



From Motivation to Action: Investigating the Impact of Theory of Planned Behavior Components on the Use of Performance-Enhancing Substances in Young Iraqi Weightlifters

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ABSTRACT

The use of dietary supplements among athletes (including weightlifters) is highly prevalent. The aim of the present study was to analyze the components influencing the consumption of dietary supplements and performance-enhancing substances based on the Theory of Planned Behavior among young Iraqi weightlifters. This study employed a descriptive-correlational design and was conducted using a survey method. The statistical population consisted of 376 active weightlifters from 17 cities in Iraq during the years 2023–2024, of whom 324 individuals were selected using proportional stratified random sampling. A researcher-made questionnaire was used to measure the variables under investigation. This questionnaire was designed to assess the levels of attitude, perceived behavioral control, and subjective norms regarding the consumption of dietary supplements and performance-enhancing substances. The reliability of the questionnaire was confirmed with a Cronbach's alpha coefficient above 0.70, and its validity was approved by experts in the field of sports. Data were analyzed using SPSS version 25 and SmartPLS software. The findings revealed that there is a significant and positive relationship between attitude ($\beta = 0.653$, $P = 0.001$), subjective norms ($\beta = 0.498$, $P = 0.001$), and perceived behavioral control ($\beta = 0.498$, $P = 0.001$) with the consumption of dietary supplements and performance-enhancing substances among young Iraqi weightlifters. Young Iraqi weightlifters are influenced by a complex set of psychological factors that drive them toward the use of dietary supplements and performance-enhancing substances, thereby increasing the prevalence of such behaviors among these athletes. It is recommended to organize educational and awareness programs about the negative consequences of using performance-enhancing substances, ethical considerations, and healthy alternatives for improving sports performance. These efforts can help in changing attitudes, reducing social pressure, and supporting young Iraqi weightlifters in achieving their athletic goals.

Keywords: Theory of Planned Behavior, perceived behavioral control, attitude, subjective norms, dietary supplements, performance-enhancing substances, weightlifting.

1. Introduction

The growth of the sports industry and the intensification of competition have turned the use of performance-enhancing substances into a serious issue and a complex phenomenon in sports (1, 2). Furthermore, with increasing competitiveness, various training methods have been developed for athletes to exhibit peak performance in competitions (3).

There are three main reasons for prohibiting the use of performance-enhancing substances in sports: First, the use of banned substances can result in the deterioration of physical and psychological health (4). Moreover, the use of performance-enhancing substances has been linked to cardiovascular disease, mental health disorders, diabetes, cancer, virilization in women, and androgen deficiency in men (5-9).

Second, the use of performance-enhancing substances creates an unethical advantage for the athlete, making sports unfair. Third, athletes are viewed as role models in society, and their use of such substances may encourage novice young athletes to adopt similar behaviors (10).

To counter this emerging condition and prevent unfair competition in sports, a multi-faceted anti-doping system has been developed to detect, prevent, and deter doping (11). The use of substances that enhance athletic performance is influenced by a variety of factors (12-15).

The current detection-based policy is insufficient for eliminating the banned use of performance-enhancing substances (16). Various factors such as representation, knowledge, attitudes, personality, and motivation play a significant role in converting normative behavior into deviant behavior (17). Psychosocial approaches and attitudes are considered indicators of doping behavior (18). Additionally, a recent study reported that a positive attitude

toward the use of performance-enhancing substances is strongly associated with intentions and behaviors related to their use (19).

The use of performance-enhancing substances among athletes, especially in strength-based sports like weightlifting, has become a serious concern in the realm of public health and sports ethics (20). Although the physical and psychological side effects resulting from the consumption of these substances are well documented, some athletes still demonstrate a tendency to use them (21).

Despite being aware of the side effects of these substances, some athletes continue to resort to their use, which reveals the need to examine the psychological factors influencing this behavior. The Theory of Planned Behavior (TPB), as one of the leading theoretical frameworks in predicting health behaviors, can play a crucial role in explaining the motivations and intentions that lead to the use of performance-enhancing substances (22).

This contradiction underscores the necessity of a deeper examination of the psychological factors influencing such behavior. In this regard, the Theory of Planned Behavior (TPB) can serve as a theoretical framework that plays a key role in explaining athletes' decision-making processes (23-26). According to this theory, three key factors—attitude, subjective norms, and perceived behavioral control—determine individuals' intentions and ultimately their behaviors (27, 28).

Previous studies have shown that a positive attitude toward athletic performance and social pressure from coaches or teammates can increase the inclination to use performance-enhancing substances (7). On the other hand, perceived behavioral control, such as easy access to these substances or the belief that one will not be detected in doping tests, is also a determinant (29).

In strength sports like weightlifting, a positive attitude toward performance enhancement and competitive pressure from the athletic environment can lead to the formation of intentions to use performance-enhancing substances (30). Additionally, subjective norms—including the influence of coaches and teammates—as well as perceived behavioral control, such as easy access to these substances, are considered influential factors in this context. In regional countries including Iraq, limited research has examined this phenomenon among weightlifters (31).

Therefore, the present study was designed with the aim of investigating the effect of Theory of Planned Behavior components on the use of performance-enhancing substances among young Iraqi weightlifters. The findings of this research can provide valuable insights to the policymakers of Iraq's Weightlifting Federation for designing evidence-based preventive programs.

2. Methods and Materials

2.1. Study Design and Participants

The aim of the present study was to determine the impact of the components of the Theory of Planned Behavior on the use of performance-enhancing substances among young Iraqi weightlifters. This research was a descriptive-correlational study conducted through a survey method. The statistical population consisted of 376 active weightlifters in 17 cities of Iraq during the years 2023–2024. A total of 324 participants entered the research process, while 26 individuals were excluded due to incomplete or corrupted data and lack of cooperation.

In this study, data regarding participants' attitudes, perceived behavioral control, subjective norms, and tendency to use dietary supplements and performance-

enhancing substances were collected through a questionnaire. The questionnaire included demographic questions such as age, height, weight, sports history, use of dietary supplements and performance-enhancing substances, as well as items related to the study objectives. The researcher designed and developed a checklist and questionnaire for analyzing the components of the Theory of Planned Behavior on substance use based on previous research questionnaires, expert consultation, and scholarly opinions.

2.2. Data Collection

During the implementation phase, the researcher visited the athletes' training sites and, after explaining the national significance of the study and assuring confidentiality, obtained written informed consent from the participants. They were asked to respond carefully and honestly according to their actual conditions. The questionnaires were completed under the supervision of the researcher and collected immediately upon completion.

This researcher-made questionnaire was developed through literature review, theoretical foundations, expert interviews, and aligned with the objectives of the study and the sociocultural context of the Iraqi weightlifting community. The questionnaire included demographic data and the three key components of the Theory of Planned Behavior (attitude, subjective norms, and perceived behavioral control), along with information on the use of dietary supplements and performance-enhancing substances.

In the study conducted by Alemi et al. (2015), the reliability of the Theory of Planned Behavior questionnaire was estimated using Cronbach's alpha above 0.70 and construct validity above 0.75 (24). In the current study, the

questionnaire's validity was assessed by experts, and its reliability was verified using Cronbach's alpha.

To determine the extent of dietary supplement and performance-enhancing substance use, the Dietary Supplement and Ergogenic Substance Consumption Questionnaire was used. This questionnaire was originally designed by Nakhaei and Pakravan (2012) and consisted of 20 questions. In their study, the questionnaire's validity was reported as 0.87 and reliability as 0.75 (32).

After final approval of the research proposal and completion of preliminary studies on the performance of young Iraqi weightlifters, the researcher, in coordination with the Iraqi Weightlifting Federation, participated in a briefing session held specifically for coaches. In this session, the research objectives, execution method, and expectations for coach cooperation were clearly explained.

Subsequently, essential information was collected, including the full names of athletes, training schedules and locations, and contact information for further coordination. In the next step, and in full compliance with ethical research standards, the researcher obtained a valid ethical approval code from the relevant university.

To develop the research instrument, the researcher-made questionnaire was designed in consultation with the academic supervisor and expert consultants. The questionnaire was first translated into Arabic and then evaluated through a multi-stage validation process. A back-translation was conducted by two "blind" professors (unfamiliar with the original version) at the University of Baghdad to ensure linguistic and cultural equivalence.

Content review was conducted by 10 faculty members specialized in physical education, who confirmed the face and content validity of the instrument (including simplicity, clarity, and appropriateness of items to the research objectives). A technical review was also carried out by five experienced Iraqi weightlifting coaches to finalize the items from a practical perspective.

After implementing the revisions, the final version of the questionnaire was distributed to 20 young weightlifters (not included in the main research sample), and the reliability of the instrument was confirmed by a Cronbach's alpha of 0.84 for all components (above the minimum standard of 0.70).

2.3. Data Analysis

The data were analyzed using SPSS version 25 for descriptive and inferential statistics, and SmartPLS software for structural equation modeling.

3. Findings and Results

The youngest participants in the study were 17 years old, while the most common age group was 18 years. Participants with less than a high school diploma represented the smallest group, while those with a high school diploma were the largest. The average height of the participants, categorized by weightlifting weight classes, was very similar, with the lowest average height belonging to the 61 kg weight category. It was revealed that 52.96% of the participants used dietary supplements and performance-enhancing substances, and 83% were aware of the side effects of these substances.

Table 1

General Description of the Variables Using Descriptive Statistics

Variable	Mean	Standard Deviation	Skewness	Kurtosis
Tendency to use performance-enhancing substances	3.628	0.892	-0.722	0.358
Attitude	3.923	0.876	-0.973	1.355
Subjective norms	3.649	0.976	-0.753	0.417
Perceived behavioral control	3.990	0.877	-0.891	0.782
Intention	3.409	0.922	-0.571	0.157

Based on the values in [Table 1](#):

1. The mean values of the study variables (tendency to use performance-enhancing substances, attitude, subjective norms, perceived behavioral control, and intention) are above the average (3). In other words, the participants rated these variables above average.
2. The standard deviation values indicate moderate variability in the data for the study variables.
3. The negative skewness values indicate that the data for these variables are inclined toward higher-than-average values, while the positive kurtosis values show a relatively flat distribution of the data for these variables. Considering the skewness and kurtosis tests (within the range of -3 to 3), the data are deemed to follow a normal distribution.

To conduct structural equation modeling (SEM), several essential assumptions were considered:

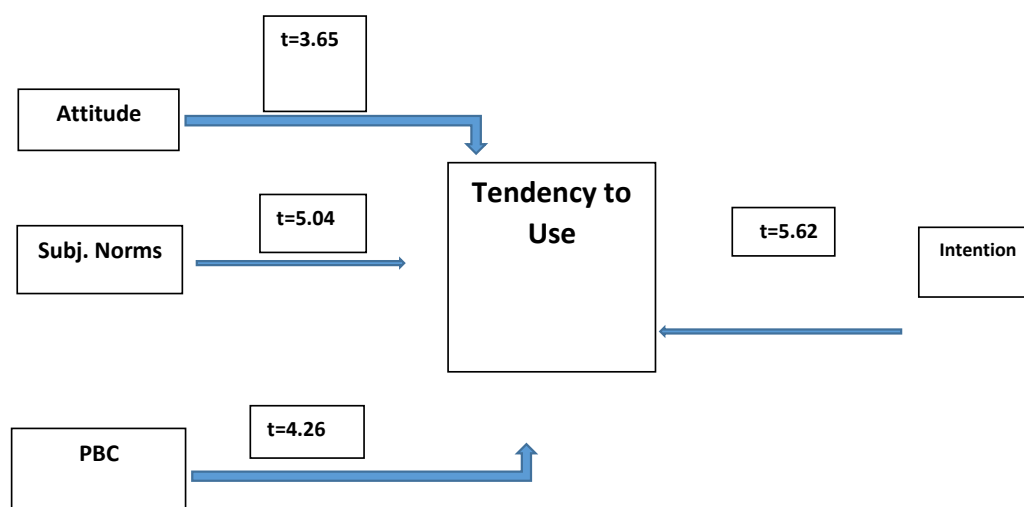
1. **Optimal Sample Size:** In this study, with a sample size of 324 participants and accounting for the ratio of sample size to observed variables, free

parameters, model complexity, and maximum likelihood estimation (which requires a large sample size), the chosen sample size was sufficient for SEM.

2. **Multivariate Outliers:** Multivariate outliers were identified using the Mahalanobis distance and excluded from the analysis.
3. **Multivariate Normality:** The Mardia coefficient and its critical ratio were used to test multivariate normality. While normality was confirmed in most cases, for minor violations, bootstrapping was employed alongside maximum likelihood estimation to compensate for dependency on normality assumptions.
4. **Multicollinearity:** To assess multicollinearity between independent variables in SEM models, the Variance Inflation Factor (VIF) and Tolerance Index were used. With thresholds of Tolerance > 0.40 and VIF < 2.5, the results indicated no multicollinearity, confirming the adequacy of this assumption.

Figure 1

Structural Equation Model in Significance Mode



Based on the output from Smart PLS, the proposed model was validated. The significance values (commonly referred to as t-statistics or z-scores) exceeded the threshold of 1.96,

confirming the model's validity without requiring structural modifications.

Table 2

Model Evaluation Metrics

Variable	Average Variance Extracted (AVE)	Composite Reliability	Cronbach's Alpha	Communality	Redundancy
Tendency to use performance-enhancing substances	0.874	0.856	0.852	0.169	-
Attitude	0.896	0.799	0.874	0.159	0.147
Subjective norms	0.874	0.863	0.863	0.158	0.126
Perceived behavioral control	0.856	0.893	0.896	0.198	0.214
Intention	0.850	0.896	0.819	0.199	0.136

The overall model evaluation metrics indicate that the proposed structural equation model is supported by the data.

The fit indices suggest that the structural model is well-specified (Table 2).

Table 3

Fornell-Larcker Discriminant Validity Matrix

Variables	Perceived Behavioral Control	Intention	Tendency to Use	Attitude	Subjective Norms
Perceived Behavioral Control	0.667	-	-	-	-
Intention	0.476	0.696	-	-	-
Tendency to Use	0.541	0.690	0.568	-	-
Attitude	0.645	0.426	0.522	0.701	-
Subjective Norms	0.524	0.547	0.656	0.445	0.667

High correlations among the variables (perceived behavioral control, intention, tendency to use performance-enhancing substances, attitude, and subjective norms) confirm the appropriate discriminant validity and strong model fit.

The coefficient of determination (R^2) for the tendency to use performance-enhancing substances is 0.734, indicating a good structural fit for the model (Table 3).

Table 4

Direct Effects Between Latent Variables

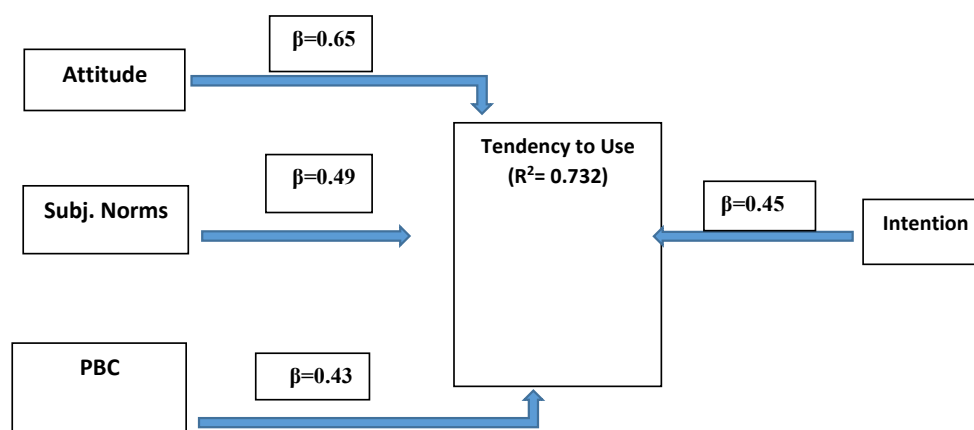
Path	Path Coefficient	t-Value	Significance Level	Result
Perceived behavioral control → Tendency to use performance-enhancing substances	0.436	4.269	0.001	Supported
Intention → Tendency to use performance-enhancing substances	0.457	5.627	0.001	Supported
Attitude → Tendency to use performance-enhancing substances	0.653	3.658	0.001	Supported
Subjective norms → Tendency to use performance-enhancing substances	0.498	5.046	0.001	Supported

The results indicate significant positive correlations between the main variables—attitude, subjective norms, perceived behavioral control, and intention—and the

tendency to use dietary supplements and performance-enhancing substances (Table 4).

Figure 2

Structural Equation Model in Standardized Mode



4. Discussion and Conclusion

The use of performance-enhancing substances is one of the most critical issues in the world of sports, striking at the core of athletic integrity and competitive fairness. When

athletes engage in the use of such substances, they commit deviant behaviors. Accordingly, the present study aimed to investigate the impact of the components of the Theory of Planned Behavior on the use of performance-enhancing substances among young Iraqi weightlifters. The findings indicated significant and positive relationships between

attitude ($\beta = 0.653$, $p = 0.001$), subjective norms ($\beta = 0.498$, $p = 0.001$), and perceived behavioral control ($\beta = 0.436$, $p = 0.001$) with the use of dietary supplements and performance-enhancing substances. Attitude toward the use of such substances is defined as the individual's readiness to use performance-enhancing methods and banned substances (12-15, 33), which may be linked to one's behavioral tendencies and athletic orientation (12). Athletes' motivations for using performance-enhancing drugs are related to maintaining and enhancing physical performance, coping with psychological or social pressure, and striving for psychological and social goals. The specific pressures of competitive sports environments may also increase such behaviors.

Although direct studies aligning with the present findings are limited, research (12-14, 34-36) support the role of attitudes. A meta-analysis by Horst (2023) confirmed a positive correlation between the use of dietary supplements and attitudes toward performance-enhancing substances (34). It is likely that dietary supplement use shapes attitudes toward performance enhancers, thus increasing their eventual use. Athletes often consult those closest to them—friends, family, coaches—about supplement use, who may encourage such behavior (37). Ali and Ali (2018) found a significant relationship between attitude and the use of dietary supplements in Iraqi athletes (35). Similarly, Petroczi et al. (2012) found that athletes' attitudes were strong predictors of deviant behavior related to performance-enhancing substance use. Gray and DiPasquale (2016) reported a positive association between attitudes and supplement use among weightlifters. Bagheri Sheikhan Gafshah et al. (2021) also found that bodybuilders with dark personality traits were more likely to hold positive attitudes toward illegal drugs and performance enhancers. In contrast,

those with higher mental resilience were less likely to turn to such substances.

These findings may suggest that young Iraqi weightlifters view supplements as tools for improving athletic performance, increasing energy, and accelerating post-exercise recovery. Their attitudes are often shaped by scientific information, personal experience, and the influence of coaches and professional athletes. According to Fishbein and Ajzen, attitudes are influenced by beliefs—when an individual believes the outcome of a behavior is positive, a favorable attitude forms. Theory of mind further explains how mental states (e.g., intentions, beliefs) are shaped by changes in brain structures influenced by environmental interactions (38, 39). Factors like parenting, language (33), culture (40), and social cognition influence how these beliefs and schemas form.

Subjective norms—emerging, shared criteria that regulate behavior—are another key variable. They are foundational to human group structure because they provide direction and motivation, organize social interactions, and make others' responses predictable and meaningful (41). Norms are shaped by an individual's beliefs about what others expect and their motivation to comply with those expectations (25). Cultural norms may also play a role, particularly in environments that emphasize outcome-based goals, pushing some to use performance enhancers as a way to avoid failure (42). Subjective norms are believed to have two components: normative beliefs (what important others expect) and outcome evaluations (positive or negative judgments about those expectations).

Findings (34, 35) Horst et al. (2023) found that these norms moderate the relationship between supplement use and performance-enhancing substances. Spano et al. (2024) noted that, in their study of health-conscious individuals,

subjective norms, perceived effectiveness, and self-efficacy played a limited role. However, social reinforcement—particularly among friends, family, and coaches—remains a critical motivator (37). Among young Iraqi weightlifters, more than 63% used supplements, and nearly 62% were unaware of potential side effects, suggesting social influence is powerful.

Competitive pressure from teams, public expectations, and national pride in athletes contribute to the normalization of performance-enhancer use. Petroczi (2013) notes that athletes and organizations are constantly seeking tools for competitive advantage, increasing the appeal of such substances. Social approval from coaches and peers, combined with motivational climates focused on success, may reinforce this behavior. If athletes believe those around them approve, their own likelihood of using such substances increases. National policies, sport authorities, and peer environments shape these behaviors, particularly in high-pressure sports like weightlifting.

Alongside attitude and subjective norms, perceived behavioral control not only relates to intention but also to actual behavior (23), especially when perceived control aligns with real control (26). Perceived control reflects how easy or difficult the behavior is believed to be and is shaped by past experiences, anticipated challenges, and environmental cues (43). If individuals lack resources or opportunities, they may not act on their intentions even if their attitude is positive and social norms are supportive. Conversely, strong beliefs in facilitating factors enhance perceived control and increase behavioral likelihood.

Findings (5-8, 44, 45) support the present results. Grist (2023) examined sports values and anti-doping beliefs and found that perceived control was predicted by moral identity and task orientation. Campbell et al. (2021) linked positive

attitudes, social norms, and perceived control with supplement use but noted that perceived control was not influenced by attitudes or norms. Lucidi and colleagues showed that the three TPB components significantly predicted the intention and behavior of supplement use.

These results suggest that young Iraqi weightlifters may lack sufficient knowledge of the effects of supplements and performance-enhancing substances, including long-term side effects and legal risks. Social and athletic environments, particularly coaches and teammates, likely play a strong role in shaping behavior. Encouragement or criticism about supplement use may sway decisions, especially given the risk-taking tendencies of youth. Risk-taking involves pursuing behaviors with potential negative consequences—social, financial, interpersonal—as well as perceived benefits (18, 21, 33). In adolescent brains, reward-related areas are more active than in children or adults (46), which may explain why they are more susceptible to risky choices.

Supportive social environments can protect youth from risky behaviors, but when risk-taking is chosen, even such environments may not prevent harm (47). Young weightlifters are often driven to improve performance, and their decisions around supplement use may reflect this desire—though they may lack the self-awareness and knowledge to resist social pressure and make well-informed choices.

The present study demonstrated that positive attitudes, subjective norms, and perceived behavioral control are all significantly associated with the use of dietary supplements and performance-enhancing substances among young Iraqi weightlifters. Positive attitudes—shaped by media, coaching, and personal experience—foster the belief that such substances are necessary for achieving optimal performance. Meanwhile, peer and social pressures within

competitive gym environments normalize such behaviors. Perceived behavioral control, facilitated by easy access, also contributes to increased usage. To counter this trend, educational programs, psychological counseling, and supportive peer groups should be implemented in sports clubs to raise awareness and promote alternatives such as proper nutrition and evidence-based training. Future research should explore cultural, social, and economic moderating variables to provide a more comprehensive understanding of this phenomenon.

Authors' Contributions

S.M.M.F. conceptualized the study, designed the methodology, and was responsible for the overall direction of the research. He also contributed to data collection and the development of the researcher-designed questionnaire. H.Z. played a key role in the statistical analysis and interpretation of the data, utilizing SPSS and Smart PLS software. A.S.I. assisted in the study design and implementation, providing expertise in survey methodology and ensuring the reliability of the data collection process. R.B. contributed to the drafting and revision of the manuscript, ensuring clarity in the presentation of findings. All authors participated in the final approval of the manuscript and take responsibility for the integrity and accuracy of the research.

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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Ethics Considerations

The study placed a high emphasis on ethical considerations. Informed consent obtained from all participants, ensuring they are fully aware of the nature of the study and their role in it. Confidentiality strictly maintained, with data anonymized to protect individual privacy. The study adhered to the ethical guidelines for research with human subjects as outlined in the Declaration of Helsinki.

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