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Development and Validation of an Aerobic Exercise Adherence Questionnaire for Female College Students

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ABSTRACT

Exercise adherence is a crucial factor in the success of an aerobic dance program; however, valid and reliable measurement instruments to evaluate this compliance among college students remain limited. This study aims to test the psychometric properties of an exercise adherence questionnaire for aerobic dance programs specifically tailored for college students. The study employed a descriptive quantitative approach with an instrument validation study design. The research subjects consisted of 30 female college students who regularly participated in an aerobic dance program. The research instrument was a workout adherence questionnaire consisting of 18 statements with a five-point Likert scale, covering five main dimensions: exercise motivation and commitment, comfort and enjoyment, perceived benefits of exercise, sustainability and consistency, and barriers and time management. Validity testing was carried out using Pearson Product Moment correlation, while reliability testing was analyzed using Cronbach's Alpha coefficient. The analysis results showed that all 18 statement items were declared construct valid, with calculated r values ranging from 0.568 to 0.745, which all exceeded the r table value of 0.361 at the 0.05 significance level, with the highest indicator representation in the perceived benefits of exercise dimension. Furthermore, the instrument demonstrated very stable internal consistency with a Cronbach's Alpha coefficient of 0.862, categorized as high reliability. Consequently, this questionnaire proved adaptive to the unique characteristics of aerobic exercise as a rhythmic and dynamic group sport, providing a valid, objective, and reliable assessment tool that is highly recommended for use by researchers and exercise practitioners to evaluate program adherence in the future.

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1. INTRODUCTION

Aerobic exercise is a very popular form of physical activity and is widely integrated into fitness programs in higher education settings (Ludyga et al., 2018). This activity has been widely proven to improve cardiovascular endurance, physical fitness, and maintain students' mental health amidst high academic pressure (Zhang, 2022). The

dynamic, rhythmic, and group characteristics of aerobic exercise make it highly sought after and readily accepted by young adults, particularly college students (Nurulita & Yusnadi, 2025). While the physiological benefits of aerobic exercise have been widely demonstrated, the long-term success of these programs depends not only on the training plan but also on the level of exercise adherence of participants (del Carmen et al., 2025; Lee et al., 2024; Cheng et al., 2022).

Exercise adherence refers to the extent to which an individual is able to follow, maintain, and commit to participating in a prescribed exercise program (Bailey et al., 2023). In the context of college students, adherence is not only reflected in physical attendance at each aerobics session, but also involves psychological aspects such as a positive attitude, intrinsic motivation, comfort, and a strong intention to continue exercising. Several previous studies have shown that low exercise adherence is a major barrier to implementing physical activity programs (Domosławska-Żylińska et al., 2023; Mahmood et al., 2023), especially among young adults with busy academic schedules and busy social lives. Therefore, measuring exercise adherence is crucial in evaluating the effectiveness and sustainability of aerobics programs on campus (Geelen et al., 2025; Piercy et al., 2018; Shaw et al., 2022).

Although adherence measurement is considered important, adherence measurement instruments specifically developed for the context of aerobics for college students remain very limited. Most previous studies tend to adopt general adherence instruments or rely solely on simple, single indicators, such as physical attendance checklists (Pereira et al., 2023). This approach often overlooks the psychological and interpersonal behavioral factors that significantly influence the sustainability of group exercise. The use of these less specific instruments has the potential to produce inaccurate measurement bias and fail to reflect the true dynamics of adherence among aerobic exercise students (Henrique et al., 2023; Khairullah & Norlinta, 2023; Peng et al., 2025).

To address this bias, an evaluation instrument with proven psychometric qualities is needed, tailored to the unique characteristics of aerobic exercise and the psychological profiles of students. Validity and reliability are two key pillars in the development and standardization of research instruments. Validity ensures that the questionnaire accurately measures the targeted adherence construct, while reliability ensures the instrument's consistency in producing stable data over time. A valid and reliable adherence questionnaire is crucial to ensuring the reliability of the data obtained, thus providing a solid basis for decision-making, planning, and evaluation of exercise programs (Arfanda et al., 2025; Henrique et al., 2023; Pinheiro et al., 2024).

The main uniqueness of this research lies in testing the psychometric properties of an instrument designed comprehensively and specifically to measure student adherence to an aerobic exercise program. Unlike conventional, one-dimensional measurement tools, the questionnaire in this study integrates five behavioral and psychological dimensions: motivation and commitment, comfort and enjoyment, perceived benefits of exercise, continuation intention, and time management. Combining psychological dimensions (such as enjoyment and motivation) with practical dimensions (such as time

management) provides a new, more holistic perspective in capturing the reasons behind a student's adherence to a physical exercise program.

Through rigorous psychometric testing, the results of this study are expected to provide two main contributions: theoretical and practical. Theoretically, this research enriches the body of knowledge in sports science and sports psychology, particularly regarding the methodology for measuring exercise adherence in young adult populations. Practically, this validated questionnaire can be used by fitness instructors, campus fitness center managers, and sports lecturers as an applicable evaluation tool to monitor participant progress, predict the risk of dropout, and design effective intervention strategies to increase student retention in long-term sports programs. Based on the above description, there is an urgent need to provide a standardized measurement tool to support the optimization of campus-based fitness programs. Therefore, this study focuses on testing the psychometric properties of the Exercise Adherence Questionnaire in an aerobics program for college students. Through validity analysis using Pearson Product Moment and reliability testing using Cronbach's Alpha, this study aims to legitimize the questionnaire as a valid, reliable instrument, and ready to be implemented in future research and evaluation of aerobics programs.

2. METHOD

This study used a quantitative approach with an instrument validation study design to test the validity and reliability of the aerobic exercise program adherence questionnaire. This design was specifically chosen to ensure that the developed instrument had adequate and robust measurement quality before being implemented in broader research or aerobic exercise program evaluations. Through this approach, the primary focus was on psychometric testing of the instrument to produce objective and reliable data.

The study subjects consisted of 30 female students aged 18–22 who actively and regularly participated in an aerobic exercise program. The sample was selected using a purposive sampling technique, with inclusion criteria including good health, no history of cardiovascular disease, and willingness to fully participate in the entire study. All participants participated in the same aerobic exercise program, thus having relatively homogeneous training backgrounds and experiences when completing the instrument.

The research instrument used was an aerobic exercise adherence questionnaire consisting of 18 items on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). This questionnaire was constructed based on a synthesis of exercise adherence theory, broken down into five main dimensions: (1) motivation and commitment, (2) comfort and enjoyment, (3) perceived benefits of exercise, (4) intention to continue exercising, and (5) time management. Before distribution, the instrument underwent expert judgment with experts in the fields of sports and measurement to ensure content validity.

Data collection was conducted at the end of the aerobic exercise program, with participants being asked to complete the questionnaire independently in a conducive environment, assisted by the researcher to explain the procedure. The collected data

were then tabulated and analyzed using statistical software. The instrument's item validity was tested using Pearson Product Moment correlation analysis between each item's score and the total score. An item is declared valid if the calculated r value is greater than the table r value at a significance level of 0.05. Reliability was tested using Cronbach's Alpha to measure the instrument's internal consistency, with a minimum reliability criterion of ≥ 0.70.

Table 1. Exercise Compliance Questionnaire

Indicator	No	Question	Score				
			1	2	3	4	5
Motivation and Commitment to Practice	1	I joined this aerobic dance program of my own free will.					
	2	I have a strong commitment to attend all aerobic dance sessions.					
	3	I feel motivated to attend every training session regularly.					
	4	I try to make time, so I don't miss my aerobic dance schedule.					
Comfort and Enjoyment During Exercise	5	I feel comfortable while doing aerobic dance.					
	6	I enjoy every aerobic dance session I take.					
	7	The gym environment makes me more enthusiastic about practicing.					
	8	I rarely get bored when I do aerobic dance.					
Perception of the Benefits of Exercise	9	I feel an increase in fitness after doing aerobic dance.					
	10	Aerobic dance helps improve my endurance.					
	11	I feel that aerobic dance provides benefits to my overall health.					
	12	I feel fresher and more energetic after participating in an aerobic dance session.					
Sustainability and Consistency	13	I intend to continue doing aerobic dance after this program ends.					
	14	I am willing to make aerobic dance a part of my lifestyle.					
	15	I would recommend aerobic dance to others.					

Indicator	No	Question	Score				
			1	2	3	4	5
Obstacles and Time Management	16	My busy schedule does not prevent me from doing aerobic dance regularly.					
	17	I can manage my time well so I can do aerobic dance.					
	18	I rarely miss a workout for non-urgent reasons.					

Rating Scale (Likert 5 Point):
1 = Strongly Disagree
2 = Disagree
3 = Undecided
4 = Agree
5 = Strongly Agree

Questionnaire Scoring

- Minimum score: 18
- Maximum score: 90
- The total score is obtained by adding up all items.

Higher scores indicate better levels of exercise compliance.

3. RESULTS AND DISCUSSION

Results

Validity testing was conducted to determine the ability of each statement item to measure the construct of exercise adherence. Item validity was analyzed using the Pearson Product Moment correlation between the score of each item and the total score (item–total correlation). Validity criteria were determined by comparing the calculated r value with the table r at a significance level of 0.05. An item is declared valid if the calculated r value > the table r value.

Table 2. Results of the Validity Test of the Exercise Compliance Questionnaire

Indicator	No Test Items	r count	r table	Information
Motivation and Commitment to Practice	1	0.608	0.361	Valid
	2	0.666	0.361	Valid
	3	0.696	0.361	Valid
	4	0.637	0.361	Valid
	5	0.578	0.361	Valid
Comfort and Enjoyment During Exercise	6	0.715	0.361	Valid
	7	0.676	0.361	Valid
	8	0.627	0.361	Valid
Perception of the Benefits of Exercise	9	0.745	0.361	Valid
	10	0.706	0.361	Valid

Indicator	No Test Items	r count	r table	Information
Sustainability and Consistency	11	0.686	0.361	Valid
	12	0.657	0.361	Valid
	13	0.725	0.361	Valid
	14	0.647	0.361	Valid
	15	0.598	0.361	Valid
Obstacles and Time Management	16	0.568	0.361	Valid
	17	0.617	0.361	Valid
	18	0.588	0.361	Valid

Table 2 presents the results of the item validity test for the Exercise Compliance Questionnaire, which consists of five indicators: motivation and commitment to practice, comfort and enjoyment during exercise, perception of the benefits of exercise, intention of sustainability and consistency, and obstacles and time management. The validity analysis was conducted using the product–moment correlation by comparing the calculated correlation coefficient (r count) with the critical value (r table = 0.361). The results show that all questionnaire items have r count values exceeding the r table, indicating that each item meets the criteria for validity. In the motivation and commitment to practice indicator (items 1–4), r count values range from 0.608 to 0.696, demonstrating a strong relationship between each item and the overall construct. Similarly, items under the comfort and enjoyment during exercise indicator (items 5–8) show r count values between 0.578 and 0.715, reflecting the relevance of these items in capturing affective experiences during exercise participation.

Furthermore, the perception of the benefits of exercise indicator (items 9–12) yields the highest r count values, ranging from 0.657 to 0.745, suggesting that participants' perceptions of exercise benefits are well represented by the instrument. The intention of sustainability and consistency indicator (items 13–15) also demonstrates adequate validity, with r count values between 0.598 and 0.725. Lastly, items related to obstacles and time management (items 16–18) present r count values ranging from 0.568 to 0.617, indicating that these items are valid in measuring barriers that may influence exercise compliance. Overall, the findings confirm that all 18 items of the Exercise Compliance Questionnaire are valid and appropriately represent their respective indicators. This result indicates that the instrument has a strong construct validity and is suitable for measuring exercise compliance, particularly within the context of aerobic gymnastics and structured group exercise programs.

The reliability test aims to determine the level of internal consistency of the instrument in measuring the construct of exercise adherence. Reliability was analyzed using the Cronbach's Alpha coefficient. The instrument is considered reliable if the Cronbach's Alpha value is ≥ 0.70.

Table 3. Results of the Reliability Test of the Exercise Compliance Questionnaire

Variables	Number of Items	Cronbach's Alpha	Category
Practice Compliance	18	0.862	High

Table 3 presents the results of the reliability test of the Exercise Compliance Questionnaire, which consists of 18 items measuring the variable of practice compliance. Reliability analysis was conducted using Cronbach's Alpha to evaluate the internal consistency of the instrument. The results show that the questionnaire obtained a Cronbach's Alpha value of 0.862, which falls within the high reliability category based on the established criteria (0.80–0.89). This finding indicates that the items in the questionnaire demonstrate a strong level of internal consistency and can consistently measure the construct of exercise compliance. A high reliability coefficient suggests that the instrument items are homogeneous and closely related to one another, reflecting the same underlying concept of practice compliance. Therefore, the Exercise Compliance Questionnaire can be considered a reliable measurement tool and is suitable for repeated use in research contexts, particularly in studies examining compliance and adherence in aerobic gymnastics and structured exercise programs.

Overall, the reliability results confirm that the instrument meets psychometric standards and provides stable and consistent measurements, supporting its use for further data collection and analysis. These findings indicate that the exercise adherence questionnaire has adequate measurement quality and can be used as an evaluation tool in aerobic dance programs. This instrument is expected to assist researchers and sports practitioners in understanding the factors that influence the sustainability of exercise participation.

Discussion

The results of this study indicate that the developed aerobic exercise adherence instrument has excellent psychometric characteristics in terms of validity and reliability. All 18 items, divided into five dimensions, were proven valid in measuring the construct of exercise adherence and demonstrated high internal consistency. Based on the analysis, the perceived benefits of exercise dimension (items 9–12) provided a very strong representation, with the highest calculated r value reaching 0.745. This finding indicates that this instrument is capable of measuring exercise adherence comprehensively and is highly relevant to the characteristics of aerobic exercise as a rhythmic, dynamic, and structured group physical activity.

The validity findings obtained in this study reinforce previous research that confirms exercise adherence is a multidimensional construct. Several international studies have reported that measuring exercise adherence cannot rely solely on indicators of attendance or frequency of exercise, given that psychological and behavioral aspects play a significant role in determining the sustainability of individual participation

(Nascimento-Ferreira et al., 2025; Nascimento-Ferreira et al., 2022). Intrinsic motivation, perceived comfort, enjoyment of exercise, and belief in the benefits of physical activity are key determinants of maintaining long-term engagement in an aerobic exercise program. This is reflected in the validity of items in the motivation and commitment dimension (r_{count} 0.608–0.696) and the comfort and enjoyment dimension (r_{count} 0.578–0.715), which successfully captured participants' affective experiences. Therefore, the inclusion of these indicators in this instrument empirically strengthens the validity of the construct being measured.

From a methodological perspective, high item validity—with all items having r_{count} values exceeding r_{table} (0.361)—indicates that each statement in the questionnaire is strongly correlated with the total exercise adherence score. This is in line with previous research on the development of sports adherence instruments, which shows that instruments built on in-depth theoretical studies and specific activity contexts tend to produce more accurate measurements (Henrique et al., 2023; Pinheiro et al., 2024; Yang et al., 2023). The instrument's ability to validate aspects of barriers and time management (r_{count} 0.568–0.617) also demonstrates its sensitivity to the real-world constraints faced by gymnasts. Therefore, the results of this study support the view that instrument development must consider the specific characteristics of the sporting activity being measured to ensure more representative measurement results.

The reliability test results further confirmed the quality of this instrument, with a Cronbach's Alpha coefficient of 0.862 placing the questionnaire in the high reliability category. This finding aligns with previous studies reporting that exercise adherence instruments with a homogeneous and relevant item structure will produce stable and consistent measurements (Arensman et al., 2022; Yang et al., 2023). High reliability is crucial in the context of aerobic exercise program evaluation, as it allows the instrument to be used repeatedly at different times and with different groups of subjects without losing consistency in measurement results (Arfanda et al., 2025; Jiang et al., 2025; Alcaraz-Ibáñez et al., 2022).

Furthermore, this study's results reinforce previous research highlighting the limitations of general exercise adherence instruments. Many instruments used in physical activity research fail to fully capture the unique characteristics of aerobic exercise, such as musical elements, group dynamics, and enjoyment orientation. Therefore, the presence of an instrument specifically developed and tested for validity and reliability in the context of aerobic exercise is an important contribution to the development of sports science (Arfanda, Aprilo, Arimbi, et al., 2025; Levy et al., 2019; Mendonça et al., 2022). Overall, the results of this study not only support previous research findings regarding the importance of psychometric standards in measuring exercise adherence but also provide new empirical evidence regarding the importance of contextually specific instruments to support more accurate program evaluations in the future.

4. CONCLUSION

The Aerobic Exercise Adherence Questionnaire developed in this study met adequate, objective, and reliable psychometric standards. All 18 items covering five main dimensions—exercise motivation and commitment, comfort and enjoyment, perceived benefits of exercise, sustainability and consistency, and barriers and time management—were declared construct valid, with calculated r values ranging from 0.568 to 0.745, all exceeding the table r value of 0.361 at the 0.05 significance level. In addition to its strong validity, with the highest indicator representation in the perceived benefits of exercise dimension, this instrument also demonstrated very stable internal consistency, with a Cronbach's Alpha coefficient of 0.862, categorized as high reliability. Overall, this questionnaire proved adaptive to the unique characteristics of aerobic exercise as a rhythmic and dynamic group sport, and is therefore highly recommended for use by researchers and exercise practitioners as an accurate tool for evaluating program adherence in the future.

As a recommendation, it is recommended that future research pilot the instrument on a broader and more diverse population scale, including involving different age groups or demographic backgrounds, to strengthen the generalizability and external validity of this questionnaire. Furthermore, sports practitioners and aerobic exercise instructors are recommended to integrate this adherence questionnaire as a periodic evaluation tool at the end of each exercise program. This is important to monitor participants' psychological dynamics—especially in the dimensions of resistance, time management, and exercise comfort—so that instructors can design appropriate intervention strategies to maintain consistency and increase participant retention in long-term aerobic exercise programs.

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