

Presenting a Model for Predicting Body Image Concern in Female Bodybuilding Athletes Based on Basic Psychological Needs With the Mediating Role of Integrative Self-Knowledge

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ABSTRACT

Purpose: The objective of this study was to develop and test a structural model for predicting body image concern in female bodybuilding athletes based on basic psychological needs, considering the mediating role of integrative self-knowledge.

Methods and Materials: This applied study adopted a descriptive–correlational design using structural equation modeling. The statistical population comprised all female bodybuilding athletes in Qazvin during 2024, from whom 375 participants were selected through available sampling. Data were collected using standardized questionnaires measuring body image concern, basic psychological needs, and integrative self-knowledge. Content validity was confirmed through expert review, and reliability was verified using Cronbach's alpha and composite reliability coefficients. Descriptive analyses were conducted to examine data distribution, and inferential analyses were performed using SPSS 25 and LISREL 7.80 to test the measurement and structural models, evaluate model fit, and assess direct and indirect effects.

Findings: Structural equation modeling indicated that basic psychological needs had a significant negative direct effect on body image concern and a significant negative effect on integrative self-knowledge. Integrative self-knowledge also showed a significant negative effect on body image concern. Mediation analysis revealed that integrative self-knowledge partially mediated the relationship between basic psychological needs and body image concern. The coefficient of determination demonstrated substantial explained variance for body image concern, and goodness-of-fit indices, predictive relevance, and discriminant and convergent validity measures confirmed the adequacy of the measurement and structural models.

Conclusion: The findings indicate that satisfaction of basic psychological needs and higher levels of integrative self-knowledge play a crucial role in reducing body image concern among female bodybuilding athletes, supporting an integrative motivational–self-regulatory framework for understanding body image in physique-oriented sports.

Keywords: Body image concern; basic psychological needs; integrative self-knowledge; female bodybuilding athletes; structural equation modeling

1. Introduction

Body image concern has emerged as a salient psychological construct in contemporary societies, reflecting persistent negative evaluations, worries, and emotional distress related to one's physical appearance. These concerns are not limited to clinical populations but are increasingly observed among physically active individuals and athletes, particularly in sports that emphasize physique, muscularity, and aesthetic appearance. Bodybuilding is a paradigmatic example of such sports, where performance evaluation is closely intertwined with bodily form, symmetry, and muscular definition. As a result, bodybuilding athletes may be especially vulnerable to body image concern, which can manifest as dissatisfaction, shame, social avoidance, and functional impairment in daily and interpersonal domains (Burgon et al., 2023; Nasrollahi et al., 2021). Understanding the psychological mechanisms that underlie body image concern in this group is therefore of both theoretical and applied importance.

Recent research has conceptualized body image concern as a multidimensional phenomenon influenced by intrapersonal, interpersonal, and sociocultural factors. Empirical evidence suggests that cognitive vulnerabilities, emotional dysregulation, perfectionism, and maladaptive self-evaluative processes play a central role in the development and maintenance of negative body image (Ahmadi Golsafidi et al., 2021; Dubé et al., 2024; MohammadiPour et al., 2023). In athletes, these factors may be exacerbated by sport-specific pressures, such as constant body monitoring, comparison with idealized physiques, and performance-related evaluation by judges, coaches, and peers (Burgon et al., 2023). Consequently, there is a growing need for integrative models that move beyond surface-level predictors and examine deeper motivational and self-related processes associated with body image concern.

One influential theoretical framework for understanding motivation and psychological functioning is Self-Determination Theory, which posits that the satisfaction of basic psychological needs—autonomy, competence, and relatedness—is essential for optimal well-being and adaptive self-regulation. When these needs are satisfied, individuals are more likely to experience psychological growth, coherent self-functioning, and resilience; conversely, need frustration is associated with maladaptive outcomes, including anxiety, distress, and negative self-perceptions (Brichacek et al., 2018; Zhao et al., 2023). Within this framework, basic psychological needs

satisfaction has been shown to play a significant role in body image outcomes, particularly in contexts involving social comparison and appearance-based evaluation (Brichacek et al., 2018; Zhao et al., 2023). However, the mechanisms through which these needs influence body image concern, especially in adult athletic populations, remain insufficiently explored.

Empirical studies have demonstrated that unmet psychological needs are associated with heightened body dissatisfaction and appearance-related anxiety. For example, individuals with lower autonomy and competence satisfaction may rely excessively on external validation and appearance-based standards to maintain self-worth, thereby increasing vulnerability to body image concern (Brichacek et al., 2018). Similarly, deficits in relatedness may intensify sensitivity to social evaluation and rejection, further amplifying concerns about physical appearance (Ilam et al., 2024; Nasrollahi et al., 2021). These findings suggest that basic psychological needs may function as foundational determinants of body image concern, shaping how individuals perceive, interpret, and emotionally respond to their bodies.

Beyond motivational needs, contemporary psychological research increasingly emphasizes the role of self-related processes, particularly self-awareness and self-knowledge, in mental health and well-being. Integrative self-knowledge refers to an individual's capacity to consciously and coherently process internal experiences across time, integrating past, present, and anticipated future experiences into a meaningful and unified sense of self. This construct encompasses reflective self-awareness, experiential self-awareness, and the integration of life experiences into a coherent narrative (Abedin et al., 2022; Robenzadeh et al., 2016). High levels of integrative self-knowledge are associated with psychological flexibility, emotional regulation, and adaptive coping, whereas fragmented or poorly integrated self-knowledge has been linked to anxiety, identity confusion, and maladaptive self-evaluations (Aftab & Shams, 2020; Robenzadeh et al., 2016).

There is growing empirical support for the relevance of integrative self-knowledge in understanding body image-related outcomes. Studies indicate that individuals with higher self-awareness and coherent self-understanding are better able to critically evaluate sociocultural appearance standards and regulate negative emotions arising from body-related comparisons (Nerini et al., 2024; Saodi et al., 2024). Conversely, deficits in self-awareness and experiential integration may lead individuals to overidentify with

external appearance cues, thereby intensifying body dissatisfaction and concern (Shahmohammadi et al., 2023; Shirazi et al., 2023). These findings underscore the potential role of integrative self-knowledge as a protective psychological resource in contexts characterized by high appearance salience.

Importantly, theoretical and empirical evidence suggests that integrative self-knowledge may serve as a mediating mechanism linking basic psychological needs to psychological outcomes. When individuals experience satisfaction of autonomy, competence, and relatedness, they are more likely to develop coherent self-awareness and an integrated sense of self, which in turn supports adaptive emotional and cognitive functioning (Abedin et al., 2022; Ebrahimi & Akbarnejad, 2025). In contrast, chronic frustration of basic needs may undermine self-integration, leading to fragmented self-experiences and increased vulnerability to maladaptive concerns, including those related to body image. Studies conducted in student and adolescent populations have provided preliminary evidence for such mediational pathways, highlighting the interconnectedness of motivational needs, self-processes, and well-being (Abedin et al., 2022; Zhao et al., 2023).

Despite these advances, there remains a notable gap in the literature regarding the simultaneous examination of basic psychological needs and integrative self-knowledge in relation to body image concern, particularly among female bodybuilding athletes. Most existing studies have focused either on psychosocial predictors of body image concern, such as perfectionism, emotion regulation, and social media use (Afzal, 2025; Ahmadi Golsafidi et al., 2021; Ebrahimi & Akbarnejad, 2025), or on the role of self-awareness and self-related constructs in general psychological adjustment (Oresti & Elengoe, 2025; Saodi et al., 2024; Sharei et al., 2025). Few studies have integrated these lines of research within a unified structural model tailored to athletic populations, where body-related pressures are both intense and normative.

Moreover, cultural and contextual factors may further shape the dynamics of body image concern and self-processes. Research conducted in non-Western contexts suggests that sociocultural norms, gender expectations, and sport-specific values can influence how athletes internalize appearance ideals and evaluate their bodies (Arianti et al., 2024; Ilam et al., 2024; Niafar et al., 2024). Female bodybuilders, in particular, may experience a unique tension between muscular ideals promoted within the sport and broader societal standards of femininity, potentially

intensifying body image concern and identity-related challenges (Burgon et al., 2023; Nasrollahi et al., 2021). These considerations highlight the importance of context-sensitive models that capture both universal psychological mechanisms and population-specific dynamics.

From an applied perspective, identifying the psychological pathways that contribute to body image concern has significant implications for prevention and intervention. Interventions that target only surface-level symptoms may be insufficient if underlying motivational and self-integrative processes remain unaddressed. Evidence from clinical and counseling research suggests that enhancing self-awareness, mindfulness, and coherent self-knowledge can reduce body dissatisfaction and improve emotional regulation (Aftab & Shams, 2020; Alokandeh, 2024; Sharei et al., 2025). Similarly, interventions aimed at supporting autonomy, competence, and relatedness have demonstrated beneficial effects on psychological adjustment and self-perception (Brichacek et al., 2018; Zhao et al., 2023). Integrating these approaches may therefore offer a more comprehensive strategy for addressing body image concern in athletes.

In summary, the existing literature points to a complex interplay between basic psychological needs, self-related processes, and body image concern, yet empirical models that simultaneously test these relationships in female bodybuilding athletes remain scarce. Addressing this gap is essential for advancing theoretical understanding and informing evidence-based psychological support within sport settings. Accordingly, the present study aims to develop and test a structural model for predicting body image concern in female bodybuilding athletes based on basic psychological needs, with the mediating role of integrative self-knowledge.

2. Methods and Materials

2.1. Study Design and Participants

The present study was applied in terms of its objective and descriptive–correlational in nature, employing a structural equation modeling approach to examine the hypothesized relationships among the study variables. The target population consisted of all female bodybuilding athletes in the city of Qazvin during the year 2024. Given the analytical requirements of structural equation modeling and its similarity to factor-analytic techniques, an adequate sample size was considered essential to ensure model stability and reliable parameter estimation. Based on

methodological recommendations regarding expected effect sizes, normality of measured variables, statistical power, and the number of estimated parameters, a minimum sample size of 300 participants was deemed necessary. Considering the number of latent and observed variables in the proposed model, as well as the structural paths among them, a larger initial sample was selected to account for potential attrition. Accordingly, 384 female bodybuilding athletes were recruited using an available sampling method from bodybuilding clubs across Qazvin. All participants were women aged between 20 and 30 years and held educational qualifications ranging from high school diplomas to bachelor's degrees. After data collection, three questionnaires were excluded due to non-return and six were removed because of incomplete responses, resulting in a final sample of 375 participants whose data were included in the analyses.

2.2. Measures

Data were collected using four standardized self-report questionnaires. Body image concern was assessed using the Body Image Concern Questionnaire developed by Littleton and colleagues in 2005. This instrument consists of 19 items measuring two dimensions: dissatisfaction and shame related to one's appearance, including checking and concealing perceived flaws, and the degree to which appearance concerns interfere with social functioning. Items are rated on a five-point Likert scale ranging from "never" to "always," with higher scores indicating greater body image concern. In the present study, content validity was evaluated through expert review to ensure clarity, relevance, and appropriateness of the items for the target population, and internal consistency reliability was confirmed using Cronbach's alpha, yielding an acceptable coefficient.

Basic psychological needs were measured using the Basic Psychological Needs Scale developed by La Guardia and colleagues in 2000. This questionnaire includes 21 items assessing the needs for autonomy, competence, and relatedness, rated on a seven-point Likert scale from "not at all true" to "very true." Several items are reverse-scored in accordance with the scale manual. Total and subscale scores reflect the degree to which individuals perceive their basic psychological needs as being satisfied. In this study, content validity was established through expert evaluation, and internal consistency coefficients indicated satisfactory reliability for the total scale and its subscales.

Integrative self-knowledge was assessed using the Integrative Self-Knowledge Questionnaire developed by Ghorbani and colleagues in 2008. This 12-item measure evaluates reflective self-awareness, experiential self-awareness, and the integration of past and present experiences to construct a coherent future orientation. Items are rated on a five-point Likert scale from "mostly untrue" to "mostly true," with higher scores indicating greater integrative self-knowledge. Content validity was examined through expert judgment, and reliability analysis using Cronbach's alpha demonstrated good internal consistency in the present sample.

Sensitivity to rejection was measured using the Rejection Sensitivity Questionnaire developed by Downey and Feldman in 1996. This instrument includes 18 two-part items assessing anxiety about potential rejection and expectations of acceptance in interpersonal situations. Scoring involves computing rejection expectancy and combining it with anxiety ratings to obtain an overall rejection sensitivity score. In the current study, the questionnaire was reviewed by experts to ensure cultural appropriateness and content validity, and internal consistency reliability was found to be acceptable.

2.3. Data Analysis

Data analysis was conducted in two stages, including descriptive and inferential analyses. In the descriptive stage, demographic characteristics and study variables were summarized using measures such as means, standard deviations, skewness, and kurtosis to assess distributional properties. In the inferential stage, structural equation modeling was employed to test the proposed predictive model and the mediating role of integrative self-knowledge in the relationship between basic psychological needs and body image concern. Statistical analyses were performed using SPSS version 25 for preliminary analyses and LISREL version 7.80 for structural equation modeling. Model fit was evaluated using multiple fit indices, and parameter estimates were examined to assess the significance and strength of the hypothesized paths.

3. Findings and Results

The demographic characteristics of the participants indicated a heterogeneous but developmentally coherent sample. In terms of age, 26% of the athletes were younger than 25 years, 32% were between 25 and 30 years, 24% were between 31 and 35 years, and 18% were older than 35 years,

with the highest frequency observed in the 25–30 year age group and the lowest in those above 35 years. Regarding educational attainment, 19% of the participants held a bachelor's degree, 54% had a master's degree, and 27% possessed a doctoral degree, indicating that the majority of the sample had postgraduate education, with master's degree holders representing the largest group. With respect to

experience in bodybuilding, 26% reported less than five years of activity, 53% had between five and ten years of experience, and 21% reported more than ten years of continuous involvement in the sport, showing that most participants had a moderate level of professional experience, while those with more than ten years of activity constituted the smallest proportion of the sample.

Table 1

Descriptive Statistics of the Study Variables Based on Central Tendency, Dispersion, and Distribution Indices (Sample Size = 375)

Variable	Mean (Likert Scale)	Total Mean Score	Standard Deviation	Skewness	Kurtosis	Minimum	Maximum
Body Image Concern	3.31	62.89	0.83	−0.36	−0.11	19	95
Basic Psychological Needs	4.54	95.34	0.76	0.05	0.07	21	147
Integrative Self-Knowledge	3.39	40.68	0.80	−0.12	−0.09	12	60

The descriptive statistics presented in Table 1 indicate that the mean Likert score for body image concern was 3.31, corresponding to a total mean score of 62.89, with a standard deviation of 0.83, suggesting a moderate to relatively high level of concern among the participants. The skewness and kurtosis values for this variable were close to zero, indicating an approximately normal distribution of scores. The basic psychological needs variable showed a mean Likert score of 4.54 and a total mean score of 95.34, with a standard deviation of 0.76, reflecting a relatively favorable level of

perceived need satisfaction in the sample. The distribution indices for this variable also demonstrated near-normality. Integrative self-knowledge had a mean Likert score of 3.39 and a total mean score of 40.68, with a standard deviation of 0.80, indicating a moderate level of integrative self-knowledge among the athletes. The skewness and kurtosis statistics for this variable were minimal and within acceptable ranges, supporting the assumption of normal distribution and suitability of the data for subsequent structural equation modeling analyses.

Table 2

Cronbach's Alpha and Composite Reliability Coefficients for the Study Constructs

Construct	Cronbach's Alpha	Composite Reliability
Body Image Concern	0.73	0.79
Basic Psychological Needs	0.79	0.82
Integrative Self-Knowledge	0.76	0.83

The results presented in Table 2 demonstrate that all study constructs achieved acceptable levels of internal consistency and reliability. Cronbach's alpha coefficients ranged from 0.73 to 0.79, exceeding the commonly accepted threshold of 0.70 and indicating satisfactory internal consistency for all measures. In addition, composite reliability values varied

between 0.79 and 0.83, further confirming the stability and reliability of the latent constructs within the measurement model. These findings suggest that the indicators associated with each construct consistently measure the intended underlying concepts and are suitable for use in structural equation modeling.

Table 3

Average Variance Extracted (AVE) for the Study Constructs

Construct	AVE
Body Image Concern	0.53
Basic Psychological Needs	0.63
Integrative Self-Knowledge	0.58

As shown in Table 3, the average variance extracted values for all constructs exceeded the recommended minimum criterion of 0.50. The AVE for body image concern was 0.53, indicating that more than half of the variance in its indicators was explained by the latent construct. Basic psychological needs demonstrated a

relatively higher AVE value of 0.63, reflecting strong convergent validity. Integrative self-knowledge also showed an acceptable AVE of 0.58. Collectively, these results provide evidence of adequate convergent validity for the measurement model, confirming that the indicators effectively represent their respective latent variables.

Table 4

Fornell–Larcker Criterion for Discriminant Validity of the Study Constructs

Variable	1	2	3
1. Body Image Concern	0.854		
2. Basic Psychological Needs	0.752	0.888	
3. Integrative Self-Knowledge	0.701	0.682	0.871

Table 4 reports the results of the Fornell–Larcker criterion used to assess discriminant validity among the study constructs. The square roots of the AVE values, shown on the diagonal of the matrix, are greater than the corresponding inter-construct correlations in each row and column. Specifically, body image concern, basic psychological needs, and integrative self-knowledge each

demonstrated higher diagonal values compared to their correlations with other constructs. This pattern indicates that each construct shares more variance with its own indicators than with other latent variables, thereby supporting adequate discriminant validity of the measurement model and confirming that the constructs are empirically distinct from one another.

Table 5

Path Coefficients, t-Values, and Significance Status of the Structural Model

Path	Path Coefficient	t-value	Status
Basic Psychological Needs → Integrative Self-Knowledge	–0.706	–20.613	Supported
Integrative Self-Knowledge → Body Image Concern	–0.713	–20.969	Supported
Basic Psychological Needs → Body Image Concern	–0.685	–20.294	Supported

The results reported in Table 5 indicate that all hypothesized structural paths in the model were statistically significant. Basic psychological needs had a strong and negative direct effect on integrative self-knowledge, suggesting that higher satisfaction of basic psychological needs was associated with higher levels of integrative self-knowledge. Integrative self-knowledge, in turn, showed a significant negative effect on body image concern, indicating that individuals with greater integrative self-

knowledge experienced lower levels of concern about their body image. In addition, basic psychological needs exerted a significant negative direct effect on body image concern, demonstrating that greater fulfillment of psychological needs was directly associated with reduced body image concern among bodybuilding athletes. The large absolute t-values for all paths confirm the robustness and statistical significance of these relationships.

Table 6

Decomposition of Direct, Indirect, and Total Effects in the Structural Model

Independent Variable	Dependent Variable	Direct Effect	Indirect Effect	Total Effect
Basic Psychological Needs	Integrative Self-Knowledge	–0.706	—	–0.706
Integrative Self-Knowledge	Body Image Concern	–0.713	—	–0.713
Basic Psychological Needs	Body Image Concern	–0.685	–0.503	–0.182

As shown in Table 6, the decomposition of effects clarifies the mediating role of integrative self-knowledge in

the relationship between basic psychological needs and body image concern. Basic psychological needs had a substantial

direct effect on integrative self-knowledge, while integrative self-knowledge exerted a strong direct effect on body image concern. Moreover, basic psychological needs influenced body image concern indirectly through integrative self-knowledge, with the indirect effect calculated as the product of the relevant path coefficients. The presence of both significant direct and indirect effects indicates partial mediation, meaning that integrative self-knowledge accounts for a meaningful portion of the relationship between basic psychological needs and body image concern, while a direct pathway remains operative. These findings support the proposed mediational structure of the model and highlight the central role of integrative self-knowledge in explaining how psychological need satisfaction relates to body image concerns in bodybuilding athletes.

The evaluation of the structural model demonstrated satisfactory explanatory power, predictive relevance, and overall goodness of fit. The coefficient of determination (R^2), which reflects the proportion of variance in the endogenous latent variables explained by the exogenous constructs, was calculated as 0.557 for body image concern, indicating a relatively strong level of explained variance according to established benchmarks for weak, moderate, and strong effects. The communality index, representing the extent to which the variance of the observed indicators is

explained by their corresponding latent constructs and serving as an indicator of convergent validity, yielded an average value of 0.51, which is considered acceptable. Based on the geometric mean of the average communality and the mean R^2 value, the overall goodness-of-fit (GOF) index for the model was calculated as 0.501, exceeding the recommended threshold of 0.36 and thus confirming an adequate overall model fit. Furthermore, the predictive relevance of the model was assessed using the Q^2 index, which evaluates the model's out-of-sample predictive capability for endogenous variables; the obtained Q^2 value of 0.244 indicates a moderate and desirable level of predictive power. In addition, the normed fit index (NFI), which reflects the relative improvement of the proposed model compared to a null model, exceeded the recommended cutoff of 0.90, reaching a value of 1.229, thereby further supporting the adequacy of model fit. Taken together, these indices indicate that the tested model demonstrates appropriate fit, satisfactory predictive capability, and adequate construct validity, particularly given that all factor loadings exceeded 0.40 and their corresponding significance values were greater than 1.96, confirming the robustness and validity of the measurement and structural components of the model.

Figure 1

Model with Beta Values

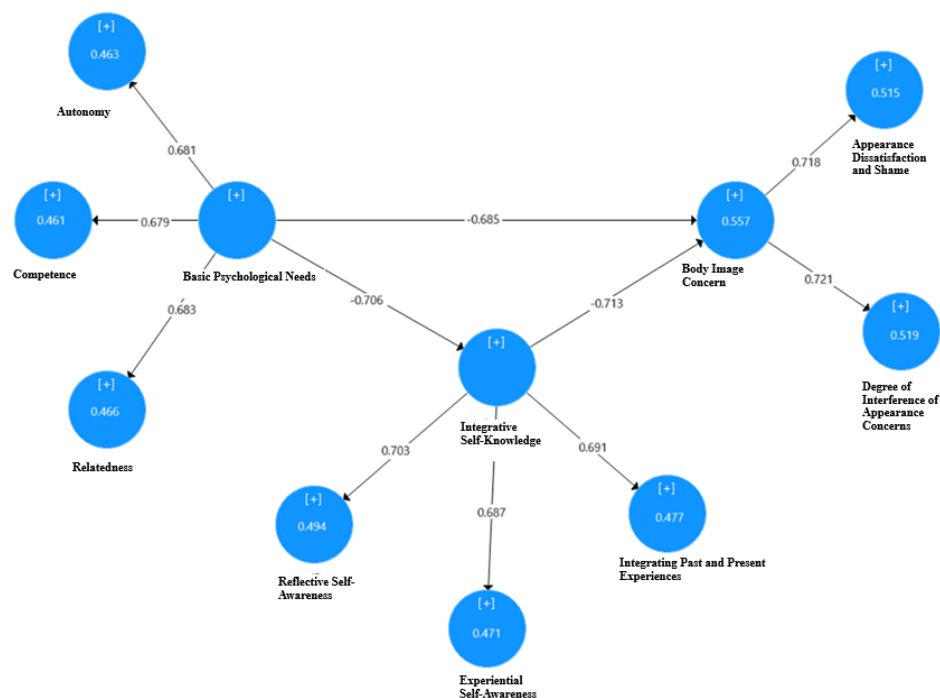
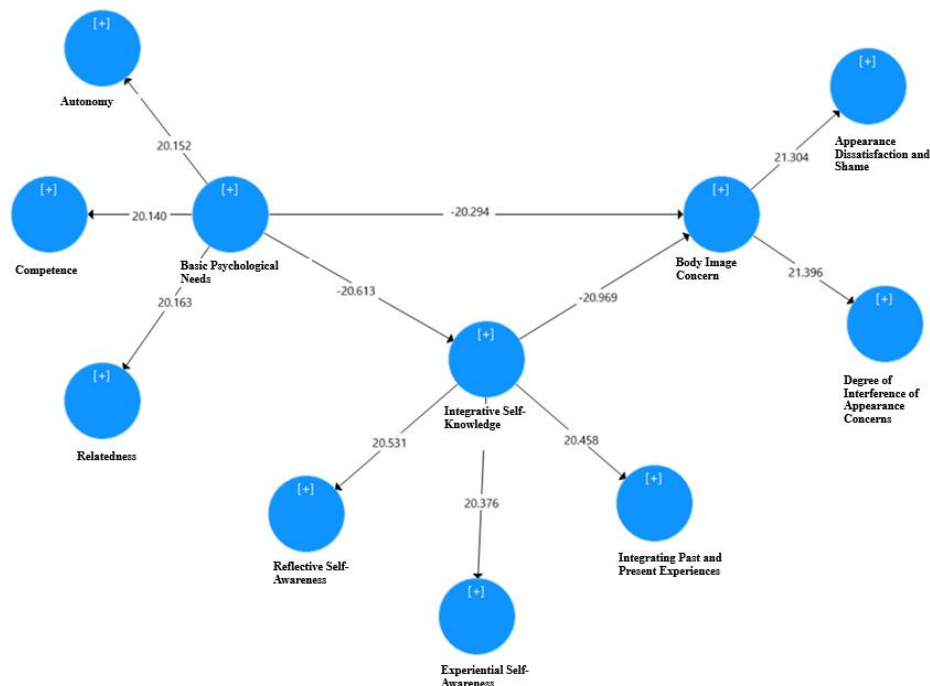


Figure 2

Model with T-Values



4. Discussion and Conclusion

The present study aimed to test a structural model for predicting body image concern among female bodybuilding athletes based on basic psychological needs, with the mediating role of integrative self-knowledge. The findings provide robust empirical support for the proposed model and highlight the central role of motivational and self-related processes in explaining body image concern in this population. Overall, the results indicate that satisfaction of basic psychological needs is directly and indirectly associated with lower body image concern, and that integrative self-knowledge functions as a significant partial mediator in this relationship. These findings are theoretically meaningful and empirically consistent with contemporary psychological models that emphasize the interplay between motivation, self-awareness, and body-related outcomes.

One of the key findings of this study was the significant direct negative effect of basic psychological needs on body image concern. This result suggests that female bodybuilding athletes who experience higher levels of autonomy, competence, and relatedness report lower levels of worry, dissatisfaction, and functional impairment related to their physical appearance. This finding aligns closely with Self-Determination Theory, which posits that satisfaction of

basic psychological needs fosters adaptive self-regulation and reduces vulnerability to maladaptive self-evaluations (Zhao et al., 2023). Similar results have been reported in non-athlete and student samples, where unmet psychological needs were associated with heightened body dissatisfaction and appearance-related anxiety (Brichacek et al., 2018). In the context of bodybuilding, where external evaluation and appearance standards are particularly salient, the protective role of need satisfaction appears especially pronounced.

The observed relationship between basic psychological needs and body image concern is also consistent with prior empirical findings in Iranian and international contexts. Ahmadi Golsafidi and colleagues demonstrated that basic psychological needs mediated the relationship between perfectionism and body image concern in girls, underscoring the centrality of motivational needs in body-related outcomes (Ahmadi Golsafidi et al., 2021). Similarly, Zhao and colleagues found that satisfaction of basic psychological needs buffered the negative effects of social anxiety on body dissatisfaction among adolescents (Zhao et al., 2023). The present study extends this line of research by confirming that these mechanisms are also operative in adult female athletes, particularly those involved in physique-oriented sports.

Another important finding was the strong negative association between integrative self-knowledge and body

image concern. Athletes with higher levels of integrative self-knowledge reported significantly lower levels of body image concern, indicating that the ability to coherently process and integrate internal experiences across time serves as a protective factor against appearance-related distress. This finding is theoretically congruent with models of self-awareness and identity coherence, which emphasize that a well-integrated sense of self reduces overreliance on external validation and appearance-based self-worth (Abedin et al., 2022; Robenzadeh et al., 2016). Individuals with higher integrative self-knowledge are likely better equipped to contextualize body-related feedback and resist internalization of unrealistic appearance ideals.

Empirical support for this interpretation can be found in several previous studies. Aftab and Shams reported that integrative self-knowledge was negatively associated with anxiety and psychological distress, partly through improved emotion regulation and reduced worry (Aftab & Shams, 2020). Nerini and colleagues similarly showed that self-awareness predicted lower body dissatisfaction and reduced acceptance of cosmetic surgery for social reasons, highlighting the role of reflective self-processes in appearance-related decision-making (Nerini et al., 2024). The present findings are consistent with these studies and suggest that integrative self-knowledge plays a comparable role in athletic populations exposed to high appearance pressure.

Crucially, the results of the mediational analysis demonstrated that integrative self-knowledge partially mediated the relationship between basic psychological needs and body image concern. This finding provides empirical evidence for a theoretically meaningful pathway in which satisfaction of basic psychological needs contributes to the development of integrative self-knowledge, which in turn reduces body image concern. This result is in line with prior research suggesting that supportive motivational environments facilitate coherent self-functioning and adaptive self-awareness (Abedin et al., 2022; Ebrahimi & Akbarnejad, 2025). When athletes feel autonomous, competent, and socially connected, they are more likely to process internal experiences openly and coherently, reducing the likelihood that body image becomes a central or distressing component of self-evaluation.

The partial nature of the mediation is also noteworthy, as it indicates that basic psychological needs influence body image concern both directly and indirectly through integrative self-knowledge. This suggests that need satisfaction exerts both immediate effects on body-related

perceptions and more distal effects via self-integration processes. Similar partial mediation patterns have been reported in studies examining the role of self-compassion, emotional reactivity, and mindfulness in body image outcomes (Niafar et al., 2024; Shirazi et al., 2023). The present study contributes to this literature by positioning integrative self-knowledge as a key mediating construct that bridges motivational needs and body image concern.

The strength of the structural paths and the satisfactory model fit indices further support the adequacy of the proposed model. The explained variance in body image concern was substantial, indicating that the combination of basic psychological needs and integrative self-knowledge captures a meaningful proportion of variability in this outcome. This finding is consistent with systematic reviews and meta-analytic evidence showing that psychological factors account for a significant share of body image concerns across different sports and competitive levels (Burgon et al., 2023). By focusing on foundational motivational and self-related processes, the present model offers a parsimonious yet powerful framework for understanding body image concern in female bodybuilding athletes.

From a contextual perspective, the findings are particularly relevant given the sociocultural pressures faced by female bodybuilders. These athletes often navigate competing appearance norms, balancing muscularity ideals promoted within the sport with broader societal expectations regarding femininity. Such tensions may heighten vulnerability to body image concern, especially when psychological needs are frustrated or self-integration is compromised (Ilam et al., 2024; Nasrollahi et al., 2021). The current results suggest that strengthening basic psychological needs and integrative self-knowledge may help athletes reconcile these pressures and maintain a more adaptive relationship with their bodies.

The findings also align with research highlighting the role of self-awareness and emotion regulation in body image-related interventions. Therapeutic approaches that enhance mindfulness, cognitive self-awareness, and emotional integration have been shown to reduce body image concern and related maladaptive behaviors (Alokandeh, 2024; Sharei et al., 2025). Similarly, positive affirmation and self-reflective practices have demonstrated potential in addressing body image concerns in medical and non-athletic populations (Arianti et al., 2024). By empirically linking integrative self-knowledge to body image concern, the present study provides further justification for incorporating

self-awareness-focused components into prevention and intervention programs for athletes.

In sum, the discussion of results underscores the value of an integrative psychological model that combines motivational and self-related constructs in explaining body image concern. The findings support and extend existing literature by demonstrating that basic psychological needs and integrative self-knowledge are both independently and jointly associated with body image concern in female bodybuilding athletes. These results contribute to a more nuanced understanding of body image in sport contexts and offer a theoretically grounded basis for future research and applied practice.

Despite the strengths of this study, several limitations should be acknowledged. First, the cross-sectional design precludes causal inferences regarding the directionality of the observed relationships. Second, the reliance on self-report measures may have introduced response biases, such as social desirability or self-presentation concerns, particularly in a population sensitive to appearance evaluation. Third, the sample was limited to female bodybuilding athletes from a single city, which may restrict the generalizability of the findings to other athletic populations, competitive levels, or cultural contexts.

Future studies are encouraged to employ longitudinal or experimental designs to more rigorously examine causal pathways among basic psychological needs, integrative self-knowledge, and body image concern. Expanding the model to include additional psychological variables, such as perfectionism, social media exposure, or emotion regulation strategies, may further enhance explanatory power. Comparative studies across different sports, genders, and cultural settings would also help clarify the boundary conditions and generalizability of the proposed model.

From an applied perspective, the findings suggest that psychological interventions for female bodybuilding athletes should move beyond symptom-focused approaches and target underlying motivational and self-integrative processes. Coaches, sport psychologists, and counselors may benefit from creating autonomy-supportive environments, fostering feelings of competence, and strengthening social connectedness within training contexts. Incorporating interventions that enhance integrative self-knowledge, such as reflective practices, mindfulness-based exercises, and narrative self-exploration, may be particularly effective in reducing body image concern and promoting long-term psychological well-being among athletes.

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 study and participated in the research with informed consent.

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