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Predictors of Exercise Practice: From Intention to Exercise Behavior

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Abstract This study analyzed the predictor variables of participants' intentions to exercise, subjective perception of exercise, and objective exercise behavior. For that it was adopted a cross-sectional design with follow-up measures of exercise behavior that was evaluated for a period of three months. The study included 304 participants (female = 198, 65%) aged between 14 to 73 years (M = 36.11; SD = 13.17) exercising in private fitness centers. We evaluated three sets of variables: personal (age and gender), physical activity (past exercise behavior), and psychological characteristics of participants (including variables from the Theory of Planned Behavior, the Transtheoretical Model, Self-determination Theory, and Emotional and Affective States Theory). The combination of independent variables most strongly predicted intention to exercise (71% of the variance), followed by subjective perceptions of exercise (38%), and last, by exercise behavior (16%). Results implicate the need to accommodate new variables and theoretical approaches to explain exercise behavior.

Keywords Intention, Perception of Exercise Practice, Exercise Behavior, Predictors of Exercise

1. Introduction

Sedentary lifestyles have a negative impact on individual and public health and represent a huge economic burden for healthcare systems around the world [1-3]. To promote more active lifestyles it is important to understand the factors that encourage different populations to exercise consistently. Among these factors, psychological experiences play a major role in determining exercise behavior [4, 5].

However, research demonstrates that psychological factors can better explain the intention to exercise than exercise behavior itself. This phenomenon has been labeled as the "intention-behavior gap" [6, 7] and represents one of the biggest challenges for researchers in this field. Previous research has indicated that psychological dimensions are better predictors of the intention to exercise (approximately 78% of explained variance) than of exercise behavior itself (approximately 20% of explained variance) [8, 9]. Accordingly, research should focus not only on variables that can predict intention to exercise but also on variables that can predict subjects' subjective perceptions about their exercise habits, and – most important – on variables that can predict their objective exercise behavior. The main goal of this study was to analyze these three sets of factors related to exercise, testing variables that predict intention to exercise, subjective perceptions of exercise, and objective exercise behavior in a sample of participants exercising at private fitness centers. Our analysis used an integrative conceptual approach, as previous research has indicated that single theoretical models have made only limited contributions to understanding exercise behavior [8, 10, 11]. For example, the Theory of Planned Behavior (TPB) [12] is one of the most widely used theories in analyses of health behaviors like exercise. However, research has demonstrated that this model is better at explaining the intention to exercise (44% of the variance) than the objective exercise behavior itself (24% of the variance) [13]. As recognized by Ajzen [12], it is important to consider additional variables that may explain health behaviors. Therefore, this study tested psychological factors that can predict the experience of exercise behavior by congregating social, cognitive, motivational, and emotional factors regarding exercise activity. More specifically, social and cognitive models included the Theory of Planned Behavior (TPB) [12] and the Transtheoretical Model (TTM) [14]; motivational factors included the Self-Determination Theory (SDT) [15]; and emotional factors included the Emotional and Affective States Theory of Subjective Exercise Experiences (EAST) [16].

The analysis strategy defined the TPB model as the base to explain the three dependent variables considered in this study (intention to exercise, subjective perceptions of exercise, and objective exercise behavior). Then, it was added cumulatively to the analysis variables from the TTM,

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SDT, and EAST models in order to test their augmented effect in explaining the dependent variables. The TPB was the pivotal model of the analysis because it has been used extensively in the domain of exercise, representing one of the best proposals to explain human behavior in different setting, such as exercise practice [5]. However, the model has been subject to criticism due its major difficulty of addressing the discordance between intentions and behaviors [17]. Although intentions represent an important variable to explain human behavior, as is the case with exercise, they are insufficient for predicting this healthy behavior [18]. In this way, it becomes important to consider other variables that can explain the translation of intentions into behavior. In this study, we chose to include variables from the TTM, SDT, and EAST models because they provide a broad perspective of important factors involved in the experience of exercise practice. In fact, research has been given support for adding these variables to better understand exercise behavior. For example, Jordan, Nigg, Norman, Rossi, and Benisovich [19], in a study with college undergraduates, found that the combination of attitude components and pros and cons significantly increased the overall explained variance across the stages of change from 32% to 56%, and improved the predictive ability of pros and cons from 31.2% to 48.2%. Furthermore, Wilson, Rodgers, Fraser, and Murray [20], in a study with 276 university students, found that dimensions of motivation related to identified regulation predicted exercise behavior, intention, effort, and importance given to exercise. For emotional factors, Mohiyeddini et al. [7], in a study with 237 participants from a German community sample, found that the addition of emotional variables to the TPB model increased the explained variance of exercise frequency by 17% and the explained variance of exercise duration by 20%.

Overall, these findings confirmed the advantages of adding cognitive, motivational, and emotional variables to the TPB model in order to better comprehend exercise behavior. To ensure the robustness of findings related to these psychological variables, we also controlled variables related to participants' personal and physical activity characteristics that proved to be important to explain the tendency to exercise. In the case of personal characteristics of participants, the variables of age and gender were considered. These variables were selected because the literature supports their association with exercise behavior [21]. Evidence suggests that levels of inactivity are higher among women [22] and increase with age [23, 24]. In the case of participants' physical activity, the variable of past exercise behavior was considered. Evidence shows that individuals who maintain an exercise practice for at least six months tend to remain active. Therefore, this variable has been shown to be influential in exercise practice [8, 25].

By controlling participants' personal and physical activity characteristics and by considering the contributions of the TPB, TTM, SDT, and EAST models, we established four hypotheses that are explained below according to each model.

Hypothesis 1 is based on TPB, stating that this model will better explain the variance associated with intention to exercise and subjective perceptions of exercise than the variance associated with objective exercise behavior. This hypothesis is based on research that has demonstrated that this model is better at explaining the intention to exercise than the objective exercise behavior itself [13]. The TPB [12] establishes that intention is the proximal determinant of a certain behavior, and that intentions are determined by the person's attitude toward the behavior (i.e., positive or negative evaluations regarding the behavior), subjective norms (i.e., perceptions of social pressure to perform or not perform the target behavior), and perceived behavioral control (i.e., person's confidence in his/her ability to perform the target behavior). Perceived behavioral control not only influences intention but can also have a direct effect on the target behavior mainly in cases where the individual is accurate in the evaluation of actual control regarding the behavior.

Hypotheses 2, 3, and 4 of this study states that variables selected from TTM, SDT, and EAST proposals will explain additional variance of intention to exercise, subjective perceptions of exercise, and objective exercise behavior beyond the one explained by TPB. Thus, we explain below the variables selected from each of these proposals.

Decisional balance was selected from the TTM of behavior change [26, 27]. The model proposes that health behavior changes across a set of stages from pre-contemplation to maintenance [28]. Decisional balance is a central construct of the TTM and refers to the individual's evaluation of the advantages and disadvantages (pros and cons) of performing a behavior [29]. Research has shown that the decisional balance distinguishes individuals at different stages of readiness for exercise (for a review, see [19]), explaining nearly 25% of the variance across stages [30]. Given the research on the influence of decisional balance on exercise behavior, we hypothesized that decisional balance would explain additional variance associated with intention to exercise, subjective perceptions of exercise, and objective exercise behavior beyond the one explained by the TPB, helping to *close* the gap between intention and behavior (Hypothesis 2).

Amotivation, external regulation, introjected regulation, identified regulation, and intrinsic regulation were selected from the SDT. The theory indicates that human behavior is influenced by the primary psychological needs for autonomy, competence, and relatedness [15, 31]. Deci and Ryan [15] distinguished between autonomous and controlled regulation forms of behaviors, proposing that the behavior can be volitional or result from pressure, demand, or seduction. Research suggests that if people are more autonomously motivated to exercise, they are more likely to assume this healthy behavior [32, 33]. Considering these findings, it was hypothesized that motivational factors evaluated according to the SDT could explain additional variance associated with intention to exercise, subjective perceptions of exercise, and objective exercise behavior beyond the one explained by social and cognitive factors proposed by the TPB and TTM,

helping to *close* the gap between intention and behavior (Hypothesis 3).

Participants' subjective experiences related to exercise, namely positive well-being, psychological distress, and fatigue were selected from the EAST proposal [16]. These variables were included because the TPB has been criticized for not considering the affective processes involved in intention formation and behavior [34]. In the case of exercise, it is important to consider the subjective experiences and emotions individuals feel when exercising [7]. In fact, it seems quite strange that emotional and experiential dimensions had not deserved equal attention of research when it comes to explaining exercise behavior, even when it is evident from empirical and anecdotal evidence that exercising is a stimulus experience that triggers multiple physical and psychological sensations in individuals [35]. On the other hand, there is evidence that emotional and cognitive processes act together and influence human behavior [36]. Despite the scarcity of findings on the influence of subjective experiences on exercise behavior, we hypothesized that positive well-being, psychological distress, and fatigue could explain additional variance associated with intention to exercise, subjective perceptions of exercise, and objective exercise behavior beyond the one explained by social, cognitive, and motivational factors proposed by the TPB, TTM, and SDT models, helping to *close* the gap between intention and behavior (Hypothesis 4).

Altogether, the variables of the TPB and TTM-DB models have their cognitive nature in common, by centering the analysis of behavior on rational and thinking processes of human beings on a specific situation. In this study, motivational (SDT) and subjective (EAST) processes toward exercise were also considered, combining cognitive, motivational, and emotional factors involved in the behavior of exercise. In sum, this study used an integrative conceptual approach to analyze the predictor variables of three constructs related to exercise behavior (e.g., intention to exercise, subjective perception of exercise, and objective exercise behavior) to comprehend the 'intention-behavior gap' related to exercise practice.

2. Method

2.1. Participants

The sample was a convenience one, including 304 participants who had full-access memberships at eight different private fitness centers. The majority of participants were female (n = 198, 65.1%) and 106 were male (34.9%). Participants ages ranged from 14 to 73 years old (M = 36.11; SD = 13.17). Regarding past exercise behavior, 13.5% of participants (n = 41) had previously exercised for one-to-three months; 5.3% (n = 16) for three-to-six months; 8.9% (n = 27) for six-to-twelve months, 33.6% for one-to-five years (n = 102); and 38.55% (n = 117) had exercised for more than five years (M = 2.79; SD = 1.36).

2.2. Instruments

The instruments used in this study evaluated participants' personal, physical activity, and psychological experiences of exercise. It was therefore important that "exercise" be clearly defined. We followed the definition of exercise proposed by the American College of Sports Medicine (ACSM), which recommends that all healthy adults 18 to 65 years old engage in moderate-intensity physical activity for a minimum of 30 minutes five days per week or vigorous-intensity physical activity for a minimum of 20 minutes three days per week [37].

Demographic questionnaire. This instrument evaluated personal (e.g., gender and age) and physical activity (e.g., past exercise behaviors) characteristics of participants. Past exercise behavior was evaluated by asking participants their experience in exercising giving five alternatives of response: one-to-three months, three-to-six months, six-to-twelve months, one-to-five years, and more than five years.

Perception of Exercise Practice Questionnaire (PEPQ-SPEP) [38]. This instrument was used to evaluate the "subjective perception of exercise practice" (SPEP) construct that is explained in the regression model presented later in this study. Participants were asked to report the frequency of their exercise sessions at the fitness center for three different periods of time: six months, one month, and the most recent week. They responded using a four-point scale (0 = *Never in a week*; 1 = *One or two times a week*; 2 = *Three to five times a week*; 3 = *Every day*). A mean score was obtained from their answers to this question (α = .76). Exploratory Factor Analysis confirmed the single-factor structure of the instrument (KMO = .608; Bartlett's Test = 251.500, df = 3, p = .000; Explained variance = 67.8%).

Attitudes (TPB-A) [39] (Portuguese adaptation by Gomes & Capelão [40]). This instrument measured attitudes using six items on a 7-point bipolar adjective scale, evaluating instrumental (e.g., useful/useless; α = .64 in this study) and affective (e.g., pleasant/unpleasant; α = .72 in this study) dimensions of participants' attitudes toward exercise. A mean score was calculated for both dimensions; higher values represent a more positive attitude toward exercise. Exploratory Factor Analysis confirmed the two-factor structure of the instrument (KMO = .746; Bartlett's Test = 396.213, df = 15, p = .000; Explained variance = 65.5%).

Subjective Norms (TPB-SN) [39] (Portuguese adaptation by Carneiro & Gomes [41]). This instrument measured participants' normative beliefs about their significant others' opinions of their exercise practice (e.g., "People who are close to me think I should do exercise regularly"). Subjective norms were measured using three parameters: setting of exercise (e.g., fitness center), frequency of exercise (e.g., at least three times per week), and time frame (e.g., next three months). This instrument used four items answered on a 7-point Likert scale (1 = *Disagree*; 7 = *Agree*) and calculated a mean score; higher values represent a stronger perception of normative beliefs about exercise practice (α in this study = .88). Exploratory Factor Analysis confirmed the

single-factor structure of the instrument (KMO = .801; Bartlett's Test = 659.303, *df* = 6, *p* = .000; Explained variance = 73.6%).

Perceived Behavioral Control (TPC-PBC) [39] (Portuguese adaptation by Gomes & Capelão [40]). This instrument measured four components of exercise behavior (likelihood of maintaining exercise program, perception of control over exercise, personal confidence about exercise, and personal ability to maintaining exercise program). We used four items answered on a 7-point Likert scale (example: 1 = *Very difficult*; 7 = *Not at all difficult*) and calculated a mean score; higher values represent a stronger perception of behavioral control toward exercise practice (α in this study = .91). Exploratory Factor Analysis confirmed the single-factor structure of the instrument (KMO = .828; Bartlett's Test = 910.359, *df* = 6, *p* = .000; Explained variance = 79.5%).

Intention (TPB-I) [39] (Portuguese adaptation by Gomes & Capelão [40]). This instrument used three items to measure participants' intentions to exercise in a specific setting (e.g., fitness center), at a specific frequency (e.g., at least three times per week), and for a specific period of time (e.g., next three months). We used three items answered on a 7-point Likert scale (example: 1 = *Unlikely;* 7 = *Likely*) and calculated a mean score; higher values represent a stronger intention regarding exercise (α in this study = .90). The results of this variable were used to constitute the "intention to practice exercise" construct that is explained in the regression model presented later in this study. Exploratory Factor Analysis confirmed the single-factor structure of the instrument (KMO = .794; Bartlett's Test = 924.367, *df* = 6, *p* = .000; Explained variance = 77.6%).

Decisional Balance (TTM-DB) [38]. Decisional balance toward exercise was evaluated based on Jordan et al. [19] measures of benefits (pros) and costs (cons) of exercise. The TTM-DB included four items that evaluated the pros of exercise and four items that evaluated the cons of exercise, for a total of eight items. Responses were scored on a 7-point Likert scale ranging from 1 (*Disagree*) to 7 (*Agree*). The scores were obtained by calculating a mean score for both dimensions; higher values represent a more positive (pros; α in this study = .75) or negative (cons; α in this study = .88) decisional balance toward exercise. Instructions to respond to the instrument asked participants to think about their exercise practice at their fitness center, and about completing it at least three times a week for three months. Exploratory Factor Analysis confirmed the two-factor structure of the instrument (KMO = .777; Bartlett's Test = 1036.476, *df* = 28, *p* = .000; Explained variance = 66.8%).

Behavioral Regulation in Exercise Questionnaire (SDT-BREQ-2) (Portuguese version by Palmeira, Teixeira, Silva, & Markland [42]). This instrument was based on the studies of Mullan, Markland, and Ingledew [43] and on Deci and Ryan's [15, 44] Self-determination Theory. The instrument evaluates motivation regarding exercise in five dimensions: (a) amotivation (4 items; α = .63, e.g., "I don't see why I should have to exercise"); (b) external regulation (4 items; α = .75, e.g., "I exercise because other people say I should"); (c) introjected regulation (3 items; α = .60, e.g., "I feel guilty when I don't exercise"); (d) identified regulation (4 items; α = .34, e.g., "I value the benefits of exercise"); and (e) intrinsic regulation (4 items; α = .62, e.g., "I exercise because it's fun"). Items were answered on a 5-point scale ranging from 0 (*Not true for me*) to 4 (*Very true for me*) and higher values represent a stronger profile in each motivation dimension. Exploratory Factor Analysis confirmed the five-factor structure of the instrument (KMO = .784; Bartlett's Test = 1038.459, *df* = 105, *p* = .000; Explained variance = 56.2%). Identified regulation was removed from the study due low reliability (0.34) which is below the acceptable values of 0.70 [45].

Subjective Exercise Experiences Scale (SEES) [16] (Portuguese adaptation by Carneiro and Gomes [46]). This instrument measured global psychological responses of participants to the stimulus properties of exercise in three dimensions: (a) positive well-being (four items; α in this study = .85), (b) psychological distress (four items; α in this study = .87), and (c) fatigue (four items; α in this study = .88). Positive well-being and psychological distress represent positive and negative poles related to the psychological well-being that may be associated with exercise, while fatigue represents an indicator of tiredness during or after exercise. Items were answered on a 7-point Likert scale ranging from 1 (*Not at all*) to 7 (*Very much so*). The scores were obtained by calculating a mean score for each subscale; higher values represent stronger perceptions of the three dimensions. Exploratory Factor Analysis confirmed the three-factor structure of the instrument (KMO = .815; Bartlett's Test = 1737.566, *df* = 66, *p* = .000; Explained variance = 73%).

Exercise Behavior (EB). It represents the third variable explained in the regression models presented later in this study. In order to determine EB we consulted the computer records of participants' exercise behavior during the three months following the application of the evaluation protocol with the instruments just described. The final score was obtained by averaging the number of exercise sessions completed by each participant over a period of three months (with higher scores corresponding to more exercise sessions completed during this period). We chose to evaluate exercise over a three-month period to have a stable and specific measure of this behavior. This time frame is well beyond that reported by Randall and Wolff [47], who used periods shorter than one week in their studies analyzing the intention-behavior relationship in exercise. This is also according the suggestion of Armitage [8], who proposes studying a time period of several months to better evaluate the health benefits of physical activity.

2.3. Procedure

This study was approved by the Ethical Committee of the institution of the authors of this paper (# REMOVED FOR REVIEW PURPOSE). Four steps were required to collect data: (1) managers of fitness centers were contacted and

informed about the goals and procedures of data collection; (2) participants were contacted and asked to participate in the study; informed consent was obtained from those who agreed to participate; (3) participants completed the evaluation protocol that included the instruments described above (PEPQ-SPEP, TPB-A, TPB-SN, TPC-PBC, TPB-I, TTM-DB, SDT-BREQ-2, and SEES); out of 305 protocols delivered to participants, we received 304 considered valid for this study (return rate of 86.8%); and (4) three months after participants completed the evaluation protocol we returned to the fitness centers and consulted computer records of their exercise to compute the EB variable.

2.4. Research Design

This study adopted a cross-sectional design with follow-up measures of exercise behavior. First, it was collected the psychological measures (PEPQ-SPEP, TPB-A, TPB-SN, TPC-PBC, TPB-I, TTM-DB, SDT-BREQ-2, and SEES) and then it was evaluated exercise behavior of participants for a period of three months.

3. Results

Data analysis was performed using SPSS software (version 21.0 for Windows).

In order to test the four hypotheses related to the prediction of participants' intention to exercise, subjective perception of exercise, and exercise behavior, we used hierarchical regression analysis (using the "enter" method). To understand the amount of variance variables of each model could explain in the predictor variables, they were organized into blocks: block 1 controlled the personal and physical activity variables of participants, block 2 included the dimensions of the Theory of Planned Behavior-TPB, block 3 included the variables of the Transtheoretical Model-TTM, block 4 included the variables of Self-determination Theory-SDT, and block 5 included the variables of Emotional and Affective States Theory-EAST/SEES.

This organization of independent variables into blocks aimed to analyze the "Intention-Behavior Gap" phenomenon by evaluating the predictor values of TTM, SDT, and EAST/SEES proposals to explain exercise practice *beyond* the variance already explained by the TPB proposal. The three tested models showed no problems with multicollinearity, and the data were normally distributed [48]. However, some outliers had to be controlled due to results obtained from residual casewise diagnostics.

3.1. Prediction of Intention to Exercise

The intention to exercise results from the Theory of Planned Behavior (TPB-I instrument). Results from hierarchical regression analysis indicated that block 1 explained 3% of the variance; age (being older) predicted the intention to exercise. Block 2 explained 71% of the variance; higher social pressure (subjective norms) and higher perception of behavioral control predicted the intention to exercise. Blocks 3, 4, and 5 did not increase the explained variance of intention to exercise, and no variable had significant results (see Table 1). The final model was obtained after removing six outliers.

3.2. Prediction of Subjective Perception of Exercise Practice

The subjective perception of exercise practice results from the Perception of Exercise Practice Questionnaire (PEPQ-SPEP). Results from hierarchical regression analysis indicated that block 1 explained 7% of the variance; gender (being male) and higher perception of past exercise behavior predicted the perception of exercise practice. Block 2 explained 39% of the variance; higher perception of behavioral control and higher intention to exercise predicted the subjective perception of exercise. Blocks 3 and 5 also did not produce significant results. However, higher perception of introjected regulation had significant results in predicting the subjective perception of exercise (Block 4). The final model predicted 38% of the variance associated with subjective perception of exercise; one outlier had to be removed (see Table 2).

3.3. Prediction of Exercise Behavior

Exercise behavior results were obtained by averaging the number of exercise sessions completed by the participants during the three months after applicate the evaluation protocol with the psychological instruments (PEPQ-SPEP, TPB-A, TPB-SN, TPC-PBC, TPB-I, TTM-DB, SDT-BREQ-2, and SEES). Results from hierarchical regression analysis indicated that block 1 explained 4% of the variance; age (being older) and higher perception of past exercise behavior both predicted exercise behavior. Block 2 explained 18% of the variance; higher perception of behavioral control and higher intention to exercise both predicted exercise behavior. Blocks 3 to 5 did not increase the explained variance of exercise behavior and no variable had significant results. The final model predicted 16% of the variance associated with exercise behavior; one outlier had to be removed (see Table 3).

Table 1. Regression Model for Predicting Intention to Practice Exercise

	R^2 (R^2 adjust.)	ΔR^2	ΔF	F	β	t	p
Block 1	.04 (.03)	.04	3.27	(3, 220) 3.27*			
Gender [(a)]					-.08	-1.14	.25
Age					.15	2.16	.03
Past exercise behavior					.09	1.36	.18
Block 2	.72 (.71)	.68	130.45	(7, 216) 79.24***			
TPB-A-Attitude-Instrumental					-.01	-.30	.76
TPB-A-Attitude-Affective					-.02	-.53	.60
TPB-SN-Subjective norms					.09	2.26	.03
TPC-PBC-Perceived behav. control					.83	21.30	$p < .001$
Block 3	.72 (.71)	.00	.79	(9, 214) 61.69***			
TTM-DB-Benefits					-.05	-1.14	.26
TTM-DB-Costs					-.02	-.52	.61
Block 4	.72 (.71)	.00	.50	(13, 210) 42.64***			
SDT-BREQ-2-Amotivation					.01	.28	.78
SDT-BREQ-2-External regulation					-.05	-1.00	.32
SDT-BREQ-2-Introjected regulat.					.03	.88	.38
SDT-BREQ-2-Intrinsic regulation					.02	.48	.63
Block 5	.73 (.71)	.00	.48	(16, 207) 34.33***			
SEES-Positive well-being					-.01	-.19	.85
SEES-Psychological distress					-.05	-1.09	.28
SEES-Fatigue					.02	.54	.59

[(a)] **Gender:** 0-Male; 1-Female

Table 2. Regression Model for Predicting Subjective Perception of Exercise Practice

	R^2 (R^2 adjust.)	ΔR^2	ΔF	F	β	t	p
Block 1	.08 (.07)	.08	6.59	(3, 225) 6.59***			
Gender [(a)]					-.13	-1.99	.05
Age					.03	.43	.67
Past exercise behavior					.24	3.62	$p < .001$
Block 2	.48 (.39)	.42	36.39	(8, 220) 27.16***			
TPB-A-Attitude-Instrumental					-.01	-.09	.97
TPB-A-Attitude-Affective					.06	1.08	.28
TPB-SN-Subjective norms					.00	.05	.96
TPC-PBC-Perceived behav. control					.16	2.00	.05
TPB-I-Intention to practice exercise					.51	6.72	$p < .001$
Block 3	.49 (.38)	.01	2.92	(10, 218) 22.69***			
TTM-DB-Benefits					-.11	-1.91	.06
TTM-DB-Costs					.08	1.53	.13
Block 4	.50 (.38)	.02	1.81	(14, 214) 16.97***			
SDT-BREQ-2-Amotivation					-.01	-.26	.79
SDT-BREQ-2-External regulation					.07	1.30	.19
SDT-BREQ-2-Introjected regulat.					.10	2.06	.04
SDT-BREQ-2-Intrinsic regulation					.06	.97	.33
Block 5	.49 (.38)	.01	.85	(17, 211) 14.09***			
SEES-Positive well-being					-.09	-1.33	.18
SEES-Psychological distress					-.06	-1.04	.30
SEES-Fatigue					-.01	-.10	.92

[(a)] **Gender:** 0-Male; 1-Female

Table 3. Regression Model for Predicting Exercise Behavior

	R^2 (R^2 adjust.)	ΔR^2	ΔF	F	β	t	p
Block 1	.05 (.04)	.05	4.08	(3, 222) 4.08**			
Gender [(a)]					.00	.02	.99
Age					.16	2.31	.02
Past exercise behavior					.14	2.04	.04
Block 2	.21 (.18)	.16	8.83	(8, 217) 7.32***			
TPB-A-Attitude-Instrumental					.05	.70	.49
TPB-A-Attitude-Affective					.06	.82	.41
TPB-SN-Subjective norms					-.08	-1.98	.23
TPC-PBC-Perceived behav. control					.20	2.05	.04
TPB-I-Intention to practice exercise					.20	2.11	.04
Block 3	.22 (.18)	.00	.44	(10, 215) 5.91***			
TTM-DB-Benefits					-.04	-.50	.62
TTM-DB-Costs					.05	.81	.42
Block 4	.22 (.17)	.01	.47	(14, 211) 4.31***			
SDT-BREQ-2-Amotivation					-.02	-.28	.78
SDT-BREQ-2-External regulation					.09	1.21	.23
SDT-BREQ-2-Introjected regulat.					-.04	-.64	.53
SDT-BREQ-2-Intrinsic regulation					-.01	-.18	.86
Block 5	.22 (.16)	.00	.05	(17, 208) 3.51***			
SEES-Positive well-being					.03	.37	.71
SEES-Psychological distress					-.00	-.02	.98
SEES-Fatigue					.00	.01	.99

[(a)] **Gender:** 0-Male; 1-Female

4. Discussion

This study analyses the factors that may explain exercise behavior by predicting three variables: intention to practice exercise, subjective perception of exercise, and exercise behavior. Current knowledge of the factors associated with exercise behavior indicates that we have a better understanding of the *intention* to exercise than of exercise behavior itself [8, 9]. This phenomenon, called the "intention-behavior gap" [6, 7], is one of the major challenges for researchers studying exercise practice. It was addressed in this study by analyzing the predictor variables of three referred variables being established four hypotheses.

Hypothesis 1 stated that TPB explain more variance associated with intention to exercise and subjective perceptions of exercise than variance associated with objective exercise behavior. Results confirmed this hypothesis. Considering only the TPB variables, the explained variance decreased from intention to exercise (71%), to subjective perception of exercise (39%), and to exercise behavior (18%). It is therefore easier to explain the psychological experience of exercise (e.g., intention to exercise and even subjective perception of exercise) than objective exercise behavior.

These same pattern of results occurred for the TTM, SDT, and EAST proposals that did not augment the variance explained in intention to exercise (71%), subjective perception of exercise (38%), and exercise behavior (16%) beyond the one explained for the TPB. Thus hypotheses 2, 3, and 4 were not confirmed, although it should be mentioned that introjected regulation from SDT predicted the subjective perception of exercise.

Considering these results of our study, three main aspects should be addressed.

First, although we included a substantial number of predictor variables organized by personal, physical activity, and psychological factors, the explained variance decreased significantly from intention to exercise, to subjective perception of exercise, and to exercise behavior. In the case of exercise behavior, this conclusion was reached by studying participants over a longer period of time than in previous studies of this topic [10, 47]. Additionally, this study did not rely on participants' subjective perceptions of exercise, but rather looked beyond this by analyzing objective exercise behavior, as recommended by some authors [8, 10, 49]. We also considered major conceptual

models related to health behaviors. Although these *new* insights in the study design and conceptual background, our results demonstrate that there is still a gap between intention and behavior.

Second, the predictors of exercise divided into personal, physical activity, and psychological factors demonstrated some interesting results.

Among personal characteristics of the participants, gender did not emerge as a predictor of exercise experience, except for the prediction of subjective perception of exercise practice; this partially contradicts some findings of previous studies [22, 50]. One possible explanation for this result may be the fact that all participants were actively exercising at the time we applicate the evaluation protocol, possibly minimizing the role of gender as compared to situations where people have not yet begun to exercise. Age was somewhat relevant in predicting both the intention to exercise and exercise behavior, indicating that older participants were more inclined to be physically active and adopt an exercise regimen. This result supports previous evidence emphasizing the role of age in understanding the importance of exercise [22, 9].

Among physical activity characteristics of the participants, past exercise behavior was a predictor of both the intention to exercise and exercise behavior, and for the latter it was a strong predictor. This means that previous exercise behavior is related to the intention to exercise in the near future and to maintain effective exercise behavior long-term. Again, this result is in agreement with previous studies [8, 25] but, in our case, it should be stressed that past exercise behavior seems to better predict exercise practice than does the intention to exercise.

Among psychological variables, dimensions of the TPB proposal made a major contribution to explaining the exercise experiences of participants. More specifically, subjective norms and perceived behavioral control were predictors of the intention to exercise. In this case, it is interesting to note that social pressure to exercise seems to be related to the intention to exercise, but does not seem to produce effect on those variables strongly related to exercise *per se* (e.g., subjective perception of exercise and exercise behavior). Perceived behavioral control and intention to exercise (both from the TPB model) were the predictors of subjective perception of exercise and exercise behavior. It can be concluded that confidence of one's success in an exercise regimen (i.e., perceived behavioral control) and establishing a concrete plan of action (i.e., intention) are the best predictors of actual exercise behavior (i.e., subjective perception of exercise practice) and objective exercise behavior. Introjected regulation (an aspect of Self-determination Theory) was a slight but not strong predictor of subjective perception of exercise practice, meaning that people tended to exercise to avoid the guilt associated with *not* exercising. In sum, results showed that while social pressure to exercise can exert some influence on the intention to exercise, the strong predictors of exercise behavior are feelings of control over the activity and determination to maintain the behavior.

Third, our results showed that little or no variance was explained by the Transtheoretical Model, Self-determination Theory, or the Emotional and Affective States Theory beyond what has already been explained by the Theory of Planned Behavior. Despite the relevance attributed to these theories and variables in previous literature [19, 7, 51, 52], we conclude that while TPB is still a major contributor to explaining exercise behavior, the impact of this model tends to decrease as we move from the intention to exercise to the objective behavior of exercise. This indicates that other variables may be required to explain exercise behavior, making it especially important that future research continue to explore the gap between intention and behavior. Perhaps by developing and integrating conceptual models of healthy behavior, and even adopting conceptual models to the specific context of exercise, we can help to capture the complexities inherent in making exercise a part of one's lifestyle.

Some of the limitations of this study relate to its use of private fitness centers. The primary criterion we evaluated was the frequency of exercise done in the centers and not other important criteria, such as type, duration or pattern of exercise.

Considering all these aspects, our data suggests that ensuring the success of each individual in exercise activity (e.g., reinforcing perceived behavior control) and defining a concrete plan of action (e.g., reinforcing intention over exercise) can indeed help with the maintenance of an exercise regimen over the course of the life cycle.

Note

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