



Motivational Factors on Exercise Behavior in Youth

Wanee Jermuravong

Abstract

The purpose of this study was (a) to validate the Thai version of Exercise Motivation Scale (TEMS) and (b) to assess the exercise motivational factors that determine the exercise behavior of Thai youth. The total subjects for main purpose of study were 1912 (949 males and 963 females), aged between 18 and 22 ($M = 19.87$, $SD = 1.31$), who regularly exercise in the public parks, health clubs, and fitness centers throughout Thailand. All 8 subscales of TEMS (amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, intrinsic motivation to learn, to accomplish the task and to experience sensation) were found to be reliable ($\alpha .60$ to $.76$) and confirm factor analysis (CFA) indicated that the measurement model was fit with the data reasonably well. However, since three items (the External factor, the Introjected factor, and intrinsic motivation to accomplishment) showed unaccepted values on the multiple squared correlations, they were then removed from TEMS with better values. The second order analysis of the three factors was then examined with non fit results. An examination of the correlation matrix indicated high factor correlations among three latent factors of extrinsic motivation (Identified, Introjected, Integrated) and three latent factors of intrinsic motivation. These high correlations values were revised in Extrinsic Motivation and Intrinsic Motivation, so that, the only four factors of motivation were used for further analysis. The second order of TEMS showed good fit. The exercise motivation and exercise behavior were found to be related with statistical significance of .01.

Keywords : exercise motivation, self-determination, exercise motivation scale: EMS

Introduction

Exercise or physical activity is central to the quality of life. The benefits of exercise are widely known, and include both physiological and psychological variables. Data have linked exercise or physical activity to decreased risk of cardiovascular disease, reduction of blood pressure, assistance in weight management, mood improvement and mortality rates reduction (American College of Sport Medicine [ACSM], 1990; Blair, 1993). Exercise or physical activity also reduces the risk of developing diabetes and some forms of cancer, promotes healthy muscles, bones and joints (U.S. Department of Health and Human Services, 1996). Psychologically, exercise has also been associated with reduced state anxiety, reduced tension, moderate depression, and an increased sense of well-being (ACSM, 1990; Byrne & Byrne, 1993; Yeung, 1996). It is now well established that regular participation in physical exercise has beneficial effects on human physical and psychological health and social well-being (Biddle, Sallis, & Cavill, 1998). However there are still a large percentage of individuals who do not participate in regular exercise. In America, for example, over 60% of adults do not participate in the recommended amount of physical activity as promoted by ACSM; moreover, 25% are considered sedentary (National Coalition for Promoting Physical Activity, 1996) and 10% participate in regular vigorous exercise (Weinberg, & Gould, 1995). Statistics regarding exercise participants' adherence to various forms of physical activity show that approximately one half of individuals who do join organized exercise programs drop out within six months to a year (Dishman, 1988, 2001).

In Thailand, over 70% of Thai adults (over 15 years old) do not participate in exercise or physical activity (National Statistic Office of Thailand, 2000). Exercise seems to be such an important public

health mission that the Thai government put on effort through the National Economic and Social Development Plan, Number 8 and 9 (present plan) and the National Sport Development Master Plan, Number 3, B.E 2545-2549 (2002-2006) in promoting all groups of Thai people to participate in exercise and sport (Sport Authority of Thailand, 2001, p.7), with a target of 60% of all Thai people to be involved in some sorts of physical activity within the year 2006. Examples are the Sport Against Drug Project, Exercise for Health Promotion Project, and Physical Activity for Well-being Project. All these projects had set health promotion to encourage people to participate in a variety of exercise activities, such as jogging, swimming, football, indoor-soccer, aerobic dance, etc. However, many people still have not begun to follow those plans.

The adherence to exercise promotion should start with young people who are the important human resources for the future. Exercise or physical activity among childhood and adolescence is the predictor of physical activity in adults (Coakley & White, 1992; Risto, Xiaolin, Lauri, & Jorma, 2000). Of particular concern is the fact that Thai people ranged 15-24 years old spend less than 15% of their free time for exercise. Females tend to participate in exercise less than 5% (Human and Social Research Institute, 1998). The province's health status survey in 2001, indicated that Thai people, age 15-24, were the age group that had the lowest participation rate of all age groups (National Statistic Office of Thailand, 2001). The lack of exercise or physical activity of Thai youth highlighted in these surveys, leads to more need for promotion of exercise by health related organizations.

The understanding of factors that motivate young people to engage in exercise is one important research agenda item because different age groups have different motivation factors of exercise (Campbell, McAuley, McCrum, & Evans, 2001). Knowledge gained from studying exercise participation have valuable benefits because it can be used to encourage those who need to do greater amounts of exercise. The most important and immediate determinant of any human behavior such as exercise is the internal

factor, called motivation. Motivation is a psychological mechanism that governs the direction, intensity, and persistence of behavior (Iso-Ahola, & Clair, 2000). Consequently, motivation concerns energy, direction, and persistence – all aspects of activation and intention (Ryan, & Deci, 2000). Motivation to participation in exercise or physical activity is a major area of research in exercise and sport psychology. The reason why people exercise and factors which temper participants' exercise patterns have always been of great interest in understanding variations in exercise or physical activity behavior such as choice, effort, consistency, and persistence. Intrapersonal factors such as self – motivation have continued to be identified as an important personal variable association with exercise – related to feeling in adherence (Morgan, 1997; Merkle, Jackson, Zhang, & Dishman, 1998, Dishman & Buckworth, 1997), and have been found to have a significant impact on exercise behavior (Dishman & Gettmann, 1980; Dishman & Ickes, 1981; Frederick & Ryan, 1993; Douthitt, 1994; Frederick, Morrison, & Manning, 1996). On the other hand, individuals with limited motivation possibly begin exercise programs only with external prompts.

Understanding adherence to health-related behaviors is important for scientific inquiry. Knowledge of the fundamental processes and mechanisms of human behavior can inform practitioners how to promote human motivation. Deci and Ryan's (1985) self-determination theory has become increasingly popular in studies of human motivation (Deci, Koestner, & Ryan, 1999; Biddle, & Nigg, 2000). Self-determination is defined as the perception of choice and having those choices to be the determinants of one's action.

One recent approach to the study of human motivation involves the use of Deci and Ryan's (1985,1991) self-determination theory (SDT). Based on Deci's (1975) early work, Deci and Ryan (1985, 1991), proposed a multidimensional conceptualization of motivation. The opposition of intrinsic and extrinsic motivation have traditionally been emphasized, with the former related to positive

and negative consequences. SDT has differentiated types of motivation, in what is called organismic integration, to detail the different forms of extrinsic motivation and contextual factors that either promote or hinder internalization and integration of the regulation for these behaviors. (Ryan, & Deci, 2000). Internalization is viewed as a motivation process by which people actively transform external regulation into internal regulation (Deci & Ryan, 1991)

The lowest stage of self-determination starts with amotivation, the state of lacking the intention to act. The next stage of self-determination is extrinsic motivation. Extrinsic motivation cover the continuum between amotivation and intrinsic motivation, and vary in extent to which their regulation is autonomous. The extrinsically motivated behaviors that are least autonomous are referred to as externally regulated. Such behaviors are performed to satisfy an external demand or reward contingency. The second type of extrinsic motivation is labeled introjected regulation. Introjection involves taking in a regulation but not fully accepting it as one own. It is a relatively controlled form of regulation in which behaviors are performed for reasons such as pride. Thus, external regulation (begin interpersonally controlled) and interjected regulation (begin intrapersonally controlled) have been combined to form a controlled motivation composite (Ryan, & Deci, 2000).

Another form of extrinsic motivation is identification regulation. Identification reflects a conscious valuing of a behavioral goal or regulation, such as the action being accepted or owned as personally important. Finally, the most autonomous form of extrinsic motivation is integrated regulation. Integration occurs when identified regulations are fully assimilated to the self, which means they have been evaluated and brought into congruence with one's other values and needs. Actions characterized by integrated motivation share many qualities with intrinsic motivation, although they are still considered extrinsic because they are done to attain a separable outcome rather than for their inherent enjoyment (Ryan, & Deci, 2000). With the latter, the theory suggests that there are

different types of extrinsically motivated behaviors (external, introjected, identified, and integrated regulation) and these types of motivation orientation are transformed through a regulation process called internalization, which describes the transformation of controlling types of motivation regulated (Li, 1999).

The greatest level of self-determination is intrinsic motivation. Intrinsically motivated actions occur without there being any indication of external reward: or the action emanates from the self and is thus self-determination. Deci (1975) suggested that the general intrinsic motivation construct can be separated into more specific motives. Vallerand, Blais, Briere, & Pelletier (1989) proposed a tripartite taxonomy of intrinsic motivation termed as intrinsic motivation to know, intrinsic motivation to accomplish task, and intrinsic motivation to experience stimulating sensations while engaging in an activity.

Accordingly, the most important and immediate determinant of any human behavior is motivation. Rather, the internal factor, called motivation, arouses and directs behavior such as exercise. This internal factor is a psychological mechanism that governs the direction, intensity, and persistence of behavior (Iso-Ahola, & Clair, 2000; Pappous, 2003). In light of these important views, understanding of exercise motivation factors in relation to exercise participation will be applied to support the exercise adherence.

The Exercise Motivation Scale (EMS) was developed by Li (1999), based on the self-determination theory (Deci & Ryan, 1985) and the work of Vallerand and his associates (Pelletier, et al., 1995; Vallerand & Bissonnette, 1992). The EMS has 31 items and was divided into 8 subscales: amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, intrinsic motivation to learn, intrinsic motivation to accomplishment, and intrinsic motivation to experience stimulation. The EMS was designed to assess motivation tendencies in exercise contexts. EMS factorial structure, acceptable subscale reliability estimates and nomological validity.

Participation may also be affected by cultural factors. The study

of Yan, & McCullagh (2002) found cultural influences on different motivation in the physical activity of participants (Chinese, American born Chinese-ABC and American-USA) and suggested that understanding cultural differences in motives for participation may result in a better organization of physical activity experiences. According to populations in Hong Kong and The United Kingdom, different motivational components of exercise adherence in sport and exercise were found (Tsang, Szabo, & Robinson, 2003). So the application of motivation factors in exercise behavior in the Thai population will help to organize intervention to promote exercise through adherence.

Purpose of the Study

This study has a twofold purpose. First, to determine the validity and reliability of a Thai version of Exercise Motivation Scale (TEMS). The second purpose is to assess the factor of exercise motivation that determines the exercise behavior in Thai youth.

Research Hypotheses

This study had two hypotheses to be examined. Firstly, the Thai version of Exercise Motivation Scale (TEMS) was reliable and valid. Secondly, the exercise motivation factors are predictive of exercise behavior.

Method

Study Sampling and Participants

The sample in this study consisted of Thai youths whose age ranged 18 to 22 years old, who engaged in exercise activities in public parks, health clubs, fitness centers, or exercise/sport community stadiums. The participants in the main part of this study were recruited through a 2-phase sampling process. This sampling strategy was considered practical and economical for study of a widely distributed population (Pilot & Hungler, 1995).

In Part 1 : Pilot testing of TEMS, participants in this phase were 523 Thai youths was gathered from population in Bangkok and perimeter of Bangkok (range of age 18-22 year, $M = 19.78$, $SD = 1.23$). These participants were divided into two groups. Fifty of the participants in the first group used for test appropriateness of language and content of understanding of TEMS. This group was purposively selected to serve as subjects for the preliminary try out. The rest, 473 participants (211 males and 262 females) were used to test for reliability

In Part 2 : CFA and SEM testing , the survey on study participants was then conducted within each selected province through a nonrandom process. Thirteen provinces (3 from each region) in Thailand were randomly selected from a total of 75 provinces located throughout 4 regions of Thailand (North, Northeast, South, and Central) and Bangkok. Specifically, participants were approached in local public places, such as parks, health clubs, fitness centers, or exercise/sport community stadiums. The process resulted in a sample of 2,007 participants (males = 1013, females = 994; mean age = 19.87, $SD = 1.31$), and 1912 questionnaires were complete to analyze (949 males and 963 females).

Procedures

At the time of the data collection, all subjects were participating in a variety of exercise activities in local public parks, health clubs, fitness centers, national stadiums, or exercise/sport community stadiums. Research assistants approached potential individuals at these public places and asked them whether they would be interested in participating in a survey study on exercise motivation. All individuals received information about the research and were told that their participation in this research were strictly voluntary. Individuals who agreed to participate and signed an informed consent form completed the survey, which took about 10 to 15 minutes. All participants were thanked for their cooperation at the end of the data collecting.

Measures

A two-part questionnaire was administered to each of the participants: (a) demographic information, and exercise behavior, and (b) exercise motivation (TEMS). The demographic information included participants' age, gender, and types of exercise activities, and exercise experience. The exercise behavior portion of the survey asked the participants to report their level of participation including: exercise frequency (i.e., "How many days per week do you spend on exercise?"), exercise duration (i.e., "How long do you spend exercising each day?"), and exercise intensity, defined by the Borg's Rate of Perceived Exertion scale (RPE) (Borg, 1982). The RPE measured the amount of effort made by the participants when exercising, with the scale ranging from 6 (*very very light*) to 20 (*very very hard*).

The last part of the survey contained the Exercise Motivation Scale (EMS) (Li, 1999). The 31-item EMS was translated into Thai language (TEMS). Details are presented below following the description of scale items.

This scale is composed of 8 subscales including:

- Amotivation, containing 3 items : item 7, 16, 23 (e.g., I can't understand why I am doing this).
- External regulation, 4 items : item 3, 8, 13, 25 (e.g., Because other people believe that it's a good idea for me to exercise).
- Introjected regulation, 4 items : item 4, 12, 21, 31 (e.g., Because I must exercise to feel good about myself).
- Identified regulation, 4 items : item 5, 9, 18, 24 (e.g., Because I believe that regular exercise is a good way to enhance my overall development).
- Integrated regulation, 4 items : item 6, 14, 22, 29 (e.g., Because it is consistent with what I value).
- Intrinsic motivation to learn, 4 items : item 2, 10, 15, 27 (e.g., For the satisfaction it gives me to increase my knowledge about this activity).
- Intrinsic motivation to accomplish the tasks, 4 items : item 17, 20, 28, 30 (e.g., For the pleasure of mastering this activity).

- Intrinsic motivation to experience sensation, 4 items : item 1, 11, 19, 26 (e.g., For the pleasure it gives me to experience positive sensation from the activity).

The TEMS asked the participants to respond to the stem “Why are you currently participating in this activity” and indicated their degree of agreement with each of the TEMS item on a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree).

Statistical Analyses

Descriptive statistics including percentage, means, standard deviation, kurtosis, and skewness are presented. Cronbach’s alpha coefficient was computed to estimate reliability of each subscale of TEMS.

Model testing. Confirmatory factor analysis (CFA) was used to examine the factorial structure of TEMS in Thai youth. Based on *a priori* specified theoretical model (Li, 1999), eight latent factors were specified, each measured by 3 or 4 items. Following CFA, a structural model was specified and tested by linking the dimensions of exercise motivation to exercise behavior. All structural equation models were tested by the method of latent variable structural equation modeling using the LISREL (Linear Structural RELations) computing program (version 8.53) (Jöreskog & Sörbom, 2002). Analyses were conducted on covariance matrices.

Model fit evaluation. Several goodness-of-fit indices were used: the Chi-Square statistic (χ^2), the Root Mean Square Error of Approximation : RMSEA (Steiger, 1990), the Non-Normed Fit Index: NNFI (Tucker & Lewis, 1973), and the Comparative Fit Index: CFI (Bentler, 1990). The RMSEA values less than .08 indicate acceptable fit, and values less than .05 are reflective of close model fit (Browne & Cudeck, 1993). For the indices of NNFI and CFI, values closer to 1.0 represent a good fit of the model under investigation. In order to assess the model fit, all parameter estimates were examined and interpreted in light of the hypothesized relationships among variables in the model. Significant parameters in the model are denoted by t-values ≥ 1.96 (at .05) and ≥ 2.54 (at .01). To set the matrix for each latent

variable in the measurement model, one factor loading was set to 1.0 and thus was not estimated for significance.

Results

The overall purposes of this study were to test the reliability and validity of a Thai version of exercise motivation scale (TEMS) and to examine the relationships between exercise motivation and exercise behavior in Thai youth samples. There were shown two parts, the first part presents the results of pilot testing (reliability) of the TEMS measurement. Then the second part presents the results of the CFA and the structural equation modeling examine of motivational factors on exercise behavior.

Part 1: Pilot Testing of TEMS

The pilot testing of TEMS was to provide a reliable and valid measure of exercise motivation in Thai language, three steps were taken. In Step 1, the English version of the EMS was translated into Thai language by four Thai bilingual doctorate experts in the field of sport psychology, social psychology, or sport science and collected to TEMS. In Step 2, the translated Thai version was evaluated by a sample of youth volunteers (N = 50) for content and item appropriateness and understanding (rang of scales 1 – 5). The scales of all item shows 4-5 (M = 4.02, SD = 0.63 to M = 4.39, SD = 0.19). This indicated the potential appropriateness and meaning understanding of all 31 items. And the last step were evaluated the internal consistency of the subscales of TEMS was examined in a sample of 473 youth volunteers.

The sample for this phase included 523 Thai youths (236 males and 287 females) were gathered from population in Bangkok and perimeter of Bangkok (range of age 18-22 years, M = 19.78, SD = 1.23)

Reliability of TEMS subscales.

The means, standard deviations, skewness, and kurtosis of the 31 TEMS item for the sample (N = 473) used in test qualitative of TEMS. Descriptive statistic that mean for the 31 item range from

2.25 to 5.15 and standard deviation range from .88 to 1.49. (Table.1). The values of skewness and kurtosis of all observed variables in both the validation and calibration samples were lower than 3.75 which is accepted for the assumption of multivariate normality (Tabachnick & Fidell, 1996). Therefore, this data is suitable to the CFA in the analysis.

Means and standard deviation among the 8 subscales of TEMS, identified regulation was most strongly endorsed in this sample ($M = 5.08$, $SD = .72$), followed by IM to sensation ($M = 4.72$, $SD = .69$), integrated regulation ($M = 4.69$, $SD = .75$), IM to learn ($M = 4.05$, $SD = .69$), IM to accomplishment ($M = 4.39$, $SD = .75$), introjected regulation ($M = 4.05$, $SD = .89$), external regulation ($M = 3.07$, $SD = .96$), and amotivation ($M = 2.73$, $SD = 1.08$).

The reliability of TEMS was assessed by the internal consistency for each subscale with use of Cronbach's alpha reliability coefficient. The alphas coefficient varied from .60 to .76 and corrected item total correlation varied from .24 to .63 (Table 3). This result indicated the reliability of 8 subscales was acceptable.

Table 1 Reliability of TEMS.

Subscale	Item	Corrected Item Total Correlation	Alpha
Amotivation	AM 7	.45	.71
	AM 16	.52	
	AM 23	.63	
External Regulation	EX 3	.26	.64
	EX 8	.44	
	EX 13	.54	
	EX 25	.47	
Introjected Regulation	INT 4	.24	.60
	INT 12	.39	
	INT 21	.44	
	INT 31	.41	
Identified Regulation	ID 5	.59	.76
	ID 9	.51	
	ID 18	.61	
	ID 24	.54	
Integrated Regulation	INTE 6	.46	.72
	INTE 14	.49	
	INTE 22	.53	
	INTE 24	.57	
Intrinsic Motivation to Learn	IM-L 2	.45	.69
	IM-L 10	.47	
	IM-L 15	.44	
	IM-L 27	.51	
Intrinsic Motivation to Accomplish	IM-AC 17	.42	.60
	IM-AC 20	.43	
	IM-AC 28	.43	
	IM-AC 30	.30	
Intrinsic Motivation to Sensation	IM-SE 1	.41	.68
	IM-SE 11	.50	
	IM-SE 19	.48	
	IM-SE 26	.47	

***Part 2 : Construct Validity of TEMS and the SEM of
Exercise Motivation***

The Overall Fit of TEMS: CFA

Analyses of The CFA hypotheses in this study proceeded in two stages. Stage 1 : analysis involved the assessment of the measurement model of TEMS. Stage 2 : analysis provided a test of second order of TEMS.

The results of the TEMS measurement model testing for the 1912 samples were as found. Overall, the TEMS model fitted the empirical data reasonable well $\chi^2 = 3409.48$, $df = 406$, $RMSEA = 0.065$ (0.063:0.067), $NNFI = 0.95$, $CFI = 0.96$. An inspection of factor loadings (standardized, t-value) indicated that all measured items were significantly loaded for their respective latent factors. However, the multiple squared correlations showed that item 3 (on the External factor), item 4 (on the Introjected factor), and item 30 (on Intrinsic motivation to accomplishment) have the lowest explained variance (.06, .19, .16) (Table 2). These low magnitudes of variance indicated a poor or weak relationship between measured items and their latent constructs. Therefore, these three items were removed from the TEMS measurement model in the subsequent analyses.

Table 2 Standardized Loadings, Factor Loadings (t value), Errors Variance, and Squared Multiple Correlations for the TEMS measurement.

TEMS Items	Standardized Loading	(t value)	Error variance	R ²
AM 7	1.00	-	22.78	0.56
AM 16	1.03	28.28	24.58	0.50
AM 23	1.05	30.58	21.08	0.61
EX 3	1.00	-	30.48	0.06
EX 8	3.66	9.96	21.26	0.58
EX 13	2.74	9.48	28.21	0.29
EX 25	3.45	9.89	23.86	0.50
INT 4	1.00	-	28.87	0.19
INT 12	1.44	14.67	27.29	0.28
INT 21	1.64	14.92	26.85	0.30
INT 31	1.59	14.84	27.01	0.30
ID 5	1.00	-	26.81	0.45
ID 9	0.98	24.93	27.37	0.42
ID 18	1.03	27.01	25.77	0.51
ID 24	1.03	25.49	27.02	0.44
INTE 6	1.00	-	28.57	0.39
INTE 14	1.14	24.06	28.15	0.42
INTE 22	1.11	23.45	28.49	0.39
INTE 29	1.10	24.81	27.63	0.45
IM-L 2	1.00	-	29.46	0.34
IM-L 10	1.14	23.51	28.37	0.44
IM-L 15	1.12	23.24	28.56	0.43
IM-L 27	1.15	23.68	28.23	0.45
IM-AC 17	1.00	-	28.95	0.35
IM-AC 20	0.96	22.56	28.41	0.38
IM-AC 28	1.01	23.92	27.16	0.45
IM-AC 30	0.80	15.83	30.39	0.16
IM-SE 1	1.00	-	29.44	0.35
IM-SE 11	1.13	23.26	29.06	0.39
IM-SE 19	1.09	23.33	29.03	0.39
IM-SE 26	1.09	23.42	28.98	0.40

Note : t-values ≥ 1.96 are significant ($p < .05$), and t-values ≥ 2.54 are significant ($p < .01$)

When the 3 items of TEMS were removed, the TEMS model fit data decrease RMSEA from 0.065 to 0.057 (0.055:0.059) another index showed $\chi^2 = 2342.46$, $df = 322$, NNFI = 0.97, CFI = 0.97. However, the outputs of LISREL showed the modification indices suggested adding the error covariance. Therefore, the researcher set the error covariance free based on theory. The TEMS model fit showed data well $\chi^2 = 1786.63$, $df = 317$, RMSEA = 0.049 (0.047:0.051), NNFI = 0.97, CFI = 0.98 (Table 3).

Table 3 Modified TEMS Measurement Model Fit Statistics.

TEMS	χ^2	N	df	RMSEA	NNFI	CFI
28 items	2342.46	1912	322	0.057 (0.055:0.059)	0.97	0.97
Modified	1786.63	1912	317	0.049 (0.047:0.051)	0.97	0.98

Note. χ^2 = Chi-Square, RMSEA = Root Mean Square Error of Approximation; NNFI = Non-Normed Fit Index; CFI = Comparative Fit Index.

The next step tested the second order of the measurement model. The model tested the relationship between 28 items, 8 variables in first order and 3 variables in second order. The second order fit index showed poorness fit model $\chi^2 = 4741.74$, $df = 343$, RMSEA = 0.097 (0.095:1.00), NNFI = 0.93, CFI = 0.93 (Table 4 Figure 1). An examination of the correlation matrix indicated excessively high within-dimension correlations (i.e., within extrinsic and intrinsic motivation constructs) and between-dimension correlations (i.e., between extrinsic and intrinsic motivation constructs). Factor correlations among three extrinsic motivation latent factors equaled 1.00 (Identified, Introjected, Integrated), and three intrinsic motivation latent correlations factors equaled 0.91. The correlations between extrinsic motivation latent factors and intrinsic motivation latent factors were even higher in magnitudes. These high correlations are indicative of poor discriminant validity of TEMS constructs, particularly with respect to the dimensions of extrinsic and intrinsic motivation. To remedy this problem, items for the factors of Identified, Introjected, Integrated, Intrinsic motivation to

learn, Intrinsic motivation to accomplish, and Intrinsic motivation to sensation were modified for extrinsic motivation, and intrinsic motivation. Then, the second order of the TEMS measurement model was modified into 4 factors (amotivation, externalizing, extrinsic motivation, and intrinsic motivation). This resulted in a revised four-factor TEMS measurement model tested in the second order, and the model fit index showed good fit $\chi^2 = 1785.94$, $df = 331$, $RMSEA = 0.049$ (0.047:0.051), $NNFI = 0.97$, $CFI = 0.98$ (Table 4). When it comes to modeling the relationships between these latent factors and the exercise behavior outcome, the multicollineality among some of the latent factors in the TEMS are of concern.

The TEMS measurement model was retested the relationship between 28 items and 4 factors. The model fit index of this model showed good fit $\chi^2 = 1815.71$, $df = 344$, $RMSEA = 0.050$ (0.048:0.052), $NNFI = 0.97$, $CFI = 0.98$ (Figure 2). Then, 4 factors of TEMS were used to test the relationship between motivation and exercise behavior.

Table 4 The Second Order of TEMS Measurement Model Fit Statistics.

TEMS	χ^2	df	RMSEA	NNFI	CFI
3 factors	4741.74	343	0.097 (0.095:1.00)	0.93	0.93
4 factors	1785.94	331	0.049(0.047:0.051)	0.97	0.98

Note. χ^2 = Chi-Square, RMSEA = Root Mean Square Error of Approximation; NNFI = Non-Normed Fit Index; CFI = Comparative Fit Index.

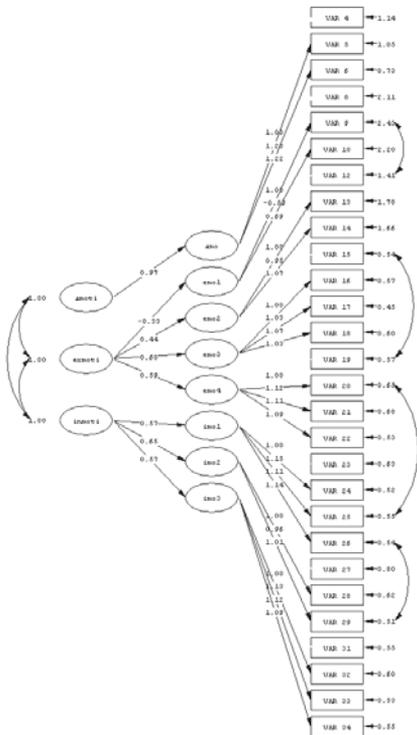


Fig. 1 The Second Order of TEMS: 3 factors.

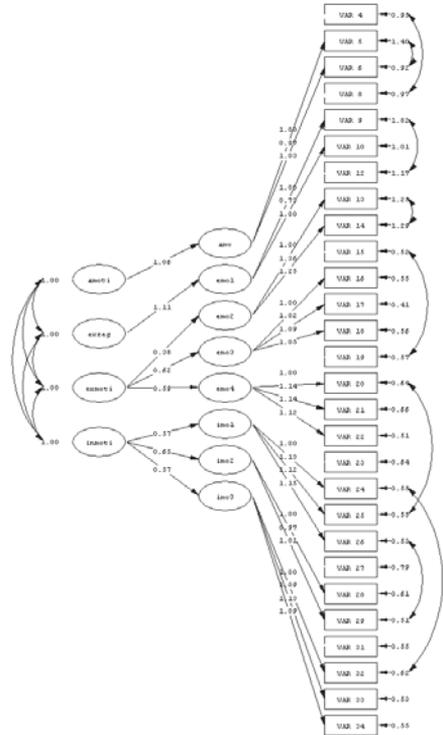


Fig. 2 The Second Order of TEMS: 4 factors.

Biography of Exercise

There were 44.5% of the sample participated in exercise activity (e.g. aerobic dance, walking, jogging, cycling, and weight training etc.), 33.2% participated in sport activity (e.g. football, volleyball, basketball etc.) and 22.3% participated in combined activities. However, the majority of males engaged in sport activity while the majority of females engaged in exercise activity. (Table 5)

Table 5 Percentages of exercise activity.

TEMS	Male	Female	ToTal
Exercise Activity	24.9	64.4	44.5
Sport Activity	48.4	17.8	33.2
Combined Activity	26.8	17.7	22.3

The exercise experience of these participants showed the majority of participants (46.6%) had been engaged in their exercise program for over 1 year, 8.3% had been engaged for 6-12 months, 12.5% had been engaged for 3-6 months, 19.1% had been engaged for 1-3 months and 13.5% had been engaged for less than 1 month. There were over 60% of females who had been exercising for less than 6 months while over 60% of males had been exercised for more than 6 months. (Table 6)

Table 6 Percentage of exercise experience.

Period time	Male	Female	ToTal
<1 month	7.2	19.9	13.5
1-3 months	12.7	25.6	19.1
3-6 months	9.7	15.3	12.5
6-12 months	7.8	8.9	8.3
>1 Year	62.5	30.3	46.6

An examination of the exercise habits (including frequency of exercise, duration of each exercise session and intensity of workout) of the participants was undertaken. American College of Sport Medicine (ACSM, 1990) recommend guidelines for exercise as follows; a minimum of 3-5 days per week (at least 3 days), 20-60 minutes per session (at least 20 minutes) and at intensity level 12-16 on the Rate of Perceived Exertion Scale (RPE) (Borg, 1982) (at least 12 RPE). The majority of participants engaged in over 20 minutes of exercise per session, with only 7.8% engaging in less than 20 minutes per session. The majority of women (30%) exercised for 20-30 minutes per session, while the majority of men (37.9%) exercised over 60 minutes per session. (Table 7)

Table 7 Percentage of exercise duration.

Duration	Male(%)	Female(%)	ToTal(%)
<20 min	3.6	12.2	7.8
20-30 min	12.9	30.0	21.4
30-45 min	20.5	24.5	22.5
45-60 min	25.1	17.8	21.5
>60 min	37.9	15.5	26.8

The data of frequency and intensity to exercise showed participants exercised an average of 3.74 days per week, and at an average RPE of 14.00. Male exercised an average of 4.25 days per week, and at an average RPE of 14.28. Female exercised an average of 3.23 days per week, and at an average RPE of 13.74. (Table 8)

Table 8 Means and standard deviations of exercise frequency and intensity

	Male	Female	ToTal
Frequency (M)	4.25	3.23	3.74
(SD)	1.66	1.59	1.70
Intensity (M)	14.28	13.74	14.00
(SD)	2.88	2.56	2.74

Thus, on average of the demographic data, the participants in this study met the guidelines from ACSM, for frequency duration and intensity of exercise behavior

The Overall Fit of Structural Equation Model

A structural equation model was tested relating the four motivation factors to the outcome of exercise behavior. The exercise behavior factor was measured by the indicators of exercise frequency, duration, and intensity.

The structural model fit the data well, $\chi^2 = 2024.63$, $df = 427$, $RMSEA = 0.047$ (CI: 0.045:0.049), $NNFI = .97$, $CFI = .98$. The parameter estimates indicated that extrinsic motivation and intrinsic motivation were shown to be significantly related to exercise behavior ($p < .01$). (Figure 3)

The results of the relationship between exercise motivation (amotivation, externalizing, extrinsic motivation and intrinsic motivation) and exercise behaviors (frequency duration and intensity) are presented in Table 9. Inspection of the path coefficients of exercise motivation indicated, amotivation – behavior = -0.02, externalizing – behavior = 0.002, extrinsic motivation – behavior = -0.58, and intrinsic motivation – behavior = 0.66. The model showed t-value of the path amotivation – behavior = -0.67, externalizing – behavior = 0.18, extrinsic

motivation – behavior = -2.86, and intrinsic motivation – behavior =4.56. The path coefficients and t-value showed amotivation and extrinsic motivation were negatively related to the exercise behavior while externalizing and intrinsic motivation were positively related to the exercise behavior.

Table 9 Structural Path Coefficients Results

Structural	Coefficient	t value	Error
Amotivation – Behavior	-0.02	-0.67	0.025
Externalizing – Behavior	0.002	0.18	0.014
Extrinsic motivation – Behavior	-0.58	-2.86**	0.20
Intrinsic motivation – Behavior	0.66	4.56**	0.14

Note : t-value > 2.54 are significant (p < .01)*

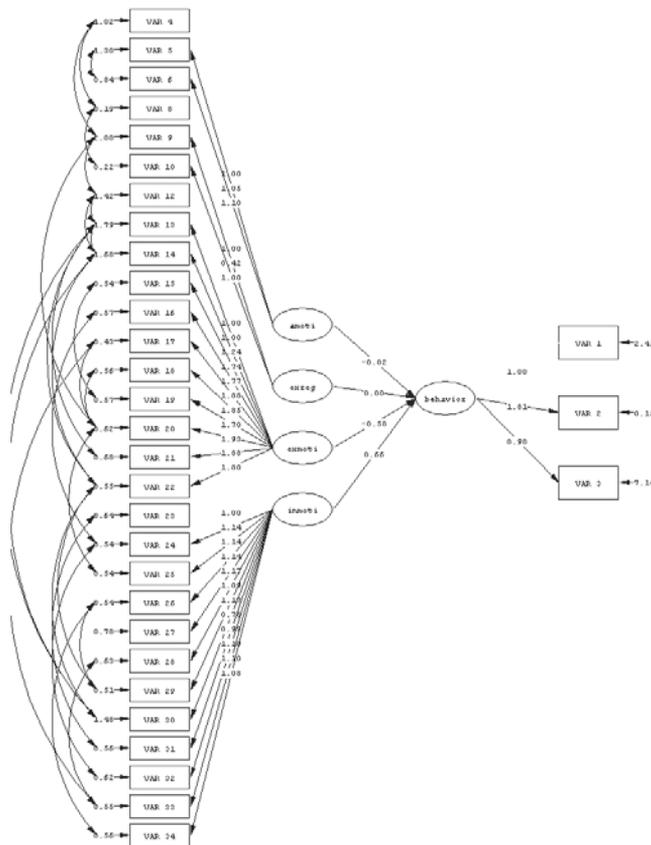


Fig. 3 The structural equation model.

Discussion

This study was tested relationship between exercise motivation and exercise behaviors based on self-determination theory (Deci & Ryan, 1985) in Thai youth. The purposes of this study were validating the Exercise Motivation Scale (EMS; Li, 1999) into Thai version, and also exploring the relationship between exercise motivation and exercise behaviors in Thai youth.

The reliability of TEMS was assessed by the internal consistency for each subscale with use of Cronbach's alpha reliability coefficient. The alpha coefficients varied from .60 to .76, and corrected item total correlation varied from .24 to .63. These results show that the reliability of TEMS was acceptable per guidelines (.05 as recommended by Fornell & Larcker, 1981).

The test of TEMS measurement model fitted the empirical data reasonable well. However, the multiple squared correlations showed that item 3 (on the External factor), item 4 (on the Introjected factor), and item 30 (on the Intrinsic motivation to accomplishment) have the lowest explained variance, but when these three items were removed, the TEMS measurement model fitted. The second order test of TEMS found that the related 8 subscales of TEMS did not fit for three types of motivation. The results showed factor correlations among three extrinsic motivation latent factors (Identified, Introjected, Integrated), and three factors of intrinsic motivation. Therefore, these TEMS subscales were revised into two factors called "Extrinsic Motivation" and "Intrinsic Motivation". The second order test of TEMS found that the relationship of 8 subscales of TEMS to 4 types of motivation showed good fit. This result showed that the continuum of self-determination could not explain self-determination in Thai youth as being of eight types.

It is noteworthy that in this study it was possible to construct the relative autonomy index or self-determination index, which has been used as a continuum variable of motivation varying from external to true intrinsic motivation (Pelletier et al., 1995), due to the high correlations between 3 factors of extrinsic motivation

(identification, introjection, and integrated regulation) and 3 factors of intrinsic motivation.

Liukkonen, Jaakkola, Biddle, and Leskinen (2003) found the correlation between identification, introjection, and intrinsic motivation. These relationship can be formulated by combining the levels of the motivation continuum so that intrinsic motivation, Identified, Introjected, Integrated regulation include varying levels of self-determination, whereas extrinsic motivation does not (Vallerand, 2001)

Descriptive data show that 44.5% of the whole sample participate in exercise activity (aerobic dance, walking, jogging, cycling, weight training), 33.2% participate in sport activity (football, volleyball, basketball) and 22.3% participate in combined activity. However the majority of males engaged more in sport activity while females engaged in exercise activity. The majority of participants (46.6%) had been engaged in their exercise program for over 1 year, which indicated that these participants were out of the drop out phase. Exercise participants' adherence to various forms of physical activity shows that approximately one half of individuals who do join organized exercise programs drop out within six months to a year (Dishman, 1988, 2001). However over 60% of women had been exercising less than 6 months while over 60% of men had been exercised more than 6 months.

An examination of the exercise habits (including frequency of exercise, duration of each exercise session and intensity of workout) of the participants was undertaken. American College of Sport Medicine (ACSM, 1990) guidelines for exercise are exercising a minimum of 3-5 days per week (at least 3 days), 20-60 minutes per session (at least 20 minutes) and at intensity level 12-16 on the Rate of Perceived Exertion Scale (RPE) (Borg, 1982) (at least 12 RPE). The majority of participants engage in over 20 minutes of exercise per session, participate an average of 3 days a week, and an average RPE of 14. Thus, on average, the participants in this study met the guidelines by ACSM, for frequency, duration and intensity of exercise behavior

The descriptive data for the exercise routine of these participants show that males engaged in sport activity for 60 minutes per day, and females engaged in exercise activity 30 minutes per day. Therefore, exercise promotion for adherence should set these levels in the sport activity program for males and exercise activity for females.

The structural model fit index shows $\chi^2 = 2024.63$ $df = 427$, $RMSEA = 0.047$ (CI: 0.045:0.049), $NNFI = .97$, $CFI = .98$, these data indicated that the structure model of exercise motivation to exercise behavior good fit. The parameter estimates indicated that extrinsic motivation and intrinsic motivation were shown to be significantly related to exercise behavior ($p < .01$). Because participants in this study were in exercise routines and had been engaging in exercise for more than 6 months.

Intrinsic and extrinsic factors have been studied to determine their relationship to exercise behavior. In general, extrinsic factors such as weight control and appearance have been linked to exercise initiation (Dishman, 1988), while intrinsic factors such as mastery of task, and enjoyment have been linked to greater exercise adherence (McAuley, Wraith & Duncan, 1991; Oman, & McAuley, 1993). Accordingly, the most important and immediate determinant of any human behavior is motivation. Specifically, the internal factor, called motivation, arouses and directs behavior such as exercise. This internal factor is a psychological mechanism that governs the direction, intensity, and persistence of behavior (Iso-Ahola, & Clair, 2000; Pappous, 2003). Roberts (1992), said that “the study of motivation is the investigation of the constructs that energize and direct behavior”.

Dunn and Rollnick (2003) state that the intrinsic motivation and the autonomous motivation are imperative in maintaining preferable health behaviors in the long-term. Li (1999) found higher intrinsic motivation and integrated internalization were related to higher exercise effort and interest. Similarly, Frederick and Ryan (1993) examined participation motivation and found that people who participated in individual sport were motivated more by interest and

enjoyment of their activity, which is indicative of intrinsic motivation, while those involved in fitness activities were driven to participate for motives regarding body appearance, or extrinsic motivation. In this study, the data showed that participants engaged in both activities (sport and exercise activity), so that both extrinsic and intrinsic motivation were influences on exercise behavior.

Conclusions

The TEMS validating from EMS (Li, 1999), developed in North America, were used in this study for the test of the relationship between exercise motivation and exercise behavior in Thai youth. The conclusions can be drawn from the current finding.

First, the result suggests that the TEMS is a reliable and valid instrument measuring four constructs of exercise motivation in Thai youth. It can be used for assessing exercise motivation in future research.

Second, the structure equation model testing of exercise behavior indicates that extrinsic and intrinsic motivation are indicators to motivate people to engage in exercise.

Recommendations for Future Research

1. Future research should investigate motivation and test the continuum of self-determination with people who want to start exercising or who have just started.
2. Future research needs to investigate whether these variables of motivation are differentially correlated across diverse countries and cultures.
3. Future research should investigate the relationship of exercise motivation and exercise behavior in other age groups.

References

- American College of Sport Medicine. (1990) Position stand on the recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in health adults. *Medicine and Science in Sport and Exercise*, 22 : 256-274.
- Bentler, P. M. (1990) Comparative fit indices in structural model. *Psychological Bulletin*, 107(2) : 238-246.
- Biddle, S. J. H., & Nigg, C.R. (2000) Theories of exercise behavior. *International Journal of Sport Psychology*, 31 : 290-304
- Biddle, S., Sallis, J., & Cavill, N. (1998) *Young and active? Young people and health-enhancing physical activity : Evidence and implications*. London : Health Education Authority.
- Blair, S. (1993) Physical activity, physical fitness and health. *Research Quarterly for Exercise and Sport*, 64 : 365-376.
- Borg, B. A. (1982) Psychophysiological bases of perceived exertion. *Medicine and Science in Sports and Exercise*, 14 : 377-381.
- Brislin, R. W. (1976) *Translation : Application and research*. New York : Gardner.
- Browne, M. W., & Cudeck, R. (1993) Alternative ways of assessing model fit. In K. A. Bollen, and J.S. Long (Eds.), *Testing structural equation models*. Newbury Park, CA : Sage.
- Byrne, A., & Byrne, G. (1993) The effect of exercise on depression, anxiety and other mood state : A review. *Journal of Psychosomatic Research*, 37 : 565-574.
- Campbell, P. G., MacAuley, D., McCrum, E., & Evans, A. (2001) Age differences in the motivation factor for exercise. *Journal of Sport & Exercise Psychology*, 23 : 191-199.
- Caruso, C. M., & Gill, D. L. (1992) Strengthening physical self-perceptions through exercise. *Journal of Sport Medicine and Physical Fitness*, 32 : 416-427.
- Coakley, J. J., & White, A. (1992) Making decisions : Gender and sport participation among British adolescents. *Sociology of Sport Journal*, 9 : 20-35.

- Davis, C., Fox, J., Brewer, H., & Ratusny, D. (1995) Motivation to exercise as a function of personality characteristics age and gender. *Personality and Individual Difference, 19* : 165-174.
- Deci, E. L. (1975) *Intrinsic motivation*. New York : Plenum Press.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999) A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125* : 627-668.
- Deci, E. L., & Ryan, R. M. (1985) *Intrinsic motivation and self-determination in human behavior*. New York : Plenum Press.
- _____. (1991) A motivation approach to self : Integration in personality. *Nebraska Symposium on Motivation, 38* : 237-288.
- _____. (2000) The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11* : 227-268.
- Dishman, R. K. (1988) *Exercise adherence : Its impact on public health*. Champaign, IL : Human Kinetics.
- _____. (2001) The problem of exercise adherence : Fighting sloth in nations with market economie. *Quest, 53* : 279-294.
- Dishman, R. K., & Buckworth, J. (1997) Increasing physical activity : A quantitative synthesis. *Medicine and Science in Sport and Exercise, 28* : 706-719.
- Dishman, R. K., & Gettman, L.R. (1980) Psychobiological influences to exercise adherence. *Journal of Sport Psychology, 2* : 295-310.
- Dishman, R. K., & Ickes, W. (1981) Self-motivation and adherence in secondary school student. *Journal of Behavioral Medicine, 4* : 421-438.
- Douthitt, V. L. (1994) Psychological determinants of adolescent exercise adherence. *Adolescence, 29* : 711-722.
- Dunn , C., & Rollnick, S. (2003) *Lifestyle change*. Elsevier Limited : London.
- Finkenberg, M. E. (1990) Effect of participation in Taekwondo on college women? self-concept. *Perceptual and Motor Skills, 71* : 891-894.
- Fornell, C., & Larcker, D.F. (1981) Evaluating structural equaton model with unobservable variable and measurement error. *Jornal of Marketing Research, 18(1)* : 39-50.

- Frederick, C. M., & Ryan, R. M. (1993) Differences in motivation for sport and exercise and their relations with participation and mental health. *Journal of Sport Behavior*, 16 : 124-145.
- Frederick, C. M., Morrison, C., & Manning, T. (1996) Motivation to participate, exercise affect, and outcome behaviors toward physical activity. *Perceptual of Motor Skill*, 82 : 691-701.
- Human and Social Research Institute (1998) *1998 Survey of Thai youth*. Bangkok : Mahidol University.
- Iso-Ahola, S., & Clair, B. (2000) Toward a theory of exercise motivation. *QUEST*, 52 : 131-147.
- Jöreskog, K.G., & Sörbom, D. (2002) *LISREL 8.53*. Lincolnwood, IL : Scientific Software International.
- Koivula, N. (1999) Sport participation : Differences in motivation and actual participation due to gender typing. *Journal of Sport Behavior*, 22 : 360-375.
- Li, F. (1999) The exercise motivation scale : Its multifaceted structure and construct validity. *Journal of Applied Sport Psychology*, 11 : 97-115.
- Liukkonen, J., Jaakkola, T., Biddle, S., & Leskinen, E. (2003) Motivation antecedents of physical activity in Finnish youth. *Manuscript Submitted to the Scandinavian Journal of Medicine and Science in Sports*. Retrieved 6, 13 : 2005, from www.nuorisuomi.fi/files/ns/liikuntaharrastuksena.
- Markland, D., & Hardy, L. (1993) The exercise motivations inventory : Preliminary development and validity of a measure of individuals' reasons for participation in regular physical exercise. *Personality & Individual Differences*, 15 : 289-296.
- McAuley, E., Wraith, S.C., & Duncan, T.E. (1991) Self-efficacy, perceptions of success and intrinsic motivation for exercise. *Journal of Applied Social Psychology*, 21 : 139-155.
- Merkle, S., Jackson, A.S., Zhang, J., & Dishman, R.K. (1998) Construct validation of the self-motivation inventory. *Medicine and Science in Sports and Exercise* : 30, S99.

- Morgan, W. P. (1997) Methodological considerations. In W.P. Morgan (Ed.), *Physical activity and mental health*. Washington, CD : Taylor and Francis, pp. 3-32.
- Mueller, R. (1996) *Basic principles of structural equation modeling : An introduction to LISREL and EQS*. New Orleans : Springer Press.
- Nabli, El. H., Abderrahim, B., & Oubahammou, L. (2003) Motivation profiles of Moroccan athletes. In *Proceedings XIth European congress of sport psychology*. Copenhagen : University of Copenhagen Press, p. 116.
- National Coalition for Promoting Physical Activity (1996) *An agenda for physical activity and health : Public policy priorities of the National coalition for promoting physical activity*. Retrieved May, 15, 2002, from <http://www.ncppa.org/ncppa/ncprior.htm>.
- National Statistic Office of Thailand (2001) *The survey of health status and security*. Retrieved April, 18, 2003, from http://www.nso.go.th/thai/stat/stat_23/toc_4/4.5-3.
- Oman, R. F., & McAuley, E. (1993) Intrinsic motivation and exercise behavior. *Journal of Health Education*, 24 : 232-238.
- Pappous, A. (2003, July 22-27) Predicting exercise adherence in fitness clubs. In *Proceedings XIth European congress of sport psychology*. Copenhagen : University of Copenhagen Press, p. 125.
- Pelletier, L. G., Fortier, M.S., Vallerand, R. J., Tuson, K. M., Briere, N. M., & Blais, M. R. (1995) Toward a new measure of intrinsic motivation, extrinsic motivation, and amotivation in sport : The sport motivation scale (SMS). *Journal of Sport & Exercise Psychology*, 17 : 35-53.
- Polit, D.F., & Hungler, B.P. (1995) *Nursing research : Principle and methods*. PA : Lippincott.
- Risto, T., Xiaolin, Y., Lauri, L., & Jorma, V. (2000) Physical activity in childhood and adolescence as predictor of physical activity in young people. *American Journal of Oreventive Medicine*, 13 : 317-323.
- Roberts, G. C. (1992) *Motivation in sport and exercise*. Champaign, IL : Human Kinetics.

- Ryan, R. M., & Deci, E. L. (2000) Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55 : 68-78.
- Smith, B. L., Handley, P., & Eldredge, D. A. (1998) Sex differences in exercise motivation and body-image satisfaction among college students. *Perceptual of Motor Skill*, 86 : 723-732.
- Sonstroem, R. J., Harlow, L. L., & Josephs, L. (1994) Exercise and self-esteem : Validity of model expansion and exercise association. *Journal of Sport & Exercise Psychology*, 16 : 29-42.
- Sport Authority of Thailand (2001) *National sport development master plan, number 3, B.E. 2545-2549 (2002-2006)*. Bangkok : News Thai Mith Khan Pim.
- Steiger, J.H. (1990) Structural model evaluation and modification : An interval estimation approach. *Multivariate Behavioral Research*, 25 : 173-180.
- Tsang, E. C. K., Szabo, A., & Robinson, A. (2003) A cross-cultural examination of motivational components of exercise adherence in sport and exercise. In *Proceedings XIth European congress of sport psychology*. Copenhagen : University of Copenhagen Press, p.172.
- Tucker, L. R., & Lewis, C. (1973) A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, 39(1) : 1-10.
- U.S. Department of Health and Human Services (1996) *Physical activity and health : A report of the surgeon general*. Atlanta, GA : Dept. of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.
- Vallerand, R. J. (1997) Toward a hierarchical model of intrinsic and extrinsic motivation. In M. P. Zanna (Ed.), *Advances in experimental social psychology*, 29 : 271-360. San Diego, CA : Academic Press.
- _____. (2001) A hierarchical model on intrinsic and extrinsic motivation in sport and exercise. In G.C. Roberts (Ed.), *Advance in motivation in sport and exercise*. Champaign, IL : Human Kinetics, pp. 263-319.

- Vallerand, R. J., & Bissonnette, R. (1992) Intrinsic, extrinsic, and amotivational styles as predictors of behavior : A prospective study. *Journal of Personality, 60* : 599-620.
- Vallerand, R.J., Blais, M., Brière, N., & Pelletier, L. (1989) Construction & validation de l'Échelle de motivation en education. *Revue Canadienne Des Sciences Du Comportement, 21* : 323-349.
- Weinberg, R., & Gould, D. (1995) *Foundation of sport and exercise psychology*. Champaign, IL : Human Kinetic.
- Yan, J. H., & McCullagh, P. (2002, April) Children's motivation in physical activity : Cultural influences. In *Paper presented at the 2002 AAHPERD National convention and exposition*. Abstract retrieved June, 12, 2003, from http://aahperd.confex.com/aahperd/2002/finalprogram/paper_1321.htm
- Yeung, R. (1996) The acute effect of exercise on mood state. *Journal of Psychosomatic Research, 40* : 123-141.