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Predicting Exercise Behavior: Testing Personal, Athletic, and Psychological Variables

A. R. Gomes, T. Capelão

School of Psychology, University of Minho, Braga, 4710-057, Portugal

Abstract This study analyzes whether personal, athletic, and psychological factors predict the perception of current exercise frequency. The study included 193 participants, of whom 130 were females (67.4%) and 63 were males (32.6%). Personal and athletic information, current exercise frequency, exercise attitudes, perceived behavioral control, expected outcomes of exercising, behavioral regulation, satisfaction with life, and satisfaction with body shape and physical appearancewere evaluated. The results showed that perception of current exercise frequency was best predicted by personal and athletic variables, followed by satisfaction with body shape and physical appearance, intrinsic regulation, and negative expectations about exercise. In conclusion, considering the role of personal and athletic variables (and some psychological dimensions) seems important in explaining exercise behavior.

Keywords Exercise Behavior, Personal and Athletic Factors, Psychological Factors

1. Introduction

Regular exercise is considered a significant component of a healthy lifestyle[1].However, the rates of physical activity are low for the majority of the population[2]. As a result, some models have been proposed to analyze the factors explaining the relationship between exercise behavior and a person's intentions to do exercise.

One of the major models concerning this subject (e.g., the theory of planned behavior, TPB)[3] proposes that the intention to assume a certain behavior and the perceived behavioral control are direct predictors of behavior and that behavioral intention is determined by an individual's attitude, subjective norm, and perceived behavioral control[4],[5]. In a meta-analysis of 72 studies based on the TPB, it was concluded that 45% of the variance in intention was predicted by perceived behavioral control, subjective norms, and attitudes but that only 27% of the variance in exercise behavior was predicted on the basis of intention[6]. Thus, intention seems to be a variable that is better explained by the variables proposed in the TPB than by the exercise behavior itself. The absence of a relationship between intention and exercise behavior is a major concern of research that is known as the "intention-behavior gap"[7],[8].

A possible way to reduce this gap is to incorporate other variables that could indeed explain the relationship between intention and exercise behavior[7],[10],[5].

* Corresponding author:
rgomes@psi.uminho.pt (Rui Gomes)
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Considering this need, this study was based on two ideas. First, it was incorporated five sets of variables that are involved in the exercise behavior, namelysome personal and athletic characteristics of the participants and also some important psychological vairables (exercise attitudes and perceived behavioral control, expectations about exercise, behavioral regulation in exercise, and body satisfaction and global satisfaction). In this way, we tried to augment the knowledge about the dimensions involved in the explanation of the exercise behavior, and thus reducing the intention-behavior gap. Second, more than predicting the "intention of doing exercise", this study predicts the perception of "current exercise frequency". More specifically, it was evaluated the participants perceptions of exercise frequency per week, that seems to be a more objective and proximal measure of exercise behavior than the evaluation of the participants' intention to do exercise. For example, in this last case typical measures evaluate the intention to do exercise by asking the participants to answer items as follows: "I intend to exercise for at least 20 minutes, three times per week for the next three months"[9]. These estimations for periods relatively long could indeed decrease the efficacy to predict exercise behavior. Thus, the alternative selected for this study was asking participants to rate the frequency of exercise per week they were really doing, and not their intention or estimation of exercise for the following months.

Regarding the variables used to predict the perception of current exercise frequency, the first set of variables tested personal (e.g., gender, age, BMI, and desire for ideal weight) and athletic (e.g., attraction toward exercise and past exercise behavior) factors. These variables were selected because of some indications about their impact on exercise

behavior[10],[7],[11],[12], being now all analyzed together in order to comprehend their predictive value in explaining the current exercise frequency.

The second set of variables included exercise attitudes and perceived behavioral control, which are two main constructs of the TPB together with subjective norms[3]. Attitudes can be positive or negative, and are overall evaluations regarding assuming a specific behavior. Perceived behavioral control refers to the individual's perception of his or her own ability to translate a certain goal into an observable behavior. Subjective norms are the individual's perception of the expectations of others toward the target behavior. Subjective norms were excluded in this study because attitudes and perception of behavioral control are more significant in determining intentions and exercise behavior than are perceptions of pressure from others[4],[6].

The third set of variables is related to expectations about exercise. We selected a measure that evaluates positive and negative expectations about exercise (i.e., the "pros" and "cons" of exercise), which are main constructs of the transtheoretical model[13]. The "pros" and "cons" of assuming a certain behavior reflect the individual's assessment of the benefits and costs of changing a specific behavior[14]. In exercise settings, there is some evidence that pros and cons represent valid dimensions for discriminating among individuals that are at different stages of exercise readiness[15], being now examined their predictive value in explaining the perception of current exercise frequency.

The fourth set of variables concerned behavioral regulation in exercise. For this study, a measure was selected that evaluates different forms of behavioral regulation in exercise contexts (i.e., the Behavioral Regulation in Exercise Questionnaire;[16]). This instrument is based on self-determination theory[17], which proposes that behavior can be regulated by different forms of motivation that are more autonomous (e.g., intrinsic motivation) or controlled (e.g., extrinsic motivation). Being so, five dimensions were evaluated. Three of them represent different forms of extrinsic motivation: i) external regulation: the individual becomes involved in an activity in order to satisfy external pressures, achieve externally imposed rewards, or avoid coercion from other people; ii) introjected regulation: the individual engages in an activity because of the internalization of external controls, which are then applied through self-imposed pressures in order to avoid guilt or to maintain self-esteem, self-worth, and pride; and iii) identified regulation: the individual is involved in an activity because he accepts the behavior as being important in order to achieve personally valued outcomes. The fourth dimension is intrinsic regulation, which measures intrinsic motivation, meaning that the individual is involved in an activity for the enjoyment and satisfaction inherent in engaging in the behavior itself. Finally, the fifth dimension is amotivation, which reflects a state of lacking any intention to engage in a behavior and is a completely non-self-determined form of regulation[16].

The fifth set of variables concerned satisfaction. The first one was related to the body shape and appearance and the second one was related to global satisfaction. Body dissatisfaction was selected because it represents an important dimension in sports contexts, being related to willingness to lose weight[18], the risk of dieting, and unhealthy weight control behaviors[19]. Life satisfaction was selected because it is a measure that is independent of the participants' backgrounds and contexts, and because it has an impact on overall well-being, making people feel good about themselves, their lives, and the way that they relate to other people[20]. It is therefore interesting to know whether this variable is sensitive to exercise practice. As such, this study tested the predictive value of specific and global satisfaction dimensions with respect to the current exercise frequency.

In sum, this study analyzed the predictive value of five sets of variables that includes personal, athletic, and psychological variables regarding the perception of current exercise frequency. The variables were selected because of their impact on the beginning and maintenance of physical activity, being now tested their capacity to explain the participants' perception of exercise behavior. That is, in this study it was analyzed the relationship between five sets of variables and the participants' routines of exercise, trying to observe their importance when it comes to explain the practice of exercise.

2. Material and Methods

2.1. Participants

The sample was a convenience one, being all the participants included in the same exercise academy. The study involved 193 participants, 130 of whom were females (67.4%) and 63 of whom were males (32.6%). They were between 16 and 68 years old (M = 36.89; SD = 12.33). The majority of the sample was of normal weight (n = 139, 76.4%; BMI= 18.6-24.9), 5 participants (2.7%) were below normal weight (BMI $\leq$ 18.5), and 38 participants (20.8%) were overweight or obese (BMI $\geq$ 25). For eleven participants it was not possible to calculate the BMI due missing data regarding height and/or weight information. In this sample, 82 participants reported a desire to weigh less than their current weight (43.2%), 97 reported a desire to remain the same weight (51.1%), and 11 reported a desire for an ideal weight greater than their current one (5.7%). In addition, 101 participants (52.9%) reported low-to-moderate attraction toward exercise, and 90 participants reported high attraction toward exercise (47.1%). It should be mentioned that two participants did not answer this question. The participants' perception of current exercise frequency per week varied between 1 and 10 training sessions (M = 2.60; SD = 1.33). The participants' perception of past exercise frequency for the last three months were the following: 77 participants (40.7%) reported exercising one to two times per week, 34 participants (18%) reported exercising three times per week,

32 participants (16.9%) reported exercising four to five times per week, 46 participants (24.4%) reported exercising six to seven times per week, and four participants did not reported any information on this subject.

2.2. Measures

Demographic and athletic information.This questionnaire evaluated personal information (e.g., gender, age, weight, height, and desire for ideal weight) and athletic information (e.g., attraction toward exercise, current and past exercise behaviors). Self-reported current weight and height measurements were used to determine body mass indices. A measure of the desire for an ideal weight was obtained by asking participants if they would like to weigh more, less, or the same as their current weight. A measure of attraction toward exercise was obtained by asking the participants whether they liked to exercise being used aLikert-scale (0 = *not at all*, 3 = *very much*) was used to record their responses. Self-reported past exercise frequency was obtained by asking the participants the number of training sessions they had done in the last 3 months, given the following options: 1 to 2 times per week, 3 times per week, 4 to 5 times per week, and 6 to 7 times per week.

Current Exercise Frequency. The participants were asked to rate their frequency of exercise per week by one item, using as example a typical week of exercise.

Exercise Attitudes[9]. Attitudes toward exercise was measured using a 7-point bipolar adjective scale that consisted of three items evaluating the instrumental attitude component (e.g., useful/useless, wise/foolish, beneficial/harmful; Cronbach's α in this study = .84) and three items evaluating the affective attitudinal component (e.g., enjoyable/unenjoyable, interesting/boring, relaxing/stressful; α in this study= .78). The statement preceding the adjective was ''For me, practicing regular exercise over the next three months will be…''. The scores were obtained by adding item values and the sum was then divided by the total number of items forming the subscale.

Perceived Behavioral Control[9]. Perceived behavioral control was measured by averaging the responses to the following three items: "I am confident that I will be able to perform regular physical activity in the next *4 weeks/2 months/3 months*". Responses were scored using a Likert-scale ranging from *not at all true for me* to *completely true for me* (α in this study= .91).

Expectations of Exercise[21]. This instrument evaluates the positive and negative perceptions that participants had about doing physical exercise the number of training sessions they were doing at that moment (taking as a reference the rates of exercise in that week). Positive expectations were measured with three items (α in this study= .66, e.g., coping better with daily hassles) as were negative expectations (α in this study= .79, e.g., not having sufficient time for other things). Positive expectation had an alpha value above .60 but it was included in the analysis that follows because there were only three items to measure this dimension[22]. Responses were scored on a Likert-scale ranging from 1 (*does not apply me*) to 7 (*applies to me*). The scores were obtained by adding item values and the sum was then divided by the total number of items forming the subscale.

The Behavioral Regulation in Exercise Questionnaire-2 [16]; Portuguese adaptation[23]. This instrument evaluates behavioral regulation in exercise contexts, assessing the following five dimensions: i) external regulation (four items, α in this study= .83, e.g., "I exercise because other people say I should"); ii) introjected regulation (three items, α in this study= .57, e.g., "I feel guilty when I don't exercise"); iii) identified regulation (four items, α in this study= .50, e.g., "I value the benefits of exercise"); iv) intrinsic regulation (four items, α in this study= .73, e.g., "I exercise because it's fun"); and v) amotivation (four items, α in this study= .78, e.g., "I don't see why I should have to exercise"). Alpha coefficients were below .60 in the introjected regulation and identified regulation scales, which resulted in their removal from subsequent analyses. Responses were scored on a Likert-scale ranging from 0 (*not true for me*) to 4 (*very true for me*). The scores were obtained by adding item values and the sum was then divided by the total number of items forming the subscale.

Satisfaction WithLife Scale[20]; Portuguese adaptation [24]). This instrument includes five items and evaluates respondents' subjective judgments about their quality of life. Responses were scored on a Likert-scale ranging from 1 (*Totally disagree*) to 7 (*Totally agree*). The scores were obtained by adding item values and the sum was then divided by the total number of items forming the subscale. Higher values indicate greater satisfaction with life (α in this study= .88).

AthleticCondition Questionnaire[25]. For the purpose of this study, participants responded to three items from one subscale of this questionnaire that evaluates satisfaction with body shape and physical appearance. Responses were scored on a Likert-scale ranging 1 (*Extremely dissatisfied*) to 5 (*Extremely satisfied*) (e.g., "I am satisfied with my weight"). The score was obtained by adding item values and dividing the sum by the total number of items forming the subscale (α in this study= .88).

2.3. Procedure

This study was reviewed and approved by the internal review board of Research Center of Psychology (University of Minho), and conformed to both National and European regulations on conducting research with human participants and on the management of personal data.The data collection involved the following steps: i) a meeting occurred with the manager of a fitness center in order to explain the research goals and the data collection procedures; ii) after approval from the fitness center manager was attained, the participants were invited to take part in the study and were assured that their data would remain anonymous and confidential; iii) written informed consent was obtained from all participants; and iv) 240 questionnaires were distributed, and 193 were collected and were considered valid (the return rate was

80.4%).

3. Results

To predict the participants' perception of current exercise frequency, a regression analysis with blocked entry procedures was applied to the data. The prediction of the current exercise frequency was done with five regression models that were tested separately: (a) personal and athletic variables; (b) exercise attitudes and perceived behavioral control; (c) expectations about exercise; (d) behavioral regulation in exercise; and (e) satisfaction dimensions. The models showed no multicollinearity and data was normally distributed[26]. However, we had to control some outliers due to the results obtained from the "residual casewise diagnostics".

Model one included the personal and athletic variables as two blocks of predictors in order to better estimate the predictive value of each one. Block one contained the personal variables (e.g., gender, age, BMI, and desire for ideal weight). The BMI variable included two levels defined on the basis of frequency results: participants with normal weight (n = 139, 78.5%) and overweight participants (n = 38, 21.5%). The variable concerning desire for an ideal weight was likewise assigned two values on the basis of frequency results: participants that desired to weigh less (n = 82, 43.2%) and participants that desired to maintain the same weight or gain more weight (n = 108, 56.8%). The athletic variables were entered in block two (e.g., attraction toward exercise and past exercise behavior). In the case of attraction toward exercise, two levels were defined on the basis of frequency results: participants that reported low-to-moderate attraction toward exercise (n = 101, 52.9%) and participants that reported high attraction toward exercise (n = 90, 47.1%).

The first block explained 10% of the variance of current exercise frequency ($R^{2\,\text{adj.}}$ = .08), and the model was found to be significant ($F_{(4,155)}$ = 4.29, p< .01). Current exercise frequency was predicted by gender (β = -.20, t = -2.24, p< .05) and by the desire for an ideal weight (β = .22, t = 2.57, p< .05). Specifically, being female and having a desire to weigh less predicted a lower weekly frequency of exercise. The second block explained 18% of the variance of current exercise frequency ($R^{2\,\text{adj.}}$ = .14), and the model was found to be significant ($F_{(6,153)}$ = 5.46, p< .001). Current exercise frequency was predicted by attraction toward exercise (β = .19, t = 2.45, p< .05) and by past exercise behavior (β = .18, t = 2.36, p< .05). Specifically, the lower levels of attraction toward exercise and the perceptions of having exercised more infrequently in the past 3 months predicted a lower weekly exercise frequency. Three outliers were removed from the analysis.

Model two included the exercise attitudes and perceived behavioral control variables. The model was not found to be significant (R^{2} = .03; $R^{2\,\text{adj.}}$ = .02; $F_{(3,159)}$ = 1.81, n.s.).

Model three included the variables concerning expectations about exercise. The model was not found to be significant (R^{2} = .03; $R^{2\,\text{adj.}}$ = .02; $F_{(2,167)}$ = 2.24, n.s.). However, negative expectations of exercise assumed significant coefficient values (β = -.16, t = -2.01, p< .05). Specifically, expectations about exercise that were more negative predicted a lower frequency of exercise per week. Fourteen outliers were removed from the analysis.

Model four included the behavioral regulation in exercise dimensions. The model explained 4% of the variance in perceived exercise frequency ($R^{2\,\text{adj.}}$ = .03) and was marginally significant ($F_{(3,177)}$ = 2.56, p< .10). Current exercise frequency was predicted by intrinsic regulation (β = .17, t = 2.25, p< .05). Specifically, the lower intrinsic regulation predicted the lower exercise frequency per week. Three outliers were removed from the analysis.

Model five included the satisfaction dimensions of the Satisfaction With Life Scale (first block) and of the Athletic Condition Questionnaire (second block). The first block explained 1% of the variance of current exercise frequency ($R^{2\,\text{adj.}}$ = .01), and the model was not found to be significant ($F_{(1,170)}$ = 1.78, n.s.). The second block explained 9% of the variance ($R^{2\,\text{adj.}}$ = .07) and was significant ($F_{(2,169)}$ = 7.85, p< .01). Current exercise frequency was predicted by satisfaction with body shape and physical appearance (β = .30, t = 3.71, p< .001). Specifically, the lower satisfaction with body shape and physical appearance predicted the lower exercise frequency per week. Nine outliers were removed from the analysis.

4. Discussion

It has been indicated that psychological factors are more predictive of the intention to do exercise than of the actual presence of exercise behaviors[6]. Although this study does not evaluate exercise behavior with objective measures, our results substantially confirm this idea. In fact, the percentages of variance explained in all the five tested models were below the values observed when it comes to predict attitudes toward exercise[6].

More specifically, of the five regression models tested, the highest amount of variance was explained by the personal and athletic variables, followed by the satisfaction variables, and by the behavioral regulation variables. Somewhat surprisingly, attitudes, perceived behavioral control variables, and expectations about exercise did not predict a significant amount of variance of the participants' perceptions of current exercise frequency. Thus, the psychological variables did not assume a remarkable role in the prediction of exercise behavior.

In what concerns the specific predictor variables, the regression model that included personal and athletic variables made evident the predictive value of gender, desire for an ideal weight, attraction toward exercise, and past exercise behavior and did not reinforce the value of age or BMI. Thus, being female, having a desire to weigh less, being less attracted toward exercise, and having a perception of a lower level of exercise frequency in the last 3 months

predicted the lower current exercise frequency.

With regards to sex differences, the results reinforced the tendency of women to perceive a lower level of exercise frequency, which may be related to their tendency to be more physically inactive at most ages than are males[27]. In the case of age, no differences were found in this study, but there are indications that older individuals are more likely to implement their intentions to exercise than are younger individuals[6], even though physical activity decreases with age[28]. Similarly, BMI was not a significant predictor in this study. However, being overweight or obese tends to be negatively associated with exercise[27] in different populations and age groups[29],[30]. However, these results are not entirely comparable to the results of our study because in our case the overweight individuals were already doing exercise. So it would be interesting for future research to ascertain whether overweight exercisers tend to maintain or to abandon exercise more easily than exercisers with normal BMIs. Despite the no significant result for the BMI variable, the importance of weight should be reinforced in light of the results for the variable concerning the level of desire for an ideal weight. In this case, participants with the desire to weigh less reported lower perception of current exercise frequency. It is interesting to note that more than BMI, it is the individual's perception of their weight that makes a difference in their tendency to exercise.

Regarding the athletic variables, past exercise behavior assumed a significant amount of variance in current exercise frequency, which is very important because of some empirical findings suggesting that past behavior is often the best predictor of future behavior in physical activity[6]. Attraction toward exercise also assumed a significant amount of variance in the tendency to exercise. Scarce findings exist about the importance of this variable in adult exercise settings, but it is evident that pleasure and enjoyment in doing physical activity seem very important in promoting exercise frequency. This result may somehow be related to the finding about behavioral regulation in exercise, in which lower levels of intrinsic regulation predicted lower perception of current exercise frequency. In other words, being involved in exercise for the enjoyment and satisfaction inherent in that activity is a significant predictor of perceived exercise frequency, which may be related to participants' attraction toward exercise. This orientation toward the intrinsic aspects of exercise has been related to positive outcomes in terms of physical self-worth, self-reported exercise behavior, psychological well-being, and psychological needs satisfaction[31].

Exercise attitudes and the perceived behavioral control did not predict the perception of current exercise frequency. As said before, these factors seem more effective in predicting the exercise intention than the exercise behavior[6], but the fact that the model did not explain any significant variance in exercise frequency was surprising and needs to be confirmed in future research.

Expectations of exercise were also not significant. However, having more negative expectations about exercise predicted lower current exercise frequency. These results confirm the importance of expectations about the behavior (namely, the "cons" of exercise), which are key elements in the transtheoretical model[13], and also confirms some empirical findings about the importance of the pros and cons of behavior in exercise settings[15].

Finally, the satisfaction predictors made clear the importance of satisfaction with body shape and physical appearance but not the satisfaction with life. Thus, less satisfaction with body shape and physical appearance predicted lower perception of current exercise frequency. This finding is interesting because body dissatisfaction has been related with willingness to lose weight[18], eating disordered behaviors[25], and it has now also been related to lower exercise frequency.

In summary, the impacts of personal, athletic, and psychological variables on exercise practice are different, and some of them are more important than others.

Some limitations of this study should be adressed. First, it was used a convenience sample that included individuals doing exercise in a private fitness center, which is not representative of a random sample of the general population.Second, some dimensions of the instruments were not used in the analysis (e.g., introjected regulation and identified regulation scales) due some reliability problems, which limitated the full compreension of their impact on exercise practice. Third, this study used self-reported indicators of exercise practice to measure the exercise behavior, being possible that some participants overestimated their habits of exercise. Being so, future research should confirm not only the relevance of these variables in predicting exercisers' perceptions of current exercise frequency but also their relevance in predicting exercisers' true frequency of exercise[32], using objective measure of exercise behavior.

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