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Initial Construction of the Exercise Maintenance Motivation Scale: A Mixed-Method Study

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Abstract

This mixed-methods study aimed to develop and validate the exercise maintenance motivation (EMM) scale, designed to assess the motivation for maintaining exercise among fitness center (FC) members in Vietnam. The two-phase study was conducted to outline the development process of the EMM-FC scale, which is grounded in Self-Determination Theory (SDT). In the first qualitative phase, ten in-depth interviews and four focus groups (n = 39) were performed, identifying five components of EMM through content analysis. Following this, the scale's content and face validity were assessed through a connecting step and pre-testing, which led to the elimination of 20 items, resulting in 40 statements. In the second phase, a cross-sectional survey (n = 280) was conducted to assess the factorial structure of the EMM-FC scale with Exploratory Factor Analysis. Findings yielded five construct dimensions with satisfactory psychometric indicators, including convergent validity, discriminant validity, and internal consistency reliability of the EMM-FC scale. The 30-item EMM-FC scale covered five SDT-driven constructs, comprising of "Exercise achievements", "Exercise environments", "Exercise integration with life goals", "Exercise enjoyment", and "Workout-aholic", explaining 61.3% of the variance. The scores of five constructs were positively correlated with the total scores of the scale and notably distinguished between exercise maintainers and non-exercise maintainers. Further research is required to thoroughly assess the scale's robust psychometric properties to be applied in future practical research for exercise maintenance.

Keywords: Exercise; Motivation; Fitness Center; Scale; Mixed-Method Study; Vietnam.

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1. Introduction

While regular exercise is significantly associated with various health-related benefits [1], approximately 56.2% of Vietnamese adults fail to meet the recommended levels of physical activity [2]. Insufficient physical exercise among Vietnamese adults is a growing public health concern due to its potential negative impacts on health outcomes [3–5]. In the context of the emerging fitness industry, exercising in fitness settings could play a pivotal role in shaping the physical activity habits of the Vietnamese [6–8]. Previous research has revealed that a substantial percentage, ranging from 40% to 65%, of individuals who commence exercising drop out within the first year of enrolling in fitness programs, irrespective of whether they are guided or self-directed, and this trend holds across age and gender [9–11]. Maintaining a consistent exercise routine at fitness facilities can be challenging and is highly dependent on individual factors [12, 13]. The motivation of individuals engaging in exercise is a critical factor that links to both their successes and setbacks in adopting healthier behaviors [12]. Consequently, identifying the underlying motives for exercise is imperative for fitness center (FC) members to sustain a consistent fitness regimen.

To gain insight into the factors driving exercise motivation, the extensive body of public health literature has explored internal and external components that influence individuals' exercise intentions [14]. Within this realm, the Self-Determination Theory (SDT) measures six motivational regulations, comprising non-regulation (amotivation), intrinsic regulation (intrinsic motivation), and extrinsic motivation, including external regulation, introjected regulation, identified regulation, and integrated regulation (as depicted in Table 1) [15–17]. The SDT provides a framework for analyzing and grasping the numerous motivational styles in exercise behavior adoption and maintenance [13]. Over the last three decades, motivation approaches driven by the SDT have been a major research area concerning how people should behave in various exercise contexts.

Table 1. Behavioral regulations in exercise driven by the SDT

Motivation	Regulations	Definitions and examples
Amotivation	Non-regulation	Individuals who lack the motivation to engage in exercise (i.e. I am not interest in exercise)
Extrinsic motivation	External regulation	Individuals exercise to meet external expectations or to gain rewards while avoiding criticism from others (i.e. I exercise because I feel pressured by others to do so)
	Identified regulation	Individuals recognize the personal benefits of exercise and willingly adopt it into their routine, driven by the perceived health advantages (i.e. I exercise because I understand the health benefits it offers)
	Introjected regulation	Individuals engage in exercise to alleviate feelings of guilt or shame, seeking to boost their self-esteem (i.e. I exercise because I feel guilty when I skip a workout)
	Integrated regulation	Individuals integrate exercise with other aspects of life (i.e. I exercise because it is consistent with my life goals)
Intrinsic motivation	Intrinsic regulation	Individuals engage in physical activity primarily for the enjoyment it brings, rather than pursuing secondary benefits (i.e. I exercise simply because I find it enjoyable)

Sources: Adapted to Self-Determination Theory Applied to Health Contexts [18].

Numerous scales in previous studies have measured self-determined motivation in exercise driven by the SDT [19–21]. These scales typically included four to six subscales of amotivation and external, introjected, identified, integrated, and intrinsic regulation. Nevertheless, some research has failed to include these subscales, which, taken together, make up the regulatory motivation spectrum. For example, the absence of integrated regulation and motivation during exercise indicates that people don't think about these factors much when making fitness-related decisions [19–21]. Furthermore, the challenge of establishing discriminant validity between identified regulation and intrinsic motivation arises due to the absence of integrated regulation [22]. Additionally, the number of items in each subscale has varied, usually ranging from three to four, all combined into a single scale [23–25]. However, a scale with few items could provide less reliable measurements [26]. Exercise motivation research has used a variety of participant response formats, most commonly a 5-point Likert scale [27–29]. Nevertheless, more scale points may result in greater distinction between questions, leading to higher variability [30]. Numerous study methods, such as the cross-sectional design [25, 31], longitudinal studies [32, 33], or mixed-method approaches [28, 34], have been applied in several investigations, revealing acceptable validity and reliability across a variety of participant categories, including the elderly [35, 36], middle-aged adults [27, 29], and undergraduates [37, 38]. Furthermore, prior research concentrated on validating motivation scales in diverse workout environments, including public areas [25, 31, 39], academic institutions [37, 38], medical settings [40, 41], and gym and sports facilities [42–44], where those engaged in exercise have consistently reported higher motivation levels compared to other exercise settings. This strong positive association has also been linked to long-term exercise adherence [45]. When utilizing the same measuring instruments, however, prior research has not revealed significant variations in the specific items of exercise motives in the scale's construction for individuals who work out in fitness facilities as opposed to other settings. Consequently, it is essential to develop and validate a specific measurement for assessing this kind of exerciser's motivation.

Currently, Vietnam also lacks instruments that would allow for the measurement of this theoretical construct in exercise based on fitness-related contexts. The need for a measurement tool that takes into account motivation for a

particular setting, adapts to a cultural context through a combined qualitative and quantitative approach, and accommodates various regulation styles has informed the development of a country-specific EMM-FC scale in this study. Thus, the present study aimed to develop and validate the exercise maintenance motivation scale for fitness center members (EMM-FC) to address the following research questions: 1) What motivates FC members to sustain their exercise routines using the conceptual framework guided by SDT? and 2) How can the evidence supporting the construct validity of the EMM-FC scale, designed for measuring exercise maintenance, be explained?. We hypothesize that exercise maintenance motivation among Vietnamese FC members exhibits both similarities and differences when examined through the lens of the five behavioral regulations defined by SDT. Additionally, we assume that FC members who successfully maintain their exercise regimens score significantly higher in EMM than those who do not.

Examining exercise motivation among FC members in Can Tho City, one of Vietnam's five major cities, holds substantial real-world value. This study is the first of its kind, providing insight into the current exercise motivation landscape for the Vietnamese. The development of the EMM-FC scale aims to bridge this gap by encompassing all six regulatory styles outlined in the motivational continuum within the specific context of exercise. Such a novel scale can serve practical and scientific purposes, offering a valuable tool for public health and fitness professionals to enhance their efforts in promoting health and well-being.

2. Research Methodology

2.1. Study Protocol

To ensure the comprehensiveness of this mixed-method design study, checklists follow the guidelines of the Mixed Methods Appraisal Tool (MMAT), version 2018, and the CASP checklist for appraisal of qualitative research, version 2018, designed for information professionals and researchers [46, 47]. On the other hand, the literature review has provided practical guidelines regarding the steps for developing and validating this new scale [48–50].

2.2. Study Design

This study employed an exploratory sequential mixed-method design consisting of two phases. The first phase conducted a qualitative study using in-depth interviews and focus groups with members, personal trainers, and managers at FCs to comprehensively explore all the EMM components derived from the literature review. In the second phase, the findings from the qualitative study were applied to develop the EMM-FC scale. The validity and reliability of the developed scale were then assessed through a process that involved pre-testing and conducting a cross-sectional study, preceded by a connecting step for content and face validity assessment and a pre-testing study. Figure 1 illustrates the process of the two-phase study for the EMM-FC scale development and validation.

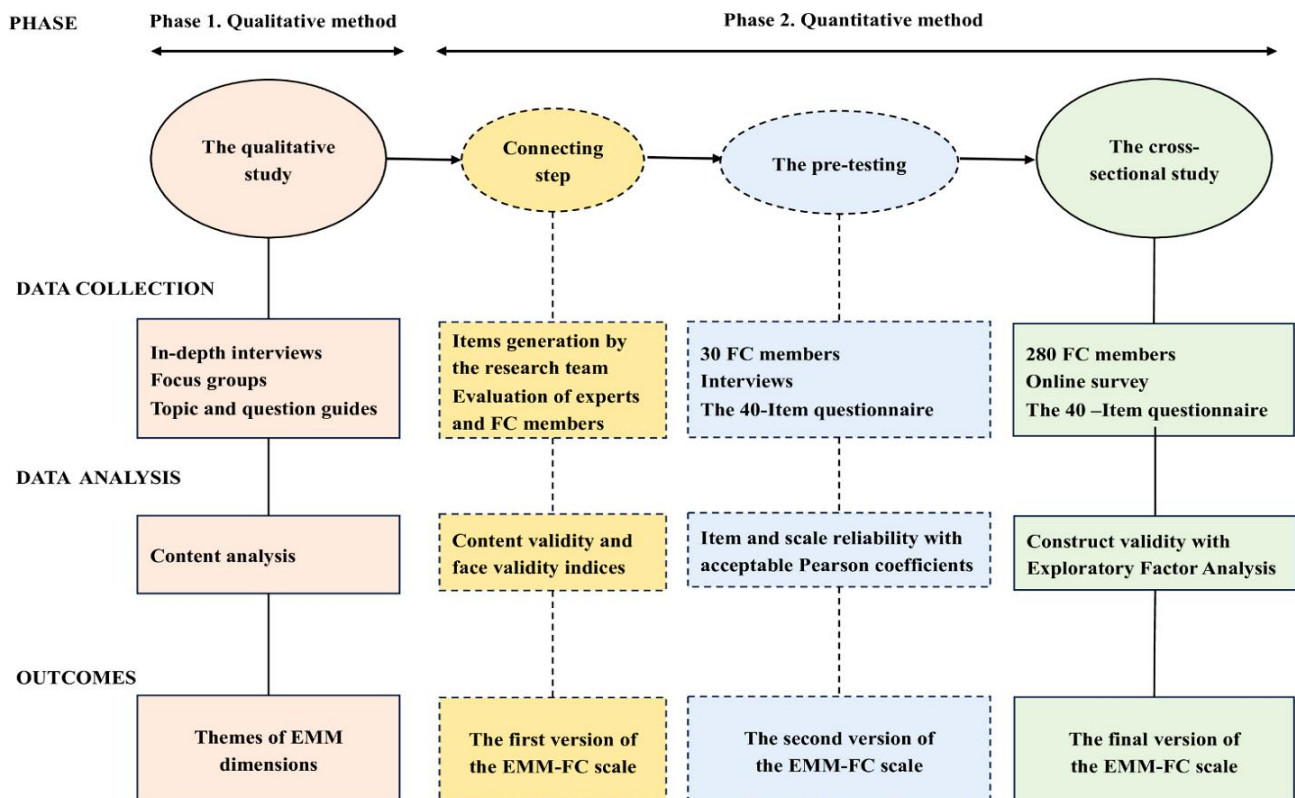


Figure 1. Study process for the initial development and validation of the EMM-FC scale

2.2.1. The Qualitative Study

This step was to explore the EMM components among FC members. In this paper, the qualitative study serves as a preliminary work, supporting the second phase of the study.

The qualitative study included ten in-depth interviews and ten focus groups with Vietnamese FC members. Overall, 39 participants were prompted to discuss their past and present EMM in the context of fitness settings, as well as contributing factors that facilitated or impeded the maintenance of exercise routines. Data were collected and analyzed using the content analysis method to identify important themes and ensure data saturation. The main theme that emerged from the analysis was motives for regular exercise in long-term adherence. Actual phrases and words that appeared across the majority of the interviews were also used to draft the initial item pool by the research team. Based on this analysis, a total of 60 EMM statements were generated.

2.2.2. The Connecting Step between the Qualitative Study and the Pre-Testing

This step involved refining items from the 60 EMM statements generated based on the findings of the qualitative study through expert evaluation and input from FC members.

2.2.3. Procedure and Participants

The Vietnamese and English versions of the items were structured to encompass all 60 EMM statement scores on a 5-point rating scale, including 0 (not true for me), 1 (rarely true for me), 2 (sometimes true for me), 3 (often true for me), and 4 (very true for me). The responding parts for experts' reflections were integrated with items using a 4-point rating scale: (1) not relevant, (2) somewhat relevant, (3) quite relevant, and (4) very relevant [51]. Comments to improve the relevance of items were added with a "recommendation if possible" option. A review panel of 7 Vietnamese and 4 international experts was invited via email to facilitate the online content validation form with instructions while remaining anonymous [51]. In cases where there was no response within a week, a reminder email was sent, and after two weeks without a response, a replacement expert was invited. Subsequently, the content validation step was followed by the face validity evaluation. The refined items from experts' evaluations were shaped into a new Vietnamese format using a 4-point rating scale: (1) not clear and understandable, (2) somewhat clear and understandable, (3) clear and understandable, and (4) very clear and understandable [52]. Eleven FC members were invited to participate in a feedback process aimed at enhancing the clarity and comprehensibility of the items, with the option to provide "recommendations if possible".

2.2.4. Data Analysis

The content validity of the EMM-FC scale was assessed using the item-level content validity index (I-CVI), the scale-level content validity index based on the average method (S-CIV/Ave), and the scale-level content validity index based on the universal agreement method (S-CVI/UA). Likewise, face validity was evaluated using the item-level face validity index (I-FVI), the scale-level face validity index based on the average method (S-FIV/Ave), and the scale-level face validity index based on the universal agreement method (S-FVI/UA). All these indices had to have values of at least 0.83 to meet the satisfactory criteria [51, 52]. Hence, the first version of the EMM-FC scale was formulated for pre-testing.

2.2.5. The Pre-testing

The pre-testing aimed to assess the item reliability of the initial version of the EMM-FC scale, ensuring the scale demonstrated at least satisfactory psychometric properties [53].

2.2.6. Procedure and Participants

The questionnaire, which included the refined EMM statements, was distributed among 30 FC members who were purposively selected, with equal representation from six FCs (five participants from each). These participants were personally approached and provided with a link to the online Google form, which contained a quick response code and took approximately 15 minutes to complete. Researchers explained the research objectives during the initial meeting with participants. Participants were also given time to read the research information booklet; their potential concerns were addressed, and they were ultimately given the freedom to make an informed decision. Once a suitable time was scheduled, eligible participants were invited to participate in the study. All completed consent forms were signed in private rooms within the FCs. Researchers collected data using anonymous self-report questionnaires.

2.2.7. Data Analysis

Item discrimination indices were provided in the form of simple Pearson correlations [53]. The Cronbach's alpha coefficient range of 0.7–0.95 was also presented to show acceptable internal consistency of the scale [54]. Hence, the second version of the EMM-FC scale was constructed for the cross-sectional study.

2.2.8. The Cross-sectional Study

The survey aimed to assess the structural validity and internal reliability of the second version of the EMM-FC scale.

2.2.9. Procedure and Participants

A purposive sample of 280 FC members was selected according to the initial guidelines for Exploratory Factor Analysis (EFA) [55]. The inclusion criteria were individuals aged 18 years or older with a minimum of 6-months of exercise experience and current participation in one of the six selected FCs, as described in the first phase. Individuals planning to enter bodybuilding competitions, professional athletes, those engaged in physical activities other than gym workouts, and those with chronic physical or psychological conditions or using medication were excluded from the study.

Researchers sought permission from the owners of the six chosen FCs, after which FC members were invited to participate in a self-administered online survey lasting approximately 15 minutes. This survey included the second version of the EMM-FC scale, encompassing EMM statements alongside socio-demographic variables such as age, gender, education, occupation, and exercise habits (i.e., exercise frequency per week, duration for each exercise session, and the length of exercise participation). Based on this, exercise maintainers were identified as individuals who consistently engaged in regular exercise, defined as participating in at least three exercise sessions per week, each lasting a minimum of 30 minutes, for at least six months [56, 57]. Data collection was facilitated through a Google Form with a quick response code. Potential respondents were assured of survey anonymity and the absence of any adverse consequences, and their participation was regarded as informed consent.

2.2.10. Data Analysis

The construct validity and internal reliability of the second version of the EMM-FC scale were evaluated. The evaluation process began with an Exploratory Factor Analysis (EFA), which aimed to determine which items should be retained or excluded from the initial constructs of the scale [58]. The assumption was that the items in the EMM-FC scale were scored as continuous variables, following a normal distribution. The EFA proceeded in four steps, the first of which was to generate a correlation matrix for all variables with acceptable values of correlation coefficients greater than 0.3. Bartlett's test of sphericity was used to test the hypothesis of the correlation matrix with a significant level of <0.05 . The Kaiser-Meyer-Olkin (KMO) measure of ≥ 0.5 indicated sizeable sampling adequacy. The second step focused on factor extraction, involving the estimation of initial constructs through Principal Components Analysis (PCA). The determination of the number of constructs was based on Eigenvalues exceeding 1. The Scree plot examination offered a visual representation of the total variance associated with each factor. Moving to the third step, factor rotation aimed to ensure that each variable was associated with the fewest possible constructs through Varimax rotations. The fourth and final step was allocated to selecting the number of constructs for the rotated solution, emphasizing interpretability. This decision-making process was guided by the a priori conceptual framework of the study, the Eigenvalues computed in the second step, and the relative interpretability of the rotated solution computed in the third step [59, 60]. Consequently, the constructs of the final version of the EMM-FC scale were compiled and named in accordance with the outcomes of the EFA.

Additionally, we calculated the item scores by averaging the scores of the items within the resulting constructs using a 5-point Likert scale ranging from 0 to 4. Considering the non-normal distribution of EMM scores as a dependent variable, the Mann-Whitney U test was employed to examine differences between exercise maintainers and non-exercise maintainers. Higher scores on the constructs of the EMM-FC scale indicated higher levels of exercise motivation. This analysis enhanced construct validity by investigating distinctions between known groups [61].

3. Results and Discussion

3.1. Sample Characteristics

A total of 319 FC members were invited to participate in the 2-phase study. There were more male than female FC respondents. Nearly all participants had an undergraduate level of education or higher, accounting for 92.3% in the qualitative study and 54.2% in the cross-sectional study. The participants had diverse employment backgrounds, ranging from government workplaces to private settings. In the first phase, freelancers comprised the largest group at 43.5%, while in the second phase, government officers made up the majority at 35.7%. Table 2 presents the characteristics of study participants in detail.

Table 2. Characteristics of study participants

Characteristics	Phase 1 (n= 39)	Phase 2 (n=280)
Age in years (Mean, SD)	24.8 (4.1)	32.2 (9.8)
Length of exercise in month (Mean, SD)	47.3 (29.7)	41.9 (28.2)
Gender		
Male	33 (84.6)	208 (74.3)
Female	6 (15.4)	72 (25.7)
Occupation		
Students	15 (38.5)	53 (18.9)
Businessmen	3 (7.8)	49 (17.5)
Private officers	2 (5.1)	56 (20.0)
Government officers	2 (5.1)	100 (35.7)
Freelancers	17 (43.5)	22 (7.9)
Education		
High school	3 (7.7)	128 (45.7)
College/Undergraduate	36 (92.3)	118 (42.1)
Postgraduate	.	34 (12.1)

3.2. Construct Validation of the EMM-FC Scale

Through the analysis of the connecting step between the qualitative study and the pre-testing, 20 items were eliminated from the 60 original EMM statements by experts due to content overlap. The remaining 40 items were assessed, showing acceptable I-CVI indexes ranging from 0.91 to 1, with a value of 0.99 and 0.88 for the S-CVI/Ave indice and S-CVI/UA, respectively. The Vietnamese translation version of the 40 items was tested by FC members with all acceptable I-FVI, S-FVI/Ave, and S-CVI/UA values of 1. Details of the 40 EMM statements are shown in Table A1 (see Appendix I).

For the pre-testing, the first version of the EMM-FC scale, including 40 EMM statements, showed Cronbach's alpha coefficient of 0.7, indicating all items with satisfactory internal consistency. As a result, the 40-item version of the EMM-FC scale was identified for the cross-sectional study. The inter-40 item correlation matrix of the pre-testing is presented in Table A2 (see Appendix I).

3.2.1. Convergent Validity, Discriminant Validity, and Composite Reliability

EFA is crucial to prevent inaccurate factor definition in the early phases of scale development. Therefore, EFA was used to assess the factorial structure of the EMM-FC scale's preliminary version [55]. For phase 2, the 40 EMM statements were submitted to principal component factor analysis with varimax rotation. Based on the scree plot, the amount of variance explained, and Eigenvalues greater than 1, five factors were identified and retained and rotated. The Kaiser-Meyer-Olkin measure of sampling adequacy for the data associated with the EMM-FC scale was 0.72. Bartlette's test of sphericity was also significant ($p < 0.001$), indicating the feasibility of factor analysis. Considering low communalities (< 0.2) and low factor loadings (< 0.4), 10 EMM statements were deleted from further analyses. The remaining 30 items were once again submitted to factor analysis, accounting for 61.3% of the variance. The composite reliability (CR) indicators of each factor were 0.92 (Factor 1), 0.96 (Factor 2), 0.87 (Factor 3), 0.84 (Factor 4), and 0.84 (Factor 5), respectively. The CR estimate revealed good internal consistency of the EMM-FC scale [54]. Table 3 presents factor loadings, average variance extracted, and composite reliability using the rotated factor matrix in the PCA method.

The first factor, comprising 14 items, characterizes FC members who continue to exercise as being driven by personal achievements derived from consistent exercise practices, such as improved health (i.e., EMM 7, EMM 8), fostering relationships with others (EMM 19, EMM 20), and seeing their favorable physical changes (EMM 18). The health-related benefits encompass improvements in physical appearance (i.e., stronger and more muscular), mental well-being (i.e., less stress for happier moods), and immunity to disease (EMM 15). This aligns with the accomplishments that FC members obtained from exercise, which is why Construct 1 is called "Exercise Achievements".

The second factor, comprising 5 items, highlighted the external support (EMM 3) from friends, family, personal trainers, FC owners, ideal role models, etc. It also reflects how those who exercise serve as role models for others, encouraging FC members to work out harder (EMM 2). This factor also encompassed exercise-related conditions, such as easy access to high-quality equipment (EMM 4), convenience of workout locations (EMM 5), and affordability (EMM 6). Thus, Construct 2 was aptly termed "Exercise environments," since individuals in these supportive settings primarily aim to ensure that FC members can sustain their exercise routines.

Three items that loaded on the third factor showed how FC members incorporated exercise into their personal goals, which included improving their body image (EMM 22), physical health (EMM 24), and mental well-being (EMM 23). As a result, Construct 3 was named "Exercise integration with life goals".

The fourth factor was named "Workout-aholic", with 4 items, representing the fourth construct of the EMM-FC scale. This factor identified FC patrons who were motivated to persist in their workouts at the facility due to their personal enthusiasm and passion for exercise (EMM 35). Moreover, missing workouts could lead to negative emotional consequences, such as regret and frustration (EMM 39, EMM 40), and may ultimately result in the development of an exercise addiction (EMM 36).

The final construct, comprising four items, focused on the positive emotions associated with exercise. These emotions, which include feelings of comfort (EMM 26), fun (EMM 30), happiness (EMM 31), and relaxation (EMM 27), serve as motivating factors for FC patrons to persist in their workouts. Hence, this construct was appropriately labeled "Exercise enjoyment" as Construct 5.

Table 3. Construct validity of the 30-item version of the EMM-FC scale

Abbreviated EMM statements	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
EMM 19. I get opportunities to socialized	0.837	-	-	-	-
EMM 10. I get to eat well	0.770	-	-	-	-
EMM 9. I get stronger	0.768	-	-	-	-
EMM 15. I want to prevent illnesses	0.753	-	-	-	-
EMM 8. I feel more energetic	0.733	-	-	-	-
EMM 7. I get to be healthier	0.730	-	-	-	-
EMM 18. I recognize positive changes in me	0.727	-	-	-	-
EMM 14. I get weight balance	0.720	-	-	-	-
EMM 20. I get opportunities to facilitating the connection with others	0.691	-	-	-	-
EMM 16. I get relieved from daily life stress	0.658	-	-	-	-
EMM 11. I get a better-looking appearance	0.622	-	-	-	-
EMM 13. I get more muscular body physique	0.581	-	-	-	-
EMM 17. I am aware of routine exercise habit	0.554	-	-	-	-
EMM 12. I get a fit body appearance	0.553	-	-	-	-
EMM 4. The fitness center has complete exercise facilities	-	0.955	-	-	-
EMM 5. The fitness center is closed to my living location	-	0.935	-	-	-
EMM 3. I have support from others around	-	0.930	-	-	-
EMM 6. The fitness center is affordable	-	0.903	-	-	-
EMM 2. I try to have the similar body image of my favorite fitness idols	-	0.836	-	-	-
EMM 22. Exercise for appearance is my goal in life	-	-	0.935	-	-
EMM 24. Exercise for mental wellness is my goal in life	-	-	0.896	-	-
EMM 23. Exercise for health is my goal in life	-	-	0.666	-	-
EMM 35. I am passionate to exercise	-	-	-	0.847	-
EMM 39. I regret if miss exercise sessions	-	-	-	0.826	-
EMM 36. I am addicted to exercise	-	-	-	0.702	-
EMM 40. I am frustrated if miss exercise sessions	-	-	-	0.669	-
EMM 27. I feel relax as doing exercise	-	-	-	-	0.839
EMM 31. I feel happy as doing exercise	-	-	-	-	0.786
EMM 30. I feel fun as doing exercise	-	-	-	-	0.750
EMM 26. I feel more comfortable as doing exercise	-	-	-	-	0.636
Average Variance Extracted	0.51	0.83	0.70	0.58	0.57
Composite Reliability	0.92	0.96	0.87	0.84	0.84

3.2.2. Internal Consistency Reliability

Cronbach's alphas for the five constructs ranged from 0.75 to 0.94, revealing good internal consistency and reliability of the EMM-FC scale [61]. After examining low item-total correlations (< 0.5) and assessing whether alpha values improved by removing specific items, we determined to retain all 30 items without further deletions. Table 4 displays the descriptive statistics from the reliability analysis for the subscales and total scale of the 30-item version of the EMM-FC scale.

Table 4. The reliability analysis for the 30-item version of the EMM-FC scale

Scale	Number of items	Summary item statistics			Item-total statistics		
		Mean	Min – Max	Variance	ITC ^(a)	SMC ^(b)	Alpha
Construct 1	14	1.96	1.75 – 2.21	0.01	0.49	0.45	0.91
Construct 2	5	2.78	2.45 – 3.04	0.05	0.75	0.81	0.94
Construct 3	3	0.96	0.81 – 1.18	0.03	0.45	0.32	0.83
Construct 4	4	1.50	1.37 – 1.58	0.009	0.45	0.23	0.75
Construct 5	5	1.41	1.02 – 1.71	0.08	0.55	0.57	0.77
Total	30	1.86	0.81 – 3.04	0.30	0.07	0.30	0.80

(a): ITC = lowest corrected Item-Total Correlation

(b): SMC = lowest Squared Multiple Correlation

3.2.3. Differentiations by Known Groups: EMM and The Group of Exercise Maintenance

Construct validity was also examined by assessing the relationships between the motivation scores of each construct and self-reported exercise behavior in groups of exercise maintainers and non-exercise maintainers. Figure 2 illustrates the Mann-Whitney U test results, indicating the significant differences between exercise maintainers ($n = 136$) and non-exercise maintainers ($n = 144$) on motivation scores in the total scale score (64.17 vs. 48.4, respectively). Construct 1 accounted for the highest mean scores (27.56), followed by Construct 2 (13.92), Construct 4 (6.01), Construct 5 (5.66), and Construct 3 (2.90). For each construct of the scale, exercise maintainers scored significantly higher than non-exercise maintainers. These findings are underscored by the construct-specific mean scores for exercise maintainers compared to non-exercise maintainers, which were as follows: Construct 1 (30.13 vs. 25.15), Construct 2 (15.4 vs. 12.52), Construct 3 (4.65 vs. 1.25), Construct 4 (7.04 vs. 5.03), and Construct 5 (6.94 vs. 4.45). The EMM-FC scale had discriminant constructs across the board, but the scale's overall scores showed the strongest positive correlation with scores of Construct 1 (as depicted in Table 5).

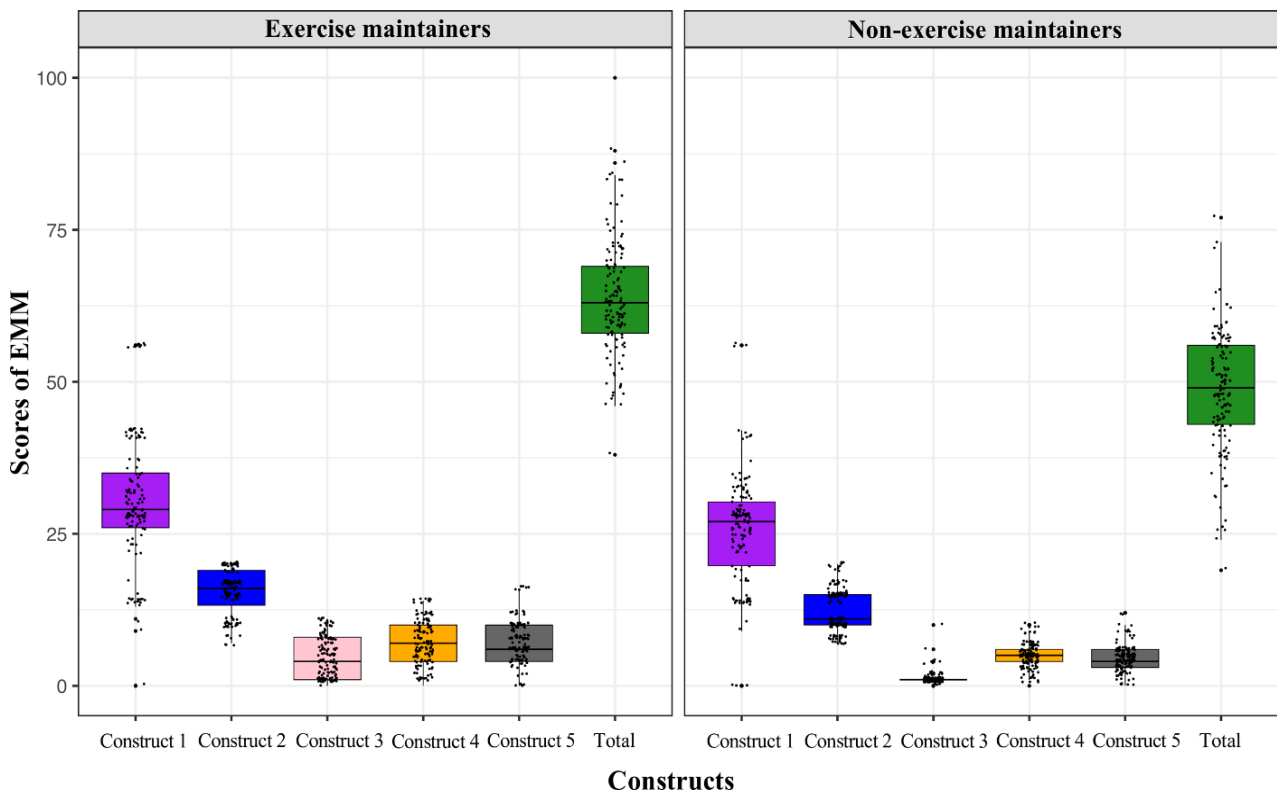


Figure 2. Scores of the 30-item version of the EMM-FC scale's constructs by the group of exercise maintenance

Table 5. EMM score correlation matrix table

Scores	Construct 1	Construct 2	Construct 3	Construct 4	Construct 5	Total
Construct 1	1.000	-	-	-	-	-
Construct 2	-.023	1.000	-	-	-	-
Construct 3	-.047	-.047	1.000	-	-	-
Construct 4	-.026	.075	.092	1.000	-	-
Construct 5	-.071	-.011	.200**	.031	1.000	-
Total	0.819**	0.301**	0.255**	0.282**	0.256**	1.000

(**): Correlation is significant at the 0.01 level (2-tailed)

3.3. Discussion

Our study aimed to initially develop and later assess the construct validity of the EMM-FC scale. Regarding the scale construction process in exercise, the applicable instructions based on the SDT allowed for its careful development within the scope of the adopted construction strategy and conceptual theoretical foundations [15–17]. In addition, competent judges (content validity), linguistic (face validity) analysis, and the pre-testing, along with the scale development procedure, led to the elimination of incorrectly formulated linguistically and inaccurate items [49]. Enabling the development of its different tested versions, which underwent psychometric property assessment in the second phase to verify the EMM-FC scale.

The internal structure of the EMM-FC scale in the cross-sectional study was verified using EFA [59, 60]. The calculations were performed, allowing the development of a stable and theoretically valid five-factorial measurement model that described the regulatory styles included in the motivational continuum by Ryan and Deci [15–17]. The reliability of the EMM dimensions was assessed by evaluating their acceptable internal consistency using Cronbach's alpha in the pre-testing and the cross-sectional study. The analysis of these results showed that the EMM-FC scale was internally consistent and ensured the satisfactory stability of the measurement. The cross-sectional study allowed for the verification of the EMM-FC scale's construct (discriminant and convergent validity).

So far, no validated scale in the Vietnamese language has been developed to evaluate motivations in adult fitness groups. For this sample of Vietnamese FC members, construct validation and internal consistency reliability of the EMM-FC scale were affirmed. Through EFA, we identified five key constructs aligning with SDT, corresponding to five behavioral regulations: external regulation, identified regulation, introjected regulation, integrated regulation, and intrinsic regulation [15–17]. Within the context of FCs, such motivational styles of EMM components for FC members in Vietnam were consequently named "Exercise environments", "Exercise achievements", "Workout-aholic", "Exercise integration with life goals", and "Exercise enjoyment", respectively. The EMM statements from each pair of meta-motivational states did not load on the same construct. For instance, items of Construct 1 (Exercise achievements) loaded separately from the four remaining constructs. Findings further highlight the presence of five distinct yet notably significant constructs within the EMM-FC scale, shedding light on how individuals approach exercise within fitness settings.

In line with definitions suggested in previous studies, participants self-reported exercise commitment as maintainers, reporting more than twice exercise sessions per week, at least 30 minutes per session, and lasting for at least six months [57, 62, 63]. Findings showed significant relationships between EMM scores on the EMM-FC scale and exercise maintenance habits. Exercise maintainers significantly scored higher than the group of non-exercise maintainers. Interestingly, even though all participants in this study participated in workouts in the long term, over half of FC members (51.4%) did not regularly exercise. To ensure practical expectations are met, it is advisable to continuously broaden the reasons for participating in exercise within fitness settings [64]. It is also anticipated that the EMM-FC scale will exhibit positive relationships with other measures of motivation in physical activity.

Sharing the similarities with other scales in previous studies, this study has used a diverse population, such as students, officers, and businessmen, based on the fitness settings [27, 29]. Some studies were entirely conducted on a specific population, including university student populations [37, 38], while others developed and validated exercise measures in a few culturally specific contexts, with a stronger emphasis on Western countries than other regions worldwide [22, 60, 65]. The EMM-FC scale extends this by focusing on a more diverse population and reflecting more cultural relevance for Vietnamese FC members. Exercise motivation scores were higher on all five of the EMM-FC scale constructs for exercise maintainers than those unable to maintain regular exercise in the FCs.

Other studies found significant relationships indicating the role of external support and long-term exercise behavior [66–68]. Similarly, the findings of our study reveal a significant association, resulting in higher scores in the "exercise environments" construct among the exercise maintainer group. Furthermore, compared to other exercise motivation scales, our study eliminated items that mentioned the influence of external requests to exercise, such as the "others ask

to do exercise” item, which might be related to the stage of exercise participation among exercisers. For those who initially started to work out, reasons regarding the requirements from others, such as family, friends, and doctors, contributed to exercise decisions [63]. In contrast, for those who participated in a certain period, it might not have contributed as a crucial motive [63, 68], which was why long-term FC members confirmed items such as “I maintain exercise because I am aware of routine exercise habits.” Additionally, the relationship between exercise adherence and perceiving numerous benefits from regular exercise was apparent [69], represented through the item “I maintain exercise because I recognize positive changes in me” by study participants.

In line with the study of Gjestvang et al. (2020), motives for initiation and sustained exercise adherence in fitness settings might be different [63]. New FC members were followed up for 1 year at three points of 3, 6, and 12 months, stating one of their reasons at the beginning time was “doctors advised to exercise” due to health-related problem pressures. However, at all-time points, motives regarding positive health benefits and physical fitness were rated higher on a six-point scale. Moreover, higher levels of motive enjoyment are significantly associated with regular exercise [70]. Members of FCs tend to be younger, frequently exercise, and have higher intrinsic motivation and social support than multipurpose and fitness-only members. This suggests that deriving enjoyment from a fitness program and being part of a community-based exercise group can play a vital role in maintaining a regular exercise routine [71]. When people find enjoyment in a fitness program and believe it to be individually significant, they are more likely to continue and regularly participate in it [72].

Items on the “workout-aholic” construct reflected negative feelings such as being “regretful” and “frustrated” when FC members were not able to exercise. This may influence motivation for long-term exercise by the way exercisers continue to exercise to prevent such adverse emotions. However, a narrative review indicated that excessive exercise patterns also co-occurred with other morbidities, including psychiatric and eating or body-image disorders [73]. This connection was particularly pronounced among FC members who had a natural inclination toward a passion for exercise, possibly bordering on “exercise addiction”. Subsequent testing of the “workout-aholic” construct clarified its positive connection through the significant reliability correlation coefficients of this construct’s items.

4. Conclusion

The EMM-FC scale was developed and driven by the Self-Determination Theory for measuring the motivation of FC members in Vietnam. The present study described the EMM-FC scale comprising five distinct constructs which were labeled “Exercise achievements”, “Exercise environments”, “Exercise integration with life goals”, “Exercise enjoyment”, and “Workout-aholic”. The item numbers of these five constructs were 14, 5, 3, 4, and 5, respectively. Findings demonstrated that the 30-item version of the new EMM-FC scale was a valid and reliable instrument based on the Exploratory Factor Analysis. The initial construction of this EMM-FC scale was to adapt to the Vietnamese context, indicating its scientific and potential application for both research and practical purposes. The study provided valuable insights into individuals' motivational styles in exercise through a mixed-methods design, examining the psychological aspects. The psychometric properties of the EMM-FC scale are expected to be thoroughly validated in future studies with larger sample sizes. Consequently, the EMM-FC scale is anticipated to serve as a valuable instrument for enhancing exercise-related health behaviors. Fitness professionals would implement more targeted interventions to promote exercise habits in the fitness settings, and higher motivation scores as assessed by the EMM-FC scale would predict long-term exercise adherence among exercisers in fitness centers.

4.1. Strengths and Limitations

To the best of our knowledge, the EMM-FC scale is the first instrument to measure the exercise motivation of FC members in Vietnam. Most previous studies reporting on motivational measures were performed more than five years ago in the fitness setting globally. Another strength was the practical application using a mixed-method approach to initially develop and validate the construct validity of the EMM-FC scale, resulting from the diversity of our sample recruited in multiple FCs. In addition, we compared exercise maintainers and non-exercise maintainers, demonstrating the scale's utility in examining the influence of exercise motivation on exercise commitment. Notably, higher motivation scores were associated with increased exercise adherence. Besides, our research team, including researchers with different backgrounds and experiences, contributed to data analysis, producing enriched understandings and contributing to better explanations for EMM [16, 74].

Although data collection happened in a genuine natural setting, the study was conducted in a certain geographic region in the southern province of Vietnam, which can reduce the generalizability of the findings. Additionally, the study only focused on long-term participants, excluding those who continued their exercise routines for other reasons. Furthermore, the study acknowledged the absence of older participants who could have had diverse motivations for engaging in fitness activities in the FCs [35, 75]. However, since the current research is consistent with other studies on maintaining exercise [63, 68], it seems unlikely that the absence of elder participants has affected the findings. Moreover, it is essential to recognize that the development of the EMM-FC scale heavily relied on the use of questionnaires as a research method. Self-reported data can be influenced by participants' desire to present themselves in a certain way and may have also been influenced by potential gaps in their understanding of the subjects under investigation [76].

4.2. Future Research

Future research may involve a thorough examination of the construct validity and predictive validity of the EMM-FC scale by Confirmation Factor Analysis (CFA), recruiting a larger sample [77]. Predictive links between exercise behavior and motivation would, therefore, be investigated. This can guide the development of personalized exercise interventions tailored to individuals' EMM scores. Furthermore, by using multi-group CFA to examine whether measurement invariance of the EMM-FC scale could be observed across samples of exercise participants in different nations, it is possible to explore the cross-cultural validity of the Vietnamese scale. To promote the creation of successful practice techniques, it is crucial to determine whether the EMM-FC scale has to be modified for use in other fitness contexts. Examples of these settings include group versus individual exercise and exercise adoption versus maintenance [78, 79]. Additionally, a longitudinal study tracking the fitness club members over time to observe the sustainability of their regular exercise habits would offer continual validation of the EMM-FC scale within the context of Vietnamese adults.

5. Declarations

5.1. Author Contributions

Conceptualization, T.T.N., C.S., C.N.L., and O.D.; methodology, T.T.N., C.S., C.N.L., O.D., S.I., and N.T.D.; formal analysis, T.T.N., P.T.T., D.H.P., and H.K.Q.; resources, C.S.; data curation, T.T.N., P.T.T., T.V.D., T.N.D., T.T.T.C., T.D.A., N.T.H., and H.K.Q.; writing—original draft preparation, T.T.N., O.D., C.N.L., and C.S.; writing—review and editing, T.T.N. and C.S.; visualization, T.T.N., H.K.Q., and D.H.P.; supervision, C.S., C.N.L., O.D., S.I., and N.T.D.; project administration, C.S. All authors have read and agreed to the published version of the manuscript.

5.2. Data Availability Statement

The data presented in this study are available in the article.

5.3. Funding

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5.5. Institutional Review Board Statement

The study was approved by the Ethics Committee in Human Research of Walailak University (WUEC-23-029-01).

5.6. Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

5.7. Declaration of Competing Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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Appendix I

Table A1. Forty EMM statements for the pre-testing by English and Vietnamese versions

EMM	Statements	Câu	Động lực duy trì tập thể dục
1*	I maintain exercise because others around ask me to exercise	1*	Tôi duy trì tập thể dục bởi vì những người xung quanh yêu cầu tôi đi tập
2	I maintain exercise because I try to have the similar body image of my favorite fitness idols	2	Tôi duy trì tập thể dục bởi vì tôi cố gắng có được cơ thể đẹp như mẫu người tôi yêu thích
3	I maintain exercise because I have support from others around	3	Tôi duy trì tập thể dục bởi vì tôi có sự hỗ trợ từ mọi người xung quanh
4	I maintain exercise because the fitness center has complete exercise facilities	4	Tôi duy trì tập thể dục bởi vì phòng tập có trang thiết bị tập luyện đầy đủ
5	I maintain exercise because the fitness center is closed to my living location	5	Tôi duy trì tập thể dục bởi vì phòng tập gần nơi tôi sinh sống
6	I maintain exercise because the fitness center is affordable	6	Tôi duy trì tập thể dục bởi vì phòng tập có mức giá phù hợp với tôi
7	I maintain exercise because I get to be healthier	7	Tôi duy trì tập thể dục bởi vì tôi thấy khỏe mạnh hơn
8	I maintain exercise because I feel more energetic	8	Tôi duy trì tập thể dục bởi vì tôi cảm thấy nhiều năng lượng hơn
9	I maintain exercise because I get stronger	9	Tôi duy trì tập thể dục bởi vì tôi mạnh mẽ hơn
10	I maintain exercise because I get to eat well	10	Tôi duy trì tập thể dục bởi vì tôi ăn uống tốt hơn
11	I maintain exercise because I get a better-looking appearance	11	Tôi duy trì tập thể dục bởi vì tôi có ngoại hình tốt hơn
12	I maintain exercise because I get a fit body appearance	12	Tôi duy trì tập thể dục bởi vì tôi có thân hình cân đối
13	I maintain exercise because I get more muscular body physique	13	Tôi duy trì tập thể dục bởi vì tôi có thân hình cơ bắp hơn
14	I maintain exercise because I get weight balance	14	Tôi duy trì tập thể dục bởi vì tôi có cân nặng cân đối
15	I maintain exercise because I want to prevent illnesses	15	Tôi duy trì tập thể dục bởi vì tôi muốn phòng ngừa bệnh tật
16	I maintain exercise because I get relieved from daily life stress	16	Tôi duy trì tập thể dục bởi vì tôi giải tỏa được căng thẳng trong cuộc sống
17	I maintain exercise because I am aware of routine exercise habit	17	Tôi duy trì tập thể dục bởi vì tôi tự nhận thức thói quen tập thể dục hàng ngày
18	I maintain exercise because I recognize positive changes in me	18	Tôi duy trì tập thể dục bởi vì tôi nhận thấy những thay đổi tích cực của tôi
19	I maintain exercise because I get opportunities to socialized	19	Tôi duy trì tập thể dục bởi vì tôi có cơ hội quen biết nhiều người
20	I maintain exercise because I get opportunities to facilitating the connection with others	20	Tôi duy trì tập thể dục bởi vì tôi có cơ hội tăng cường sự kết nối với những người khác
21*	I maintain exercise because maintaining exercise for weight change is my goal in life	21*	Tôi duy trì tập thể dục bởi vì duy trì tập luyện thay đổi cân nặng là mục tiêu cuộc sống của tôi
22	I maintain exercise because maintaining exercise for appearance is my goal in life	22	Tôi duy trì tập thể dục bởi vì duy trì tập luyện để có ngoại hình đẹp là mục tiêu cuộc sống của tôi
23	I maintain exercise because maintaining exercise for health is my goal in life	23	Tôi duy trì tập thể dục bởi vì duy trì tập luyện để có sức khỏe tốt là mục tiêu cuộc sống của tôi
24	I maintain exercise because maintaining exercise for mental wellness is my goal in life	24	Tôi duy trì tập thể dục bởi vì duy trì tập luyện để có tinh thần tốt là mục tiêu cuộc sống của tôi
25*	I maintain exercise because I feel more pleasure as doing exercise	25*	Tôi duy trì tập thể dục bởi vì tôi cảm thấy sảng khoái khi tập luyện

EMM	Statements	Câu	Động lực duy trì tập thể dục
26	I maintain exercise because I feel more comfortable as doing exercise	26	Tôi duy trì tập thể dục bởi vì tôi cảm thấy thoải mái khi tập luyện
27	I maintain exercise because I feel relax as doing exercise	27	Tôi duy trì tập thể dục bởi vì tôi cảm thấy thư giãn khi tập luyện
28*	I maintain exercise because I feel joyful as doing exercise	28*	Tôi duy trì tập thể dục bởi vì tôi cảm thấy thích thú khi tập luyện
29*	I maintain exercise because I feel refresh as doing exercise	29*	Tôi duy trì tập thể dục bởi vì tôi cảm thấy tươi trẻ khi tập luyện
30	I maintain exercise because I feel fun as doing exercise	30	Tôi duy trì tập thể dục bởi vì tôi cảm thấy vui vẻ khi tập luyện
31	I maintain exercise because I feel happy as doing exercise	31	Tôi duy trì tập thể dục bởi vì tôi cảm thấy hạnh phúc khi tập luyện
32*	I will not maintain exercise if I lose exercise enjoyments	32*	Tôi sẽ không duy trì tập thể dục nếu tôi mất đi niềm vui khi tập luyện
33*	I maintain exercise because I do not want to give up exercise	33*	Tôi duy trì tập thể dục bởi vì tôi không muốn từ bỏ việc tập luyện
34*	I maintain exercise because I am patient to exercise	34*	Tôi duy trì tập thể dục bởi vì tôi kiên trì tập thể dục
35	I maintain exercise because I am passionate to exercise	35	Tôi duy trì tập thể dục bởi vì tôi đam mê tập thể dục
36	I maintain exercise because I am addicted to exercise	36	Tôi duy trì tập thể dục bởi vì tôi nghiện tập thể dục
37*	I maintain exercise because I am upset if miss exercise sessions	37*	Tôi duy trì tập thể dục bởi vì tôi buồn nếu tôi bỏ những buổi tập
38*	I maintain exercise because I am uneasy if miss exercise sessions	38*	Tôi duy trì tập thể dục bởi vì tôi cảm thấy không dễ dàng nếu tôi bỏ những buổi tập
39	I maintain exercise because I regret if miss exercise sessions	39	Tôi duy trì tập thể dục bởi vì tôi cảm thấy hối tiếc nếu tôi bỏ những buổi tập
40	I maintain exercise because I am frustrated if miss exercise sessions	40	Tôi duy trì tập thể dục bởi vì tôi cảm thấy bức rức khó chịu nếu tôi bỏ những buổi tập

(*) 10 EMM statements were deleted after using the Principal Component Analysis with Varimax rotation method in the cross-sectional study

Table A2. The inter-40 item correlation matrix table in the pre-testing

	EMM 1	EMM 2	EMM 3	EMM 4	EMM 5	EMM 6	EMM 7	EMM 8	EMM 9	EMM 10	EMM 11	EMM 12	EMM 13	EMM 14	EMM 15	EMM 16	EMM 17	EMM 18	EMM 19	EMM 20	EMM 21	EMM 22	EMM 23	EMM 24	EMM 25	EMM 26	EMM 27	EMM 28	EMM 29	EMM 30	EMM 31	EMM 32	EMM 33	EMM 34	EMM 35	EMM 36	EMM 37	EMM 38	EMM 39	EMM 40		
EMM 1	1																																									
EMM 2	-.022	1																																								
EMM 3	.385"	.633"	1																																							
EMM 4	.125"	.904"	.809"	1																																						
EMM 5	.374"	.674"	.951"	.834"	1																																					
EMM 6	.120'	.650"	.841"	.841"	.804"	1																																				
EMM 7	-.002	-.012	.028	.005	.008	.035	1																																			
EMM 8	-.006	-.012	.027	.003	.005	.030	.995"	1																																		
EMM 9	-.006	-.011	-.033	-.036	-.061	-.028	.543"	.554"	1																																	
EMM 10	-.008	-.013	-.033	-.038	-.065	-.029	.546"	.557"	.995"	1																																
EMM 11	-.059	-.037	-.078	-.051	-.049	-.043	.409"	.403"	.420"	.416"	1																															
EMM 12	-.003	-.064	-.095	-.099	-.097	-.108	.094	.098	.324"	.327"	.370"	1																														
EMM 13	-.101	.069	-.001	.017	-.006	-.007	.376"	.375"	.367"	.375"	.363"	.389"	1																													
EMM 14	.008	-.011	.033	-.002	.034	.014	.440"	.441"	.404"	.413"	.404"	.459"	.397"	1																												
EMM 15	-.012	.023	.019	.008	.009	.009	.393"	.394"	.558"	.563"	.452"	.435"	.438"	.529"	1																											
EMM 16	.101	-.086	.060	-.053	.032	.034	.446"	.454"	.440"	.430"	.238"	.341"	.141"	.551"	.309"	1																										
EMM 17	.120'	-.032	.064	-.012	.049	.013	.340"	.343"	.296"	.291"	.294"	.328"	.115	.417"	.299"	.747"	1																									
EMM 18	-.032	-.073	-.068	-.086	-.066	-.045	.440"	.440"	.432"	.438"	.529"	.388"	.490"	.486"	.559"	.443"	.337"	1																								
EMM 19	-.006	.009	.014	-.005	-.009	.011	.559"	.561"	.567"	.569"	.550"	.500"	.438"	.575"	.875"	.379"	.397"	.597"	1																							
EMM 20	-.010	-.035	.023	-.040	.000	.010	.413"	.409"	.461"	.457"	.269"	.517"	.496"	.515"	.399"	.542"	.311"	.489"	.492"	1																						
EMM 21	-.016	-.060	-.094	-.113	-.077	-.113	-.132'	-.126'	-.005	.000	-.099	.108	.097	.013	.068	-.045	-.065	.000	.019	.069	1																					
EMM 22	.001	-.023	.001	-.031	-.013	-.023	-.012	-.008	-.019	-.016	-.055	-.054	-.034	-.007	-.009	-.038	-.017	-.007	-.028	-.022	.292"	1																				
EMM 23	-.010	-.016	-.040	-.072	-.047	-.100	-.058	-.053	-.026	-.025	.031	-.028	-.067	.027	.012	-.017	.003	-.028	-.022	-.023	.132'	.504"	1																			
EMM 24	.021	-.075	-.017	-.065	-.031	-.032	-.034	-.032	-.010	-.008	-.050	-.036	-.044	-.044	-.038	-.061	-.065	-.047	-.053	-.030	.296"	.945"	.391"	1																		
EMM 25	.081	.077	.087	.078	.104	.023	.021	.032	.024	.013	.002	-.044	.057	.082	.037	.049	.082	.052	.035	.037	.109	.101	.094	.048	1																	
EMM 26	.066	.135'	.144'	.142'	.124'	.104	-.088	-.081	-.007	-.012	-.117	-.044	-.126'	-.069	-.032	.010	.025	-.118"	-.064	-.065	-.121"	.124'	.093	.119'	.237"	1																
EMM 27	.004	-.025	-.007	-.009	-.051	.038	.045	.046	.058	.060	-.057	.058	-.029	-.037	.033	.059	.024	.007	.017	.045	.097	.018	-.115	.062	-.079	.336"	1															
EMM 28	-.072	.079	.057	.083	.033	.071	-.006	-.002	.000	.002	.021	-.019	-.018	.041	.021	-.035	-.004	-.022	-.004	-.007	-.125'	.468"	.308"	.433"	.286"	.416"	.189"	1														

** . Pearson Correlation is significant at the 0.01 level (2-tailed).