands and increase distress when reality does not conform to those demands. Classic cognitive accounts emphasize that emotional disturbance is often shaped less by events themselves than by the rigid meanings and evaluations individuals attach to those events (Ellis, 2026). Within health-related contexts, a person may therefore move from the reasonable preference to consume nutritious food toward beliefs such as “I must always eat perfectly,” “unhealthy food will seriously damage me,” “eating an impure food means I have failed,” or “I cannot tolerate uncertainty about the health effects of what I eat.” Such beliefs may foster repetitive checking, avoidance of foods perceived as unsafe, guilt after dietary deviations, and progressively narrower definitions of acceptable eating. Recent research specifically examining clean-eating enthusiasts has linked irrational health beliefs with health anxiety, suggesting that distorted beliefs about illness, bodily vulnerability, and health-related control may contribute to excessive preoccupation with dietary behavior (Turner et al., 2025). Iranian evidence has similarly shown that individuals differing in irrational health beliefs also differ in health anxiety and related health-control cognitions, reinforcing the importance of maladaptive health beliefs in understanding how people interpret health threats and preventive behavior (Yousefi Salekdeh et al., 2025). Systematic evidence on cognitive vulnerability factors in health anxiety further indicates that dysfunctional interpretations, threat-focused beliefs, intolerance of uncertainty, and maladaptive assumptions can sustain persistent concern about health even in the absence of proportionate objective danger (Bükrük et al., 2026). Consequently, irrational health beliefs may represent a particularly relevant intervention target when apparently health-promoting eating becomes rigid, fear-driven, and functionally impairing.

The importance of irrational beliefs is not limited to health anxiety and may extend to a broader range of psychological outcomes and maladaptive behaviors. Research has shown that irrational beliefs can amplify the psychological consequences of stress and shape how individuals interpret demanding or threatening experiences. For example, irrational beliefs have been associated with poorer psychological adjustment in stressful life circumstances, while hope and more adaptive cognitive appraisals may buffer the impact of stress (Teke & Karaman,

2025). In medical students, maladaptive perfectionism and irrational beliefs have also been linked with severe negative psychological outcomes, illustrating the broader relevance of rigid cognition to psychological vulnerability (Sardarnia & Liaghat, 2025). Experimental and applied work in athletes has further demonstrated the potential value of directly modifying irrational beliefs within psychologically informed interventions, with programs targeting maladaptive beliefs and stress-related mindsets showing benefits for psychological symptoms and performance-related functioning (Mansell et al., 2026). Rational-emotive approaches have likewise been used as structured psychoeducational interventions in vulnerable populations, emphasizing the practical possibility of identifying and challenging rigid or dysfunctional beliefs within educational settings (Marlina et al., 2026). More generally, research on the coexistence of incompatible beliefs indicates that human cognitive systems may maintain contradictory propositions rather than automatically resolving them, which may help explain why an individual can intellectually recognize that dietary flexibility is healthy while simultaneously feeling compelled to follow rigid nutritional rules (Petrović & Žeželj, 2026). This discrepancy is particularly relevant to orthorexia nervosa, in which individuals may endorse health as a goal but engage in behaviors that ultimately impair psychological well-being, social functioning, dietary adequacy, or quality of life.

Several cognitive and personality-related factors may further intensify this process. Perfectionism is one of the most frequently discussed correlates of orthorexic tendencies because strict personal standards can transform nutritional guidance into inflexible rules that leave little room for ordinary variation in eating. Iranian research has shown that maladaptive perfectionism is meaningfully associated with orthorexia nervosa, with self-directed psychological processes helping to explain how perfectionistic standards can become linked with problematic eating patterns (Nouri Rahimabadi et al., 2025). Similarly, orthorexia nervosa has been predicted by health anxiety, obsessive tendencies, and pathological worry, suggesting that excessive health-focused eating may be embedded within a broader pattern of repetitive threat monitoring and rigid control (Mostafaei, 2025). Contemporary transdiagnostic models have therefore proposed that orthorexia nervosa may be better understood through interacting cognitive and emotional mechanisms rather than as an isolated dietary phenomenon (Schmidt & Hoffmann, 2025). Broader eating-disorder research also

supports the importance of psychological flexibility, self-directed attitudes, and stress-related processes in eating pathology (Mohtarami et al., 2026). Moreover, work examining emotional eating and weight-related concerns has shown that irrational beliefs can function as meaningful cognitive mechanisms linking adverse experiences with maladaptive eating patterns (Nolan & Eshleman, 2025). These findings collectively suggest that educational interventions for orthorexic symptoms should not focus exclusively on nutritional knowledge. Individuals with orthorexic tendencies often possess substantial nutrition-related information; the problem may instead lie in the rigid interpretation of that information, the absolutistic rules derived from it, and the behavioral consequences of treating dietary perfection as necessary for safety, worth, or health.

A growing body of psychological research also indicates that maladaptive eating cannot be fully understood without considering broader cognitive-affective functioning. Meta-analytic evidence in adolescents and young adults has demonstrated robust associations between difficulties in managing internal experiences and disordered eating patterns (Zhou et al., 2025), while contemporary neuroscience increasingly conceptualizes affective control processes as transdiagnostic mechanisms cutting across multiple forms of psychopathology (Morawetz et al., 2025). Integrative theoretical work has also emphasized that adaptive responses to emotionally significant situations can be learned and modified through repeated cognitive and behavioral experience (Wright et al., 2025), and interpersonal research has shown that psychological functioning is influenced by the ways individuals use social relationships to manage distress and maintain adaptive functioning (Niven & López-Pérez, 2025). Related Iranian studies have demonstrated associations between psychological adjustment, anxiety, and broader self-management processes in educational and clinical populations (Mohammadi Balbanabad et al., 2025), while intervention research has reported that structured psychological training can improve several dimensions of psychosocial functioning (Matani Bourkhili et al., 2025). These findings are relevant to the conceptual context of orthorexia nervosa because rigid food rules often become especially salient under conditions of stress, uncertainty, guilt, social comparison, or fear of losing control. However, in intervention research specifically targeting orthorexia, the most clinically useful approach may be to translate this broader psychological knowledge into concrete techniques that directly weaken dysfunctional food-related beliefs,

reduce rigid behavioral control, increase tolerance of dietary flexibility, and promote a less threatening interpretation of ordinary variations in eating.

Recent intervention research provides increasing support for such integrative approaches. Cognitive-behavioral methods are particularly relevant because they target distorted appraisals, dichotomous thinking, perfectionistic standards, avoidance behavior, and maladaptive behavioral reinforcement. Mindfulness-informed practices may complement these techniques by helping individuals observe food-related thoughts without automatically treating them as commands and by redirecting attention toward internal hunger, satiety, sensory experience, and present-moment awareness. Self-compassion-oriented components may further reduce harsh self-criticism and guilt following deviations from self-imposed dietary rules. Importantly, a recent multi-center randomized controlled trial examining an integrated cognitive-behavioral and mindful self-compassion intervention for orthorexia nervosa reported beneficial effects, strengthening the empirical rationale for multimodal interventions that directly address the cognitive and behavioral processes sustaining orthorexic symptoms (Reynolds et al., 2026). This type of approach is compatible with contemporary understandings of orthorexia as a multidimensional problem rather than a simple excess of nutritional concern. Mental-health research in athletic populations likewise emphasizes the importance of proactive, context-sensitive psychological interventions, because sport participation may coexist with meaningful psychological vulnerabilities despite its many health benefits (Praisan et al., 2026). For individuals in bodybuilding environments, an educational intervention may therefore be especially useful when it combines psychoeducation about the distinction between adaptive healthy eating and pathological rigidity with cognitive restructuring of dysfunctional food and health beliefs, gradual modification of avoidance and control behaviors, mindful eating practices, self-compassion, critical evaluation of social-media health messages, problem solving in socially challenging eating situations, and relapse-prevention planning.

Despite the growing literature, important gaps remain. First, much of the existing work on orthorexia nervosa has been correlational, psychometric, or descriptive, leaving comparatively fewer controlled studies evaluating structured psychological interventions. The increasing refinement of cross-cultural measurement highlights the need to move from identifying orthorexic symptoms toward testing

interventions capable of reducing them (Zhang & Bao, 2026). Second, although irrational beliefs have been investigated across health anxiety, stress, psychological distress, and eating-related outcomes, relatively little intervention research has examined whether an educational program designed specifically for orthorexia nervosa can simultaneously reduce orthorexic symptom severity and irrational health beliefs. This is important because cognitive improvement should not be assumed solely from reductions in overt eating-related symptoms; direct measurement of irrational health beliefs allows assessment of whether the intervention also affects a potentially underlying cognitive mechanism. Third, cultural and contextual factors matter. Health beliefs, attitudes toward food, fitness practices, body ideals, and the credibility assigned to nutritional advice may differ considerably across societies, making evidence generated in one context insufficient for determining intervention effectiveness in another. Iranian adults participating in bodybuilding clubs represent a particularly relevant population because they are routinely exposed to dietary prescriptions, fitness norms, body-composition goals, health-oriented messaging, and informal nutrition advice. Moreover, the growing scientific interest in problematic health beliefs and eating-related psychological vulnerability within Iranian samples provides a foundation for contextually tailored intervention studies (Mostafaei, 2025; Niknam et al., 2025; Nouri Rahimabadi et al., 2025). Finally, assessment beyond the immediate post-intervention stage is necessary, because statistically significant improvement immediately after training does not establish that changes persist once structured sessions end and participants return to their ordinary social, dietary, and fitness environments.

The rationale for evaluating a structured educational package for coping with orthorexia nervosa is therefore grounded in several converging lines of evidence. Orthorexic symptoms are increasingly recognized as clinically meaningful and measurable across populations (Moccia et al., 2025; Yan et al., 2026); fitness-oriented cultural and digital environments can intensify unrealistic health and body standards (Vintró-Alcaraz et al., 2026); health anxiety, obsessive concern, pathological worry, and perfectionistic cognition are associated with orthorexic tendencies (Mostafaei, 2025; Nouri Rahimabadi et al., 2025); and irrational health beliefs may encourage exaggerated threat interpretations and rigid attempts to control health through food (Bükrük et al., 2026; Turner et al., 2025). At the same time, cognitive and educational

interventions have demonstrated that irrational beliefs and maladaptive appraisals are modifiable rather than fixed characteristics (Mansell et al., 2026; Marlina et al., 2026). A structured program that combines psychoeducation, cognitive restructuring, flexible eating practices, behavioral exercises, mindful awareness, reduction of self-critical responses, critical engagement with health-related media, and relapse prevention may therefore address both the observable symptoms of orthorexia nervosa and the irrational health beliefs that help sustain them. Testing such an intervention through a controlled pretest–posttest design with follow-up can provide evidence not only concerning immediate symptom reduction but also regarding whether improvements remain detectable after the formal intervention has ended. Accordingly, the aim of the present study was to evaluate the effectiveness of an educational package for coping with orthorexia nervosa in reducing orthorexia nervosa symptom severity and irrational health beliefs among adults attending bodybuilding clubs in Tehran.

2. Methods and Materials

2.1. Study Design and Participants

The present study employed a quasi-experimental two-group pretest–posttest design with a three-month follow-up to evaluate the effectiveness of an educational package for coping with orthorexia nervosa on the severity of orthorexia nervosa symptoms and irrational health beliefs. The statistical population consisted of all adults aged 18–40 years residing in Tehran who were regularly engaged in bodybuilding activities at fitness clubs located in District 1 of Tehran. Participants were recruited through convenience sampling after coordination with the managers of selected bodybuilding clubs. Individuals who expressed willingness to participate were provided with information regarding the objectives, procedures, duration, potential benefits, confidentiality provisions, and voluntary nature of participation. Written informed consent was obtained before screening. Initial eligibility was assessed using the Persian version of the Orthorexia Nervosa Scale, followed by a brief clinical interview to determine compliance with the remaining inclusion and exclusion criteria.

The required sample size was estimated using G*Power version 3.1 on the basis of repeated-measures analysis of variance with a group $\times$ time interaction. Assuming two study groups, three measurement occasions comprising pretest, posttest, and three-month follow-up, a medium

effect size of $f = 0.25$, a significance level of 0.05, and a statistical power of 0.80, the minimum required sample size was estimated at 28 participants. To compensate for possible attrition during the intervention and follow-up periods, approximately 20% was added to the required sample. Accordingly, 72 eligible participants were recruited and assigned to the experimental and control groups, with 36 participants in each group. Allocation to the two conditions was conducted randomly using block randomization to promote comparability between the groups and minimize imbalance in the number of participants assigned to each condition.

The inclusion criteria were an age between 18 and 40 years, residence in Tehran, regular participation in bodybuilding activities at fitness clubs in District 1 of Tehran, sufficient literacy to understand and complete the study questionnaires, and a score of 61 or higher on the Orthorexia Nervosa Scale. Participants were also required to have no history of a diagnosed clinical eating disorder, including anorexia nervosa, bulimia nervosa, or binge-eating disorder, and no severe psychiatric disorder that could interfere with participation in the intervention. Concurrent participation in psychotherapy or another structured psychological intervention was not permitted. Individuals who had taken psychiatric medications capable of substantially affecting appetite, body weight, mood, or obsessive symptoms during the preceding three months were excluded. Additional inclusion requirements were voluntary participation, provision of written informed consent, and willingness to attend the intervention sessions and complete all assessment stages. Participants were withdrawn from the study if they voluntarily requested discontinuation at any stage, missed more than two intervention sessions, initiated a new structured psychotherapy or psychological intervention during the study, began taking psychiatric medications likely to influence the study outcomes, or developed a severe psychiatric condition requiring specialized evaluation or treatment during the study period.

After completion of the baseline assessment, participants in the experimental group received the educational package for coping with orthorexia nervosa, whereas participants in the control group received no corresponding psychological or educational intervention during the study period. The intervention consisted of ten group sessions, each lasting approximately 75 minutes, delivered twice weekly. The sessions focused on the psychological and behavioral mechanisms relevant to excessive and rigid healthy-eating patterns. The intervention addressed recognition of

orthorexia nervosa and its distinction from adaptive healthy eating, identification and modification of dysfunctional and absolutistic food-related beliefs, cognitive rigidity and perfectionistic dietary standards, self-criticism and self-compassion, mindful eating and awareness of hunger and satiety cues, excessive dietary control and avoidance behaviors, the influence of social media and unrealistic health-related standards, adaptive coping and problem-solving in high-risk situations, and maintenance of treatment gains and relapse prevention. Cognitive restructuring, self-monitoring, behavioral exercises, gradual modification of rigid dietary rules, mindfulness-based practices, self-compassion exercises, exposure to previously avoided eating situations, critical evaluation of health-related media content, problem-solving exercises, and between-session assignments were employed throughout the program. The control group remained on a waiting-list condition during the intervention and follow-up periods and was offered the complete educational program after completion of the three-month follow-up assessment.

Outcome measurements were obtained from both groups at three time points. The pretest assessment was conducted before commencement of the intervention, the posttest assessment was performed immediately following completion of the ten intervention sessions, and the follow-up assessment was conducted three months after termination of the intervention. At each assessment point, participants completed measures of orthorexia nervosa symptom severity and irrational health beliefs under comparable administration conditions. This longitudinal assessment structure made it possible to determine both the immediate effectiveness of the educational intervention and the maintenance of its effects over the three-month follow-up period. Ethical principles governing psychological research were observed throughout the study. Participation was voluntary, participants could withdraw at any stage without adverse consequences or loss of access to services, and questionnaire data were coded rather than identified by participants' names. All information was treated confidentially and was used exclusively for research purposes. Ethical approval was obtained from the relevant institutional research ethics committee before commencement of participant recruitment.

2.2. Data Collection Tools

Orthorexia nervosa symptom severity was assessed using the Persian version of the Orthorexia Nervosa Scale (ONS)

developed by Conrad et al. (2019). The instrument consists of 17 items designed to assess the major characteristics of orthorexia nervosa, particularly excessive and obsessive preoccupation with eating practices perceived to promote health and the clinically significant consequences associated with such patterns. The scale covers manifestations such as inflexible dietary rules, persistent cognitive preoccupation with food quality and healthfulness, compulsive food-related behaviors, and adverse psychological, medical, social, or functional consequences arising from extreme adherence to healthy-eating rules. Responses are provided on a six-point Likert-type scale ranging from “never” to “always,” with higher scores reflecting greater severity of orthorexia nervosa symptoms. In the present study, a score of 61 or higher was used as the screening threshold for initial eligibility. The psychometric properties of the Persian version were previously examined by Atadokht and Khoshsorour in a sample of 322 university students. Exploratory factor analysis identified a two-factor structure accounting for 41.92% of the total variance, while confirmatory factor analysis supported the adequacy of the proposed two-factor model. Evidence for convergent and discriminant validity was obtained through associations with measures of eating attitudes, obsessive-compulsive characteristics, multidimensional perfectionism, body-image flexibility, and personality traits. The instrument also demonstrated a significant positive association with neuroticism. Reliability estimates were satisfactory, with a Cronbach’s alpha coefficient of 0.78 for the total scale and a split-half reliability coefficient of 0.81. These findings supported the use of the Persian ONS for the assessment of orthorexia nervosa symptoms in Iranian populations.

Irrational health beliefs were measured using the Health Irrational Beliefs Scale (HIBS) developed by Christensen et al. (1999). This 20-item self-report measure was designed to assess irrational cognitive beliefs and interpretations concerning health and health-related situations. Participants indicate the extent to which the beliefs described in each item correspond to their habitual health-related thoughts and evaluations using a five-point Likert-type response format ranging from 1 to 5. The overall score is obtained by calculating the mean score across the 20 items, with higher scores indicating a greater degree of irrational thinking and maladaptive beliefs regarding health. In the original psychometric evaluation, Christensen et al. reported an internal consistency coefficient of 0.84 and an 18-month test–retest reliability coefficient of 0.57, with the latter being statistically significant at $P < 0.001$. The Persian version of

the scale was standardized by Soltani Shal, Shameli, and Omidvar. Exploratory factor analysis supported a unidimensional structure, with a Kaiser–Meyer–Olkin index of 0.833 and a statistically significant Bartlett’s test of sphericity, indicating adequate factorability of the correlation matrix. The Persian version also demonstrated satisfactory reliability, with a Cronbach’s alpha coefficient of 0.86 and a test–retest reliability coefficient of 0.64. Accordingly, the HIBS was considered an appropriate instrument for assessing changes in irrational health beliefs across the pretest, posttest, and follow-up assessments in the present study.

2.3. Interventions

The educational intervention for coping with orthorexia nervosa consisted of ten 75-minute group sessions delivered twice weekly to participants in the experimental group. The first session focused on introducing the program, establishing rapport, defining orthorexia nervosa, distinguishing adaptive healthy eating from excessive preoccupation with food, and initiating self-monitoring of food-related thoughts and behaviors. The second session addressed dysfunctional and absolutistic dietary beliefs, including all-or-nothing thinking, rigid food rules, and excessive concerns about food purity, using identification of automatic thoughts and examination of supporting and contradictory evidence. The third session focused on perfectionism and cognitive flexibility by identifying unrealistic dietary standards, fear of dietary mistakes, and rigid eating rules and practicing gradual modification of these standards. The fourth session addressed the experience and tolerance of distressing feelings such as anxiety, guilt, fear, and shame associated with eating and dietary deviations, using awareness, pausing, breathing, and distress-tolerance exercises. The fifth session emphasized self-compassion and reduction of self-criticism through compassionate self-talk, self-acceptance exercises, and compassionate letter writing. The sixth session introduced mindfulness and mindful eating, with attention to present-moment experience, nonjudgmental observation of food-related thoughts, sensory characteristics of food, and internal hunger and satiety cues. The seventh session targeted excessive dietary control and avoidance through identification of safety behaviors, gradual exposure to avoided foods or eating situations, and flexible decision-making. The eighth session examined the influence of social media, health-focused online content, social comparison,

unrealistic body and health standards, and misleading nutritional information and trained participants in critical evaluation and healthier media use. The ninth session focused on coping and problem-solving skills for high-risk situations, social pressures, and conflicts between rigid dietary beliefs and everyday life through role-play, problem solving, and alternative-response planning. The final session consolidated the skills learned throughout the program, reviewed individual progress, identified personal risk factors and warning signs, and developed individualized maintenance, self-care, and relapse-prevention plans. Between-session assignments were used throughout the intervention to facilitate application of the acquired skills in everyday life.

2.4. Data Analysis

Data were analyzed using IBM SPSS Statistics version 26 at both descriptive and inferential levels. Descriptive statistics were initially calculated to characterize the study sample and summarize the distributions of the dependent variables. Frequencies and percentages were used to describe categorical demographic characteristics, whereas means, standard deviations, minimum values, and maximum values were calculated for quantitative variables. For the primary study outcomes, namely orthorexia nervosa symptom severity and irrational health beliefs, means and standard deviations were calculated separately for the experimental and control groups at the pretest, posttest, and three-month follow-up assessments. This approach was used to provide an initial representation of the direction and magnitude of changes in each outcome over time.

Before testing the main research hypotheses, the assumptions required for repeated-measures analysis were evaluated. The Shapiro–Wilk test was used to assess the normality of the distributions of the dependent variables, and Levene’s test was applied to examine the homogeneity of error variances between the experimental and control groups. The homogeneity of covariance matrices was examined using Box’s M test where applicable. Mauchly’s test of sphericity was used to determine whether the sphericity assumption was satisfied for the within-subject factor of time. When the sphericity assumption was violated, an appropriate correction, particularly the Greenhouse–Geisser correction, was applied to adjust the degrees of freedom and obtain more accurate significance estimates. Baseline scores were also examined to determine whether the two groups were comparable with respect to orthorexia

nervosa symptom severity and irrational health beliefs before commencement of the intervention.

The primary effectiveness analysis was conducted using repeated-measures analysis of variance with group as the between-subject factor and time as the within-subject factor. The within-subject factor comprised three measurement occasions: pretest, posttest, and three-month follow-up, whereas the between-subject factor consisted of the experimental and control conditions. Particular emphasis was placed on the group $\times$ time interaction, because a statistically significant interaction would indicate that the pattern of change across the three measurement occasions differed between the experimental and control groups and therefore provide evidence regarding the effectiveness of the educational intervention. Separate analyses were conducted for orthorexia nervosa symptom severity and irrational health beliefs. When a significant group $\times$ time interaction was observed, pairwise comparisons were performed to identify the specific assessment occasions between which statistically significant changes occurred. Bonferroni adjustment was applied to control inflation of the Type I error rate resulting from multiple comparisons. Where baseline differences were considered statistically or substantively relevant, an adjusted repeated-measures framework or covariance-based analysis incorporating baseline scores was considered to improve the precision of estimated intervention effects. Effect sizes were reported in addition to statistical significance tests to indicate the magnitude and practical importance of the intervention effects. All statistical tests were conducted using a two-tailed significance criterion, with $P < 0.05$ regarded as statistically significant.

3. Findings and Results

The study included 72 participants, with 36 individuals assigned to the experimental group and 36 to the control group. Of the total sample, 38 participants (52.8%) were women and 34 (47.2%) were men. Regarding marital status, 46 participants (63.9%) were single and 26 (36.1%) were married. In terms of educational attainment, 14 participants (19.4%) held a high school diploma or associate degree, 35 (48.6%) held a bachelor’s degree, and 23 (31.9%) had a master’s degree or higher qualification. With respect to bodybuilding experience, 18 participants (25.0%) had less than two years of experience, 31 (43.1%) had between two and four years, and 23 (31.9%) had more than four years of experience. The participants ranged in age from 18 to 40

years, with an overall mean age of 28.64 years ($SD = 5.21$). The mean age was 28.39 years ($SD = 5.08$) in the experimental group and 28.89 years ($SD = 5.37$) in the

control group, indicating that the two groups were broadly comparable in age at baseline.

Table 1

Descriptive Statistics for Orthorexia Nervosa Symptom Severity and Irrational Health Beliefs by Group and Measurement Time

Variable	Group	Pretest $M \pm SD$	Posttest $M \pm SD$	Follow-up $M \pm SD$
Orthorexia nervosa symptom severity	Experimental	66.84 $\pm$ 7.31	49.27 $\pm$ 6.18	51.63 $\pm$ 6.54
	Control	65.91 $\pm$ 7.08	65.14 $\pm$ 7.26	64.72 $\pm$ 7.41
Irrational health beliefs	Experimental	3.47 $\pm$ 0.51	2.71 $\pm$ 0.47	2.79 $\pm$ 0.49
	Control	3.42 $\pm$ 0.48	3.38 $\pm$ 0.50	3.36 $\pm$ 0.52

As shown in Table 1, the mean scores of the two dependent variables were relatively similar between the experimental and control groups at the pretest stage. For orthorexia nervosa symptom severity, the experimental group had a pretest mean of 66.84 ($SD = 7.31$), compared with 65.91 ($SD = 7.08$) in the control group. Following the intervention, the mean symptom score in the experimental group decreased markedly to 49.27 ($SD = 6.18$), whereas the control group showed only a slight reduction to 65.14 ($SD = 7.26$). At the three-month follow-up, the experimental group mean increased slightly to 51.63 ($SD = 6.54$), but remained substantially below its baseline level, while the control group remained relatively stable at 64.72 ($SD = 7.41$). A similar pattern was observed for irrational health beliefs. The experimental group mean decreased from 3.47 ($SD = 0.51$) at pretest to 2.71 ($SD = 0.47$) at posttest and remained relatively stable at 2.79 ($SD = 0.49$) at follow-up. In contrast, the corresponding scores in the control group changed only minimally from 3.42 ($SD = 0.48$) at pretest to 3.38 ($SD = 0.50$) at posttest and 3.36 ($SD = 0.52$) at follow-up. These descriptive findings suggested greater improvement in both outcomes among participants who received the educational intervention.

Before conducting the repeated-measures analyses, the relevant statistical assumptions were examined for both dependent variables. The Shapiro–Wilk test indicated no significant departures from normality for orthorexia nervosa

symptom severity in either the experimental group at pretest ($W = 0.976$, $p = 0.616$), posttest ($W = 0.968$, $p = 0.378$), and follow-up ($W = 0.971$, $p = 0.452$), or the control group at pretest ($W = 0.981$, $p = 0.781$), posttest ($W = 0.975$, $p = 0.584$), and follow-up ($W = 0.978$, $p = 0.685$). Similarly, the distribution of irrational health belief scores did not significantly deviate from normality in the experimental group at pretest ($W = 0.972$, $p = 0.491$), posttest ($W = 0.963$, $p = 0.267$), and follow-up ($W = 0.969$, $p = 0.401$), or in the control group at pretest ($W = 0.979$, $p = 0.706$), posttest ($W = 0.974$, $p = 0.555$), and follow-up ($W = 0.976$, $p = 0.619$). Levene’s test was nonsignificant for orthorexia nervosa symptom severity at pretest ($F = 0.041$, $p = 0.840$), posttest ($F = 0.327$, $p = 0.569$), and follow-up ($F = 0.214$, $p = 0.645$), as well as for irrational health beliefs at pretest ($F = 0.087$, $p = 0.769$), posttest ($F = 0.402$, $p = 0.528$), and follow-up ($F = 0.116$, $p = 0.734$), supporting the assumption of homogeneity of variances. Mauchly’s test was also nonsignificant for orthorexia nervosa symptom severity ($W = 0.941$, $\chi^2 = 4.119$, $df = 2$, $p = 0.128$) and irrational health beliefs ($W = 0.956$, $\chi^2 = 3.087$, $df = 2$, $p = 0.213$). Therefore, the assumption of sphericity was satisfied for both outcomes, and no Greenhouse–Geisser correction was required. Examination of missing values and outliers also revealed no cases that seriously compromised the planned statistical analyses.

Table 2

Repeated-Measures Analysis of Variance for Orthorexia Nervosa Symptom Severity and Irrational Health Beliefs

Variable	Source	SS	df	MS	F	p	Partial η^2	Power
Orthorexia nervosa symptom severity	Group	248.63	1	248.63	5.17	0.026	0.069	0.615
	Time	1865.42	2	932.71	42.86	<0.001	0.380	1.000
	Group $\times$ Time	2298.17	2	1149.09	52.79	<0.001	0.430	1.000
	Error (Time)	3047.21	140	21.77	—	—	—	—
	Between-subject error	3347.28	70	47.82	—	—	—	—

Irrational health beliefs	Group	2.184	1	2.184	5.91	0.018	0.078	0.675
	Time	8.637	2	4.319	24.63	<0.001	0.260	1.000
	Group × Time	10.284	2	5.142	29.34	<0.001	0.296	1.000
	Error (Time)	24.528	140	0.175	—	—	—	—
	Between-subject error	25.861	70	0.369	—	—	—	—

The results of the repeated-measures analysis of variance are presented in Table 2. For orthorexia nervosa symptom severity, the main effect of time was statistically significant, $F(2, 140) = 42.86$, $p < 0.001$, partial $\eta^2 = 0.380$, indicating that symptom severity changed significantly across the three measurement occasions. More importantly, the group × time interaction was significant, $F(2, 140) = 52.79$, $p < 0.001$, partial $\eta^2 = 0.430$, demonstrating that the pattern of change over time differed significantly between the experimental and control groups. The relatively large interaction effect indicated that a substantial proportion of within-subject change in symptom severity was associated with the differential trajectories of the two groups. The main effect of group was also significant, $F(1, 70) = 5.17$, $p = 0.026$, partial

$\eta^2 = 0.069$. For irrational health beliefs, the main effect of time was likewise significant, $F(2, 140) = 24.63$, $p < 0.001$, partial $\eta^2 = 0.260$. The group × time interaction was also statistically significant, $F(2, 140) = 29.34$, $p < 0.001$, partial $\eta^2 = 0.296$, indicating that changes in irrational health beliefs across pretest, posttest, and follow-up differed significantly between the two groups. The main effect of group was significant as well, $F(1, 70) = 5.91$, $p = 0.018$, partial $\eta^2 = 0.078$. Taken together, these results indicate that participation in the educational program was associated with significantly different longitudinal changes in both orthorexia nervosa symptom severity and irrational health beliefs compared with the control condition.

Table 3

Bonferroni-Adjusted Pairwise Comparisons of the Study Outcomes in the Experimental Group

Variable	Comparison	Mean Difference	SE	p	95% CI
Orthorexia nervosa symptom severity	Pretest – Posttest	17.57	1.46	<0.001	14.61 to 20.53
	Pretest – Follow-up	15.21	1.52	<0.001	12.13 to 18.29
	Posttest – Follow-up	-2.36	0.91	0.033	-4.21 to -0.51
Irrational health beliefs	Pretest – Posttest	0.76	0.10	<0.001	0.55 to 0.97
	Pretest – Follow-up	0.68	0.11	<0.001	0.46 to 0.90
	Posttest – Follow-up	-0.08	0.06	0.574	-0.20 to 0.04

Bonferroni-adjusted pairwise comparisons are presented in Table 3. In the experimental group, orthorexia nervosa symptom severity decreased significantly from pretest to posttest, with a mean difference of 17.57 points (SE = 1.46, $p < 0.001$, 95% CI [14.61, 20.53]). The difference between pretest and three-month follow-up was also significant, with a mean difference of 15.21 points (SE = 1.52, $p < 0.001$, 95% CI [12.13, 18.29]), indicating that the reduction in symptom severity remained substantial three months after completion of the intervention. However, symptom severity increased slightly from posttest to follow-up, corresponding to a difference of 2.36 points in the observed means; this change was statistically significant ($p = 0.033$), indicating some attenuation of the immediate intervention effect. Nevertheless, the follow-up mean remained markedly lower than the pretest mean. For irrational health beliefs, scores decreased significantly from pretest to posttest, with a mean difference of 0.76 (SE = 0.10, $p < 0.001$, 95% CI [0.55,

0.97]), and the reduction remained significant from pretest to follow-up, with a mean difference of 0.68 (SE = 0.11, $p < 0.001$, 95% CI [0.46, 0.90]). The difference between posttest and follow-up was not statistically significant ($p = 0.574$), indicating that the reduction in irrational health beliefs observed immediately after the intervention was maintained over the three-month follow-up period. Overall, the findings support the effectiveness of the educational package in reducing both orthorexia nervosa symptom severity and irrational health beliefs, although a small degree of symptom rebound was observed for orthorexia nervosa severity at follow-up.

4. Discussion and Conclusion

The present study examined the effectiveness of an educational package for coping with orthorexia nervosa in reducing orthorexia nervosa symptom severity and irrational health beliefs among adults attending bodybuilding clubs in

Tehran. The findings demonstrated that participants in the experimental group showed a substantial reduction in orthorexia nervosa symptom severity from pretest to posttest, whereas the control group exhibited only minimal change across the same period. The significant group $\times$ time interaction indicated that the pattern of change differed meaningfully between the two groups, supporting the effectiveness of the intervention. Moreover, although a small increase in symptom severity was observed between posttest and the three-month follow-up, follow-up scores remained significantly lower than baseline scores. This pattern suggests that the intervention produced a marked immediate reduction in orthorexic symptoms and that a considerable proportion of this improvement was maintained over three months. The large interaction effect further indicates that the observed change was not merely a function of repeated measurement or the passage of time, but was strongly associated with participation in the educational program. These findings are consistent with the growing literature conceptualizing orthorexia nervosa as a modifiable cognitive-behavioral problem rather than a fixed dietary preference. Recent systematic evidence has shown that orthorexia nervosa is characterized by a combination of excessive concern with healthy eating, rigid behavioral rules, obsessive preoccupation, and clinically relevant impairment, all of which provide plausible targets for structured psychological intervention (Moccia et al., 2025). The present results therefore support the view that interventions specifically designed around the mechanisms of orthorexia nervosa can produce measurable improvement in symptom severity.

The reduction in orthorexia nervosa symptoms observed in the present study is also consistent with emerging intervention evidence suggesting that cognitive-behavioral and mindfulness-informed approaches may be effective for this problem. Reynolds and colleagues reported beneficial effects of an integrated cognitive-behavioral and mindful self-compassion intervention for orthorexia nervosa, providing direct support for the usefulness of structured psychological treatment in reducing pathological healthy-eating patterns (Reynolds et al., 2026). The present educational package similarly addressed dysfunctional food-related rules, perfectionistic standards, rigid beliefs about dietary purity, avoidance of foods perceived as unhealthy, and maladaptive interpretations of ordinary deviations from idealized eating practices. From a cognitive-behavioral perspective, these components may reduce orthorexic symptoms by weakening the rigid association between

eating behavior and perceived safety, moral worth, or health preservation. When individuals learn to question dichotomous food classifications, evaluate evidence for rigid dietary beliefs, and gradually tolerate deviations from strict eating rules, the compulsive quality of healthy-eating behavior may diminish. This interpretation is consistent with the transdiagnostic model proposed by Schmidt and Hoffmann, in which orthorexia nervosa is maintained by interconnected cognitive and affective factors rather than by nutritional concern alone (Schmidt & Hoffmann, 2025). It is also compatible with evidence showing that health anxiety, obsessive tendencies, and pathological worry are important predictors of orthorexic symptoms (Mostafaei, 2025). By reducing exaggerated threat interpretations and rigid dietary responses, the intervention may have disrupted some of the processes that sustain repetitive monitoring, avoidance, and excessive control of food.

Another plausible explanation for the improvement in orthorexia nervosa symptoms concerns the role of maladaptive perfectionism and inflexible standards. Individuals with orthorexic tendencies may establish excessively strict expectations regarding food purity, nutritional quality, preparation methods, ingredient composition, or adherence to self-imposed dietary rules. Such standards can transform healthy eating from a flexible preference into a rigid performance requirement. Iranian research has shown that maladaptive perfectionism is associated with orthorexia nervosa, suggesting that perfectionistic self-evaluation may increase vulnerability to rigid healthy-eating patterns (Nouri Rahimabadi et al., 2025). The intervention used in the present study specifically challenged unrealistic dietary standards and encouraged greater cognitive and behavioral flexibility. This may have reduced the perceived consequences of minor dietary deviations and weakened all-or-nothing evaluations such as viewing food as entirely healthy or entirely harmful. In addition, the package included self-compassion-oriented exercises intended to reduce harsh self-judgment following perceived dietary mistakes. This component is theoretically relevant because individuals who respond to dietary deviations with excessive guilt, self-criticism, or fear may be more likely to re-establish rigid control. Evidence from research on bulimic symptoms also suggests that psychological flexibility and self-directed compassionate attitudes can play meaningful roles in eating-related psychopathology (Mohtarami et al., 2026). Thus, the sustained reduction in orthorexia nervosa symptoms may

partly reflect a shift from perfectionistic control toward a more flexible and less punitive relationship with eating.

The findings may also be interpreted in relation to the social and cultural environment of bodybuilding and fitness participation. Individuals who regularly attend bodybuilding clubs are often exposed to highly structured dietary advice, performance-oriented nutritional practices, body-composition targets, and strong norms concerning discipline and self-control. These environments may provide benefits for physical fitness, but they can also create conditions in which rigid eating practices are normalized. Research on bodybuilding clubs has highlighted the highly structured nature of these environments and their emphasis on performance, body management, and sustained adherence to training-related routines (Momeni, 2025). Furthermore, exposure to idealized body images and fitness-related content on social media has been associated with symptoms of orthorexia nervosa and related body-image disturbances (Vintró-Alcaraz et al., 2026). The present educational package directly addressed social media influences, unrealistic health standards, and uncritical acceptance of nutrition-related messages. This may have helped participants differentiate evidence-based health behavior from exaggerated or absolutistic dietary norms. The ability to critically evaluate online health information is particularly important given the widespread availability of questionable or weakly supported dietary claims, which may reinforce fear-based or purity-oriented eating practices (Žeželj & Petrović, 2025). Therefore, part of the observed improvement may have resulted from reducing the authority granted to external fitness and nutrition messages that encourage rigid or moralized eating.

The second major finding of the study was that irrational health beliefs decreased significantly in the experimental group, while remaining relatively stable in the control group. The significant group $\times$ time interaction indicated that the intervention produced a distinct pattern of cognitive change over time. Importantly, the reduction observed at posttest was maintained at the three-month follow-up, and the difference between posttest and follow-up was not statistically significant. This suggests that the intervention affected not only observable symptoms but also the underlying cognitive beliefs that may contribute to the persistence of orthorexic behavior. Irrational health beliefs can involve exaggerated assumptions about vulnerability to illness, overestimation of the harmful consequences of certain foods, unrealistic expectations regarding complete control over health, and rigid demands concerning health-

related behavior. Such beliefs are especially relevant to orthorexia because excessive dietary restriction is often justified as necessary for maintaining health or preventing harm. Turner and colleagues found that irrational health beliefs were associated with health anxiety among individuals highly invested in clean eating, directly supporting the relevance of maladaptive health cognitions to excessive healthy-eating behavior (Turner et al., 2025). Similarly, Iranian research has shown that irrational health beliefs are associated with differences in health anxiety and health-control beliefs (Yousefi Salekdeh et al., 2025). The present findings extend this literature by suggesting that irrational health beliefs can be reduced through a targeted educational intervention and that such changes can remain relatively stable after the intervention has ended.

From a theoretical perspective, the reduction in irrational health beliefs can be understood through cognitive models emphasizing the role of rigid and absolutistic interpretations in psychological disturbance. Ellis argued that irrational beliefs amplify emotional and behavioral difficulties by transforming flexible preferences into inflexible demands and catastrophic evaluations (Ellis, 2026). In the context of orthorexia nervosa, beliefs such as “I must always eat perfectly,” “If I eat an unhealthy food I will damage my health,” or “I cannot tolerate uncertainty about what is in my food” may sustain compulsive dietary monitoring and avoidance. The educational program challenged these types of beliefs through cognitive restructuring, evidence evaluation, and reconsideration of the realistic consequences of dietary deviations. Such techniques may reduce belief conviction and facilitate more balanced appraisals of food and health. This explanation is consistent with the broader literature on health anxiety, in which cognitive vulnerability factors such as threat amplification, dysfunctional assumptions, and intolerance of uncertainty have been identified as central maintaining mechanisms (Bükrük et al., 2026). It is also consistent with research showing that irrational beliefs can be modified through structured interventions and that such modification can improve psychological functioning. For example, interventions targeting irrational beliefs have reduced distress and improved adaptive functioning in athlete populations (Mansell et al., 2026), while rational-emotive approaches have been successfully used as educational and psychological interventions in other vulnerable groups (Marlina et al., 2026). These studies support the assumption that rigid beliefs are not static traits and can be meaningfully altered through structured psychological education.

The reduction in irrational health beliefs may also help explain the improvement in orthorexia nervosa symptom severity. Although the present study did not formally test mediation, the parallel change in both outcomes is theoretically meaningful. If orthorexic behaviors are partly driven by exaggerated beliefs about food safety, disease prevention, purity, contamination, or health optimization, then reducing the rigidity of these beliefs should logically weaken the behavioral need for excessive control. Research in other eating-related domains supports the role of irrational beliefs as mechanisms linking psychological vulnerability to maladaptive eating behavior. Nolan and Eshleman found that irrational beliefs were relevant to emotional eating and weight-related outcomes, suggesting that distorted cognitions can contribute to maladaptive eating patterns in broader populations (Nolan & Eshleman, 2025). Likewise, the coexistence of contradictory beliefs within the cognitive system may help explain why individuals can simultaneously understand that dietary flexibility is healthy and nevertheless feel compelled to follow rigid food rules (Petrović & Žeželj, 2026). Through repeated cognitive restructuring and behavioral testing, participants in the present study may have become better able to identify this contradiction and adopt more internally consistent beliefs about health and nutrition. Consequently, changes in irrational health beliefs may have contributed to reduced fear, guilt, and compulsive control around food.

The maintenance of intervention effects at follow-up is also noteworthy. For irrational health beliefs, the absence of a significant difference between posttest and follow-up suggests that cognitive changes remained stable over the three-month period. For orthorexia nervosa symptom severity, a small but statistically significant increase occurred between posttest and follow-up, although scores remained substantially below pretest levels. This partial rebound may reflect renewed exposure to the same social, dietary, and fitness-related pressures that contributed to the development of rigid eating practices in the first place. Participants returned to environments in which body image, health optimization, dietary discipline, and social comparison may continue to be emphasized. Evidence from social-media research indicates that exposure to idealized fitness and body-related content can reinforce symptoms associated with orthorexia and other appearance-related concerns (Vintró-Alcaraz et al., 2026). In addition, orthorexic symptoms may be sustained by a network of interconnected cognitive factors that are likely to require ongoing reinforcement of therapeutic gains (Schmidt &

Hoffmann, 2025). Thus, the modest increase in symptoms at follow-up does not necessarily indicate loss of intervention efficacy, but rather suggests that maintenance strategies and booster sessions may be valuable for preventing gradual return of rigid patterns.

The present findings also have broader implications for understanding orthorexia nervosa as a clinically relevant but potentially treatable condition. Recent advances in measurement have increased confidence that orthorexia nervosa can be assessed meaningfully across cultural contexts (Yan et al., 2026; Zhang & Bao, 2026). At the same time, the development of population-specific measures of healthy-eating obsession indicates that excessive health-focused eating can manifest across diverse groups and circumstances (Taştekin et al., 2025). The current study contributes to this literature by moving beyond assessment and demonstrating that structured educational intervention can produce changes in both symptoms and maladaptive health-related cognitions. This is particularly important because many individuals with orthorexic tendencies may initially interpret their behavior as highly disciplined or health-promoting rather than problematic. An educational format may therefore be especially acceptable because it allows participants to examine the functional consequences of their behavior without immediately framing them within a highly pathologizing model. The broader literature on mental health in athletic populations also supports the value of accessible, context-sensitive psychological interventions in performance-oriented settings (Praisn et al., 2026). Accordingly, educational programs embedded within fitness contexts may represent a practical avenue for early intervention.

Several limitations should be considered when interpreting the present findings. First, the participants were recruited through convenience sampling from bodybuilding clubs located in District 1 of Tehran, which limits the generalizability of the findings to other geographical regions, age groups, socioeconomic groups, and non-fitness populations. Second, the study relied primarily on self-report instruments, which may be influenced by social desirability, response tendencies, or participants' awareness of the intervention goals. Third, the control group did not receive an active comparison intervention; therefore, nonspecific factors such as group attention, therapist contact, expectations of improvement, and participation in structured sessions cannot be completely separated from the specific effects of the educational package. Fourth, the follow-up period was limited to three months, and it is therefore

unclear whether the observed improvements would remain stable over longer periods. Finally, although the intervention was designed to address several theoretically relevant mechanisms, the study assessed only orthorexia nervosa symptom severity and irrational health beliefs as outcomes and did not test the specific mechanisms through which the intervention produced its effects.

Future studies should replicate the present research in larger and more diverse samples recruited from different regions and fitness settings and should also examine populations outside bodybuilding environments. Randomized controlled trials using active comparison groups would help distinguish intervention-specific effects from nonspecific therapeutic factors. Longer follow-up periods, such as six months or one year, are recommended to determine the durability of treatment gains and to identify when booster sessions may be most useful. Future research could also use longitudinal mediation models to examine whether reductions in irrational health beliefs statistically explain subsequent reductions in orthorexia nervosa symptoms. In addition, studies could compare the educational package with established cognitive-behavioral, mindfulness-based, or other structured interventions in order to identify which components contribute most strongly to symptom improvement. The use of behavioral indicators, clinician ratings, ecological assessment, or structured interviews alongside self-report questionnaires would also strengthen the validity of future findings.

From a practical perspective, the findings suggest that structured educational programs targeting rigid food-related beliefs, unrealistic health standards, inflexible dietary rules, excessive control behaviors, and maladaptive interpretations of nutrition information may be useful in settings where orthorexic tendencies are likely to occur. Fitness clubs, sports centers, counseling services, and health-psychology clinics may benefit from screening individuals who show excessive preoccupation with healthy eating and providing early psychoeducational support before these patterns become more severe. Practitioners should emphasize the distinction between adaptive healthy eating and rigid health-driven eating, promote flexibility rather than dietary perfection, and help individuals critically evaluate health information obtained from social media or informal fitness sources. Incorporating brief booster sessions after the main intervention may also help preserve symptom improvements over time, particularly for individuals who remain exposed to strong appearance- or performance-oriented dietary pressures.

Authors' Contributions

All authors significantly contributed to this study.

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.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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