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Do Basic Psychological Needs and Self-Determined Motivation Outweigh Physical Activity Volume and Body Composition in Explaining Subjective Well-Being Among Community Gym Users?

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Highlights

Public health relevance—How does this work relate to a public health issue?

- Community gym users represent a growing population that uses exercise as a strategy for health promotion and disease prevention;
- Subjective well-being is a key indicator of psychological health and quality of life, relevant for public health monitoring.

Public health significance—Why is this work of significance to public health?

- Public health initiatives often promote exercise by focusing primarily on physical metrics, such as physical activity volume and body composition;
- This study suggests that while physical factors are important, psychological needs and self-determined motivation are key drivers of subjective well-being.

Public health implications—What are the key implications or messages for practitioners, policy makers and/or researchers in public health?

- To promote sustainable mental health and well-being in community settings, public health interventions and gym programs should move beyond tracking exercise quantity and actively design environments that support autonomy, competence, and social connectedness (motivational quality).
- Creating exercise contexts that consistently satisfy basic psychological needs may enhance long-term adherence and amplify the psychological benefits of physical activity, offering a more effective pathway for improving well-being than focusing solely on training volume or physiological outcomes.

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Abstract

This study examined the relative contribution of sociodemographic, psychological, behavioral, and physiological factors to subjective well-being (SWB) among community gym users and investigated the indirect association between basic psychological need satisfaction and SWB through self-determined motivation. A cross-sectional study was conducted with 348 adults (31.53 ± 12.86 years) recruited from community gyms in Portugal. Participants completed validated measures of basic psychological need satisfaction, motivational regulation, life satisfaction, and positive and negative affect. Moderate-to-vigorous physical activity (MVPA) was assessed through self-reported weekly physical activity, and body composition through bioelectrical impedance. Hierarchical multiple linear regression and mediation analysis were performed. Missing data were addressed using multiple imputation. Psychological variables produced the largest increase in explained SWB variance ($\Delta R^2 = 0.173$, $p < 0.001$). MVPA added only 0.2% ($\Delta R^2 = 0.002$, $p = 0.478$), while body composition indicators added 1.0% ($\Delta R^2 = 0.010$, $p = 0.303$). The final model explained 21.7% of SWB variance. A significant indirect association through self-determined motivation was observed (B = 0.228, 95% CI [0.139, 0.324]). Psychological variables provided greater explanatory information about SWB than MVPA or body composition. The findings highlight the relevance of psychological experiences in exercise settings, while the cross-sectional design precludes causal interpretations.

Keywords: self-determination theory; subjective well-being; basic psychological needs; self-determined motivation; physical exercise

1. Introduction

Subjective well-being (SWB) is a multidimensional indicator of positive psychological functioning that reflects how individuals evaluate and experience their lives. It encompasses a cognitive component, commonly represented by life satisfaction, and an affective component, reflected in the balance between positive and negative affect [1,2]. Beyond the absence of psychological symptoms, higher levels of SWB have been associated with better physical health, adaptive functioning, social relationships, and healthier lifestyles [2]. Consequently, understanding the factors associated with SWB is relevant to both health psychology and public health, particularly in contexts aimed at promoting sustained engagement in health-enhancing behaviours.

Regular physical activity is consistently associated with more favourable indicators of psychological well-being. Physically active individuals generally report greater life satisfaction and positive affect and lower levels of psychological distress than less active individuals [3]. Accordingly, the promotion of moderate-to-vigorous physical activity (MVPA) is a central component of international public health recommendations because of its broad physical and psychological benefits, according to the World Health Organization (WHO) [4]. However, the association between physical activity and well-being is not necessarily explained by the amount of activity performed alone. Individuals engaging in comparable volumes of exercise may experience substantially different psychological outcomes, suggesting that the psychological quality of the exercise experience may be an important explanatory factor [5,6].

Self-Determination Theory (SDT) provides an established framework for understanding these psychological processes [7,8]. SDT proposes that optimal functioning depends on the satisfaction of three basic psychological needs: autonomy, competence, and relatedness. Autonomy refers to experiencing one's behaviour as volitional and self-endorsed; com-

petence concerns the perception of effectiveness and capability; and relatedness reflects a sense of belonging and meaningful connection with others. When these needs are satisfied, individuals are more likely to experience autonomous forms of motivation, which are associated with greater engagement, persistence, and psychological well-being [8].

This distinction is particularly relevant in exercise settings. Motivation may differ not only in strength but also in quality, ranging from externally controlled forms of regulation to more autonomous forms, including identified, integrated, and intrinsic motivation. Individuals who exercise for personally valued or inherently satisfying reasons tend to display more persistent engagement and more favourable psychological outcomes than those whose behaviour is primarily driven by external pressures or internal coercion [5,8]. Moreover, interventions informed by SDT principles have been shown to improve psychological need satisfaction, autonomous motivation, physical activity, and well-being, reinforcing the relevance of motivational processes in exercise contexts [6].

Recent empirical evidence further supports the importance of motivational processes in explaining the psychological benefits associated with physical activity. Studies have shown that basic psychological need satisfaction and self-determined motivation are associated with subjective well-being across different populations and exercise contexts. For example, [9] reported that basic psychological need satisfaction and self-determined motivation contributed to the relationship between leadership-related contextual factors and subjective well-being among Special Olympics athletes. Similarly, recent evidence involving physically active adults has indicated that more self-determined forms of motivation are associated with higher levels of well-being [10]. Evidence from adolescent populations has also highlighted the relevance of positive attitudes toward physical education and future physical activity intentions for subjective well-being [11]. Collectively, these findings suggest that the psychological benefits associated with physical activity may depend substantially on the motivational processes experienced during participation rather than solely on the quantity of activity performed.

Nevertheless, an important question remains insufficiently addressed: when psychological, behavioural, and physiological indicators are considered simultaneously, which of these domains makes the greatest contribution to explaining subjective well-being among individuals who regularly engage in exercise? Most previous studies have examined psychological determinants, physical activity behaviour, or physiological characteristics separately, limiting direct comparisons of their relative explanatory contribution. Although physical activity volume is routinely used as a central indicator in health promotion, and body composition is frequently considered an important physiological correlate of health, considerably less attention has been given to determining whether these objective indicators retain substantial explanatory value for SWB after accounting for psychological variables.

This issue is particularly relevant among community-based gym users. Unlike competitive athletes or clinical populations, community gym users typically engage in exercise primarily for health, fitness, recreation, or personal well-being. They therefore represent an important population for examining whether the psychological experience of exercise contributes to well-being beyond the amount of physical activity performed or measurable characteristics of body composition. Yet, this population remains comparatively understudied in integrated models that simultaneously consider psychological, behavioural, and physiological factors.

A second unresolved issue concerns the mechanism linking basic psychological need satisfaction with SWB. SDT proposes that satisfaction of autonomy, competence, and relatedness facilitates more autonomous forms of motivation, which in turn are expected to promote adaptive functioning and well-being [7,8]. Although this theoretical sequence has received considerable empirical support, fewer studies have examined this indirect asso-

ciation specifically among non-competitive adults engaged in community-based exercise while simultaneously considering the broader contribution of physical activity and body composition. Testing this mechanism within such a population may therefore provide a more integrated understanding of why individuals who engage in exercise may experience different levels of psychological well-being.

The present study addresses these gaps by integrating sociodemographic, psychological, behavioural, and physiological variables within a single analytical framework. Specifically, the study had two objectives: (1) to examine the relative contribution of basic psychological need satisfaction, self-determined motivation, weekly moderate-to-vigorous physical activity, and body composition indicators to subjective well-being among community gym users; and (2) to examine whether self-determined motivation statistically accounts for part of the association between basic psychological need satisfaction and subjective well-being.

Based on Self-Determination Theory and previous empirical evidence, we expected that basic psychological need satisfaction and self-determined motivation would show stronger independent associations with subjective well-being than weekly physical activity volume and body composition indicators. We further expected a significant indirect association between basic psychological need satisfaction and subjective well-being through self-determined motivation. Given the cross-sectional nature of the study, these expectations concern statistical associations and explanatory patterns rather than causal effects.

2. Materials and Methods

2.1. Study Design and Setting

This is an empirical, observational, cross-sectional study [12]. The study received ethical approval from the Ethics Committee of the Polytechnic University of Castelo Branco (Portugal), following the guidelines of the Declaration of Helsinki. All participants were treated in accordance with the ethical standards of the American Psychological Association regarding participant consent, confidentiality, and anonymity. Written informed consent was obtained from all participants.

A selection of gyms and fitness centers in the municipality of Castelo Branco (Portugal) was carried out using a convenience sampling approach [13]. To collect the data, we contacted gym users directly to request their collaboration in the study, in January 2026. The administration of the instruments took place from February to April 2026, in the presence of the researchers, who briefly explained the objectives, structure, and the procedure for completing the paper-based questionnaires. During the completion process, the researchers were available to assist with any issues that might arise. The approximate completion time was 15 min.

2.2. Sample

Table 1 presents the sociodemographic and sport-related characteristics of the sample, composed of 348 community gym users. The sex distribution was balanced, with 174 male participants (50.0%) and 174 female participants (50.0%). The mean age of the participants was 31.53 years (SD = 12.86), ranging from 18 to 67 years.

Regarding educational qualifications, there was a predominance of participants with secondary education (33.7%) and a bachelor's degree (32.0%), followed by individuals with basic education (11.0%), vocational education (9.3%), a master's degree (8.1%), a short-cycle degree (5.2%), and a doctoral degree (0.6%). Concerning professional status, the sample consisted mainly of students (43.7%) and employed individuals (48.3%), with unemployed (2.3%) and retired participants (2.9%) representing a small fraction.

The sample size for the primary analyses was based on the full cohort of 348 participants, with missing observations addressed through multiple imputation before the hierarchical regression analysis.

Table 1. Sociodemographic and exercise-related characteristics of the sample (N = 348).

Variable	n	%
Sex		data
Male	174	(50.0)
Female	174	(50.0)
Educational qualifications		
Basic education (1st to 3rd cycle)	38	11.0
Vocational education	32	9.3
Secondary education	116	33.7
Short-cycle degree	18	5.2
Bachelor's degree	110	32.0
Master's degree	28	8.1
Doctoral degree	2	0.6
Professional status		
Student	152	43.7
Employed	168	48.3
Unemployed	8	2.3
Retired	10	2.9
Other/No information	10	2.9
Weekly training frequency		
≤2 sessions	84	24.1
3 sessions	130	37.4
4 sessions	42	12.1
≥5 sessions	92	26.4
Weekly training volume		
Up to 2 h	100	29.2
3–5 h	150	43.9
6–8 h	68	19.9
≥9 h	24	7.0
Continuous variables	M	DP
Age (years)	31.53	12.86
Years of practice in the activity	4.37	5.84

Note. Values are presented as absolute frequency (n) and percentage (%) for categorical variables and mean (M) and standard deviation (SD) for continuous variables.

2.3. Instruments

Initially, all participants completed a structured questionnaire developed for the present study, designed to collect sociodemographic, occupational, and exercise-related information. Data were collected regarding age, sex, educational qualifications, professional status, years of exercise practice, weekly training frequency (number of sessions), weekly training volume (hours/week), and other information considered relevant for characterizing the sample.

Additionally, indicators of body composition were assessed using a tetrapolar bioimpedance scale, the Tanita MC-780 Multi Frequency Segmental Body Composition Analyzer (Tanita Corporation, Tokyo, Japan), a device widely used in scientific research and previously validated for estimating body composition in adults. Measurements obtained included body mass (kg), percentage of body fat (%), percentage of lean mass (%), percentage of total body water (%), and body mass index (BMI). For the multivariate analyses, percentage of body fat, percentage of lean mass, and percentage of total body water were entered as separate body composition indicators rather than being combined into a composite index.

2.3.1. Basic Psychological Needs Exercise Scale (BPNES)

Basic psychological need satisfaction was assessed using the Portuguese version of the Basic Psychological Needs Exercise Scale (BPNES), originally developed by Vlachopoulos and Michailidou [14] and validated for the Portuguese population by [15]. The instrument consists of 12 items distributed across three dimensions—autonomy, competence, and relatedness—with four items per dimension. Responses are recorded on a five-point Likert scale ranging from 1 ("Strongly disagree") to 5 ("Strongly agree"), with higher scores indicating greater satisfaction of basic psychological needs in the context of physical exercise.

2.3.2. Behavioral Regulation in Exercise Questionnaire (BREQ-3)

Motivation for physical exercise was assessed using the Portuguese version of the Behavioral Regulation in Exercise Questionnaire (BREQ-3), validated by [16]. The questionnaire includes 24 items distributed across the different motivational regulation types proposed by Self-Determination Theory (amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic motivation). Items are answered on a seven-point Likert scale ranging from 1 ("Strongly disagree") to 7 ("Strongly agree"). The subscales were later used to compute the Self-Determination Index (SDI).

2.3.3. Satisfaction with Life Scale (SWLS)

The cognitive component of subjective well-being was assessed using the Satisfaction with Life Scale (SWLS) [1], employing the Portuguese version validated by Neto [17] and later confirmed by Laranjeira [18]. The scale consists of five items rated on a seven-point Likert scale ranging from 1 ("Strongly disagree") to 7 ("Strongly agree"), with higher scores indicating greater overall life satisfaction.

2.3.4. Positive and Negative Affect Schedule (PANAS)

The affective component of subjective well-being was assessed using the Portuguese version of the Positive and Negative Affect Schedule (PANAS), originally developed by Watson et al. [19] and validated for the Portuguese population by Galinha and Pais-Ribeiro [20]. The scale comprises 20 items distributed across two independent dimensions: Positive Affect and Negative Affect, each consisting of 10 items. Responses are recorded on a five-point Likert scale ranging from 1 ("Very slightly or not at all") to 5 ("Extremely"), reflecting the intensity with which each affective state was experienced.

2.4. Statistical Procedures

Statistical analyses were conducted using IBM SPSS Statistics (version 30) and the PROCESS macro for SPSS (version 4.2; Hayes [21]). The significance level was set at $p < 0.05$.

In the first phase, descriptive statistics (mean, standard deviation, frequencies, and percentages) were calculated to characterize the sample and the variables under study. Bivariate associations between variables were examined using Pearson correlations. Normality of the distributions was assessed through inspection of skewness and kurtosis coefficients, following the criteria proposed by Curran et al. [22]. Multicollinearity was evaluated using tolerance values and the Variance Inflation Factor (VIF), with tolerance values above 0.20 and VIF values below 5 considered adequate [23]. Internal consistency of the scales was assessed using Cronbach's alpha coefficient, adopting 0.70 or higher as the criterion for acceptability [24].

For the operationalization of psychological variables, a global index of basic psychological need satisfaction (BPNS) was calculated using the mean of the autonomy, competence,

and relatedness dimensions, in accordance with the assumptions of Self-Determination Theory [7,8]. Additionally, a Self-Determination Index (SDI) was computed, reflecting the relative position of the different motivational regulation types along the self-determination continuum, using the following formula:

$$\text{SDI} = (3 \times \text{“Intrinsic Motivation”} + 2 \times \text{“Integrated Regulation”} + 1 \times \text{“Identified Regulation”}) - (1 \times \text{“Introjected Regulation”} + 2 \times \text{“External Regulation”} + 3 \times \text{“motivation”})$$

Weekly physical activity was operationalized through a composite measure of moderate-to-vigorous physical activity (MVPA), calculated as the sum of weekly minutes of moderate activity and walking, plus twice the minutes of vigorous activity, in accordance with World Health Organization [4] recommendations:

$$\text{MVPA} = (\text{“Moderate Activity”} + \text{“Walking”}) + (2 \times \text{“Vigorous Activity”})$$

Subjective well-being (SWB) was operationalized through a composite index obtained by aggregating standardized scores of life satisfaction and affect balance, calculated as the difference between positive and negative affect, such that higher values reflected higher levels of subjective well-being.

Because the body composition indicators were conceptually and statistically distinct, percentage of total body water, percentage of lean mass, and percentage of body fat were retained as separate predictors in the multivariate analysis rather than being combined into a sample-dependent composite index.

2.4.1. Missing Data and Multiple Imputation

The extent and pattern of missing data were examined before the multivariate analyses. MVPA was available for 194 of the 348 participants (55.7%), while 154 participants (44.3%) had missing MVPA data. Missingness was also observed for the body composition indicators and subjective well-being. Comparisons between participants with and without MVPA data indicated that missingness was associated with some available characteristics, including basic psychological need satisfaction, self-determined motivation, and sex, whereas age did not differ significantly between groups.

Given the substantial proportion of incomplete observations and the potential for biased estimates under listwise deletion, multiple imputation was used to preserve the available information and reduce the loss of participants from the multivariate analysis. Fifty imputed datasets were generated using the Fully Conditional Specification (FCS) method, with linear regression models specified for scale variables, 10 iterations per imputation, and no interaction terms [25]. The imputation model included age, sex, professional status, basic psychological need satisfaction, self-determination index, subjective well-being, MVPA, percentage of total body water, percentage of lean mass, and percentage of body fat.

The subsequent regression analyses were performed across the 50 imputed datasets, and parameter estimates and model tests were pooled according to the multiple-imputation procedures implemented in IBM SPSS Statistics.

2.4.2. Hierarchical Regression

To examine the relative contribution of sociodemographic, psychological, behavioral, and physiological variables in explaining subjective well-being, a hierarchical multiple linear regression was performed using the Enter method within each block. Subjective well-being was entered as the dependent variable. In the first block, sociodemographic variables (age, sex, and professional status) were included. In the second block, psychological variables (basic psychological need satisfaction and the self-determination index) were

added. In the third block, moderate-to-vigorous physical activity (MVPA) was included. In the fourth block, the three body composition indicators—percentage of total body water, percentage of lean mass, and percentage of body fat—were entered simultaneously as separate predictors.

Regression coefficients (B), standard errors (SE), t values, coefficients of determination (R^2), increments in explained variance (ΔR^2), and pooled tests of incremental model contribution (D_2) were reported. R^2 and ΔR^2 were calculated across the imputed datasets, and the corresponding inferential statistics were pooled across the 50 imputations.

Regression assumptions were verified through inspection of linearity, independence of residuals, homoscedasticity, normality of residuals, and absence of multicollinearity, with no relevant violations observed.

This approach replaced the listwise-deletion procedure used in the original analysis, which had reduced the regression sample from 348 to 168 participants.

2.4.3. Indirect Effect Analysis

A simple mediation analysis was conducted using PROCESS (Model 4; Hayes [21]) to examine the indirect association between basic psychological need satisfaction and subjective well-being through self-determined motivation, controlling for age, sex, and professional status. Basic psychological need satisfaction was defined as the predictor variable (X), the self-determination index as the mediator (M), and subjective well-being as the dependent variable (Y).

Indirect effects were estimated using 5000 bootstrap resamples and 95% confidence intervals. An indirect effect was considered statistically significant when its bootstrap confidence interval did not include zero [21,26]. Given the cross-sectional design, the indirect effect was interpreted as an indirect statistical association rather than as evidence of temporal or causal mediation.

3. Results

Table 2 presents the descriptive statistics and distributional characteristics of the variables included in the analytical model. The sample consisted of 348 participants, with a mean age of 31.53 years (SD = 12.86). Participants reported high levels of basic psychological need satisfaction (M = 4.12; SD = 0.46) and self-determination (M = 21.06; SD = 9.66). Among participants with valid physical activity data, the mean volume of moderate-to-vigorous physical activity (MVPA) was 342.06 min/week (SD = 147.61). The body composition indicators showed mean values of 58.01% for total body water (SD = 4.88), 45.47% for lean mass (SD = 10.13), and 24.08% for body fat (SD = 8.07). Subjective well-being presented a mean close to zero (M = 0.00; SD = 0.72), consistent with the standardized construction of the index.

The distributional analysis showed skewness values ranging from −0.922 to 0.906 and kurtosis values ranging from −0.476 to 1.742. All variables fell within the commonly accepted criteria for univariate normality ($|\text{skewness}| < 2$; $|\text{kurtosis}| < 7$), supporting the use of parametric statistical procedures in the subsequent analyses. Overall, the variables showed adequate distributional characteristics, although the number of valid observations varied across variables because of missing data.

Table 3 presents the Pearson correlations among the variables included in the analytical model. Basic psychological need satisfaction was moderately and positively correlated with self-determination index (r = 0.489, $p < 0.001$), moderate-to-vigorous physical activity (r = 0.419, $p < 0.001$), and subjective well-being (r = 0.357, $p < 0.001$). Self-determination index was also positively correlated with moderate-to-vigorous physical activity (r = 0.157,

$p = 0.029$) and subjective well-being (r = 0.392, $p < 0.001$), while showing a small negative correlation with body fat percentage (r = −0.227, $p < 0.001$).

Table 2. Descriptive statistics and distributional characteristics of the study variables.

Variable	N	Minimum	Maximum	M	SD	Skewness	Kurtosis
Age (years)	348	18.00	67.00	31.53	12.86	0.906	−0.065
Basic psychological need satisfaction	348	3.00	5.00	4.12	0.46	0.224	−0.283
Self-determination index	348	−5.00	36.00	21.06	9.66	−0.496	−0.443
Moderate-to-vigorous physical activity (min/week)	194	80.00	870.00	342.06	147.61	0.858	0.634
Total body water (%)	296	40.00	71.00	58.01	4.88	−0.922	1.742
Lean mass (%)	284	21.00	69.50	45.47	10.13	0.175	−0.476
Body fat (%)	310	6.50	47.00	24.08	8.07	0.318	−0.014
Subjective well-being	346	−1.98	1.58	0.00	0.72	−0.096	−0.465

Note. M = mean; SD = standard deviation. N represents the number of valid observations for each variable. Skewness and kurtosis values were within the commonly accepted limits for univariate normality (|skewness| < 2; |kurtosis| < 7).

Table 3. Pearson correlations among the study variables.

Variable	1	2	3	4	5	6	7	8
1. Age	-							
2. Basic psychological need satisfaction	−0.053	-						
3. Self-determination index	−0.033	0.489 **	-					
4. Moderate-to-vigorous physical activity	−0.143 *	0.419 **	0.157 *	-				
5. Total body water (%)	−0.092	0.000	0.065	−0.082	-			
6. Lean mass (%)	−0.025	0.092	−0.008	−0.150	0.286 **	-		
7. Body fat (%)	0.356 **	−0.104	−0.227 **	−0.043	−0.308 **	−0.269 **	-	
8. Subjective well-being	−0.122 *	0.357 **	0.392 **	0.162 *	−0.003	0.065	−0.107	-

Note. Values are presented as Pearson correlation coefficients * $p < 0.05$. ** $p < 0.01$.

Regarding physical activity and body composition, MVPA was not significantly correlated with total body water, lean mass, or body fat percentage, but was positively associated with subjective well-being (r = 0.162, $p = 0.024$). Total body water was positively correlated with lean mass (r = 0.286, $p < 0.001$) and negatively correlated with body fat (r = −0.308, $p < 0.001$). Lean mass was also negatively correlated with body fat (r = −0.269, $p < 0.001$). None of the three body composition indicators was significantly correlated with subjective well-being (total body water: r = −0.003, $p = 0.963$; lean mass: r = 0.065, $p = 0.275$; body fat: r = −0.107, $p = 0.060$).

Age showed small negative associations with MVPA (r = −0.143, $p = 0.047$) and subjective well-being (r = −0.122, $p = 0.023$), and a moderate positive association with body fat percentage (r = 0.356, $p < 0.001$). No significant associations were observed between age and basic psychological need satisfaction (r = −0.053, $p = 0.327$) or self-determination index (r = −0.033, $p = 0.540$).

Overall, the correlation pattern indicated that psychological variables, particularly basic psychological need satisfaction and self-determination, showed the most consistent positive associations with subjective well-being and physical activity, whereas the body composition indicators showed limited direct associations with subjective well-being.

Table 4 presents the results of the hierarchical multiple linear regression predicting subjective well-being across the 50 multiply imputed datasets. The first block, comprising sociodemographic variables (age, sex, and professional status), accounted for a mean of 3.1% of the variance in subjective well-being ($R^2 = 0.031$), with a significant pooled contribution of the block ($D_2 = 3.64$, $p = 0.012$). Sex was significantly associated with

subjective well-being (B = −0.231, SE = 0.107, t = −2.17, p = 0.030), whereas age and professional status were not significant.

Table 4. Hierarchical multiple regression predicting subjective well-being after multiple imputation.

Predictor Block/Variable	B	SE	t	p	R^2	ΔR^2	D_2
Step 1: Sociodemographic variables					0.031	0.031	3.64 (3), p = 0.012
Age	−0.001	0.008	−0.20	0.843			
Sex	−0.231	0.107	−2.17	0.030			
Professional status	−0.002	0.005	−0.33	0.739			
Step 2: Psychological variables					0.204	0.173	37.03 (2), p < 0.001
BPNS	0.275	0.106	2.59	0.010			
SDI	0.023	0.004	5.39	< 0.001			
Step 3: Physical activity					0.207	0.002	0.50 (1), p = 0.478
MVPA	<0.001	<0.001	0.32	0.749			
Step 4: Body composition indicators					0.217	0.010	1.21 (3), p = 0.303
% H_2O	−0.010	0.008	−1.22	0.223			
% MM	−0.002	0.005	−0.33	0.739			
% MG	0.007	0.006	1.19	0.234			

Note. B = unstandardized coefficient; SE = standard error; BPNS = global basic psychological need satisfaction; SDI = self-determination index; MVPA = moderate-to-vigorous physical activity; H_2O = total body water; MM = lean mass; MG = body fat. R^2 and ΔR^2 represent mean values across the 50 multiply imputed datasets; D_2 represents the pooled test of the incremental contribution of each predictor block.

The introduction of the psychological variables—basic psychological need satisfaction and self-determination index—in the second block produced the largest increase in explained variance (ΔR^2 = 0.173), resulting in a mean R^2 of 0.204. This increment was statistically significant (D_2 = 37.03, p < 0.001). Both basic psychological need satisfaction (B = 0.275, SE = 0.106, t = 2.59, p = 0.010) and the self-determination index (B = 0.023, SE = 0.004, t = 5.39, p < 0.001) were positively associated with subjective well-being.

In the third block, the inclusion of moderate-to-vigorous physical activity (MVPA) produced only a minimal increase in explained variance (ΔR^2 = 0.002), which was not statistically significant (D_2 = 0.50, p = 0.478). MVPA was also not significantly associated with subjective well-being in the resulting model (B < 0.001, SE < 0.001, t = 0.32, p = 0.749).

Finally, the addition of the body composition indicators (% H_2O, % MM, and % MG) produced a further increase of 1.0% in explained variance (ΔR^2 = 0.010), which was not statistically significant (D_2 = 1.21, p = 0.303). None of the individual body composition indicators showed a significant association with subjective well-being: % H_2O (B = −0.010, SE = 0.008, t = −1.22, p = 0.223), % MM (B = −0.002, SE = 0.005, t = −0.33, p = 0.739), and % MG (B = 0.007, SE = 0.006, t = 1.19, p = 0.234). The final model accounted for a mean of 21.7% of the variance in subjective well-being across the 50 multiply imputed datasets (R^2 = 0.217).

Table 5 presents the indirect effect analysis examining whether self-determined motivation statistically accounted for part of the association between basic psychological need satisfaction and subjective well-being, controlling for age, sex, and professional status. Basic psychological need satisfaction was positively associated with self-determined motivation (B = 10.58, SE = 1.03, p < 0.001), and self-determined motivation was positively associated with subjective well-being when controlling for basic psychological need satisfaction (B = 0.022, SE = 0.004, p < 0.001). The total association between basic psychological need satisfaction and subjective well-being was significant (B = 0.541, SE = 0.081, p < 0.001), while the direct association remained significant after accounting for self-determined motivation (B = 0.313, SE = 0.089, p < 0.001).

Table 5. Indirect effect of basic psychological need satisfaction on subjective well-being through self-determined motivation.

Effect	B	SE	t	*p*	95% Bootstrap CI
Total effect	0.541	0.081	6.67	<0.001	[0.381, 0.700]
Direct effect	0.313	0.089	3.50	<0.001	[0.137, 0.489]
Indirect effect via SDI	0.228	0.047	—	—	[0.139, 0.324]

Note. The model controlled for age, sex, and professional status. The indirect effect was estimated using bootstrap confidence intervals. The standardized indirect effect was β = 0.145 (95% bootstrap CI [0.090, 0.206]). Given the cross-sectional design, the indirect effect should be interpreted as a statistically significant indirect association rather than as evidence of a causal mediating mechanism. SDI = self-determination index.

The indirect association through self-determined motivation was statistically significant (B = 0.228, BootSE = 0.047, 95% bootstrap CI [0.139, 0.324]), as the confidence interval did not include zero. The standardized indirect effect was β = 0.145 (95% bootstrap CI [0.090, 0.206]). Given the cross-sectional design, this finding should be interpreted as evidence of a statistically significant indirect association rather than as evidence of a causal mediating mechanism.

4. Discussion

The present study examined the relative contribution of sociodemographic, psychological, behavioral, and physiological variables to subjective well-being among community gym users and further examined whether self-determined motivation was statistically associated with the relationship between basic psychological need satisfaction and subjective well-being. The results provide two main findings. First, psychological variables made the largest incremental contribution to subjective well-being within the hierarchical model: the addition of basic psychological need satisfaction and self-determined motivation increased the explained variance by 17.3%, whereas the subsequent addition of MVPA increased explained variance by only 0.2% and the addition of body composition indicators by a further 1.0%. Second, a statistically significant indirect association between basic psychological need satisfaction and subjective well-being through self-determined motivation was observed, although the magnitude of the standardized indirect effect was relatively small and the cross-sectional design does not permit causal or temporal conclusions.

The most prominent finding was the comparatively greater contribution of psychological variables to subjective well-being. After accounting for age, sex, and professional status, the addition of basic psychological need satisfaction and self-determined motivation increased the explained variance from 3.1% to 20.4%. Both variables remained independently and positively associated with subjective well-being. This pattern is consistent with the central proposition of Self-Determination Theory that the satisfaction of autonomy, competence, and relatedness represents an important basis for optimal psychological functioning and well-being [7,8].

The present findings also extend previous research in exercise settings by showing that these psychological variables retained their explanatory contribution when considered alongside an indicator of weekly physical activity volume and objective body composition indicators. Previous SDT research has consistently demonstrated associations between psychological need satisfaction, autonomous motivation, and exercise-related outcomes, including persistence and engagement [5]. However, much of this literature has focused on explaining exercise participation rather than directly comparing the contribution of motivational variables with objective characteristics of exercise behavior and body composition in relation to subjective well-being.

This finding should not be interpreted as indicating that physical activity is unimportant for well-being. Rather, it suggests that within this sample and this multivariable model, the psychological experience associated with exercise provided greater incremental explanatory information about subjective well-being than the volume of MVPA or the body composition indicators considered here. This distinction is important because a substantial body of evidence has established a positive association between physical activity and subjective well-being. A meta-analytic review of healthy populations, for example, found a small beneficial association between physical activity and subjective well-being (d = 0.36), while systematic evidence has also supported improvements in well-being associated with physical activity participation.

The present results therefore contribute to a more nuanced interpretation of the physical activity–well-being relationship. The quantity of activity may be relevant, but it does not necessarily capture how individuals experience and regulate their participation. Two individuals may accumulate comparable amounts of physical activity while deriving different psychological benefits depending on whether their participation is experienced as autonomous, competent, and socially connected. This interpretation is consistent with SDT-based exercise research, which emphasizes motivational quality and the satisfaction of psychological needs as relevant characteristics of exercise participation.

MVPA was positively correlated with subjective well-being at the bivariate level, although the association was small (r = 0.162, $p = 0.024$). However, after the sociodemographic and psychological variables had been entered into the hierarchical model, MVPA did not provide a significant incremental contribution to explained variance ($\Delta R^2 = 0.002$, $p = 0.478$). This distinction between bivariate association and independent contribution is important.

The finding suggests that part of the simple association between physical activity and subjective well-being may overlap with psychological characteristics of the exercise experience. In other words, the positive association observed between MVPA and well-being at the bivariate level did not remain an independent explanatory contribution once psychological variables were considered simultaneously. This does not establish that psychological variables statistically account for the causal effect of physical activity; rather, it indicates that motivational and need-related variables were more informative than MVPA volume for explaining individual differences in subjective well-being within the present analytical model.

This result is compatible with evidence showing that the relationship between physical activity and well-being is generally positive but heterogeneous [27], for example, reported a small overall association and substantial heterogeneity across studies, emphasizing the need to investigate the mechanisms underlying the relationship rather than focusing exclusively on activity quantity.

From an applied perspective, this finding suggests that community exercise programs should not evaluate their potential psychological benefits exclusively through attendance, frequency, or accumulated minutes of activity. The volume of exercise remains an important public health indicator, but it may not be sufficient to explain why some participants experience greater psychological well-being than others. The motivational environment in which exercise occurs may provide additional information that is not captured by activity volume alone.

The inclusion of percentage of total body water, percentage of lean mass, and percentage of body fat in the final block produced only a 1.0% increase in explained variance, and the block did not make a statistically significant incremental contribution to subjective well-being ($D_2 = 1.21$, $p = 0.303$). None of the three indicators showed a significant independent association with subjective well-being in the final model.

This finding is relevant because body composition is frequently emphasized in exercise and health settings as an objective indicator of physical status. However, the absence of an independent contribution in the present model suggests that objective body composition indicators should not automatically be assumed to translate into differences in subjective well-being, particularly when psychological characteristics are simultaneously considered.

Importantly, this result should be interpreted narrowly. The present study does not demonstrate that body composition is unrelated to psychological well-being in general, nor does it establish that changes in body composition cannot influence well-being. Rather, it indicates that the specific body composition indicators assessed in this sample did not explain additional variance in subjective well-being beyond the preceding sociodemographic, psychological, and MVPA variables. This distinction avoids extending the findings beyond what the design and analysis can support.

The result also reinforces the importance of distinguishing between physical outcomes of exercise and psychological outcomes of exercise. Body composition may be highly relevant to metabolic and physical health while providing comparatively limited information about subjective well-being. Consequently, health-promoting exercise programs may benefit from evaluating success through multidimensional outcomes rather than relying predominantly on anthropometric or body-composition changes.

Both basic psychological need satisfaction and self-determined motivation were independently associated with subjective well-being in the final multivariable model. This finding is theoretically consistent with SDT, according to which autonomy, competence, and relatedness represent fundamental psychological nutrients for psychological growth and well-being [7,8].

The association between basic psychological need satisfaction and self-determined motivation was also substantial at the bivariate level ($r = 0.489$, $p < 0.001$), consistent with the theoretical proposition that contexts satisfying basic psychological needs facilitate more autonomous forms of motivation. Exercise-specific evidence has similarly shown that satisfaction of autonomy, competence, and relatedness is associated with more self-determined motivational regulations.

The importance of motivational quality is also supported by recent evidence in adults. A study by [28], using a person-centered approach, found that adults characterized by more autonomous exercise motivation reported more favorable well-being-related outcomes, whereas profiles combining autonomous and controlled motivation were associated with less favorable well-being indicators. This converges with the present finding that the quality of motivation contributes information about subjective well-being beyond the amount of physical activity performed.

Taken together, these results suggest that exercise environments may be psychologically consequential not simply because they enable individuals to be physically active, but because they can provide opportunities to experience choice, competence, progress, social connection, and personal meaning. This interpretation is directly compatible with SDT and provides a plausible theoretical explanation for why psychological variables contributed more strongly than MVPA volume in the present model.

The second main finding was a statistically significant indirect association between basic psychological need satisfaction and subjective well-being through self-determined motivation. The indirect effect was $B = 0.228$, with a 95% bootstrap confidence interval of [0.139, 0.324], while the standardized indirect effect was $\beta = 0.145$. The confidence interval did not include zero, supporting the statistical significance of the indirect association.

However, the magnitude of the standardized indirect effect was modest, and its statistical significance should not be interpreted as evidence of substantial practical or

clinical impact. This distinction is particularly important given the reviewer's concern that statistical significance should not be equated with practical relevance.

The finding is nevertheless theoretically consistent with SDT. The theory proposes that satisfaction of basic psychological needs facilitates more autonomous forms of motivation, which are in turn associated with adaptive functioning and well-being [7,8]. Exercise research has provided substantial evidence for associations among need satisfaction, autonomous motivation, and exercise-related outcomes, providing a theoretical basis for the indirect pattern observed here.

At the same time, the present result must be interpreted cautiously. Because all variables were assessed cross-sectionally, the observed indirect effect cannot establish the temporal ordering required to demonstrate mediation as a causal mechanism. Alternative models—for example, in which subjective well-being contributes to more positive motivational experiences or in which unmeasured contextual factors influence both motivation and well-being—cannot be excluded. Therefore, the present evidence is best understood as being consistent with an indirect association predicted by SDT, rather than as demonstrating that need satisfaction causes changes in motivation that subsequently cause changes in well-being.

This distinction is particularly important because longitudinal research can provide stronger evidence regarding temporal ordering. Recent longitudinal work, for example, has shown that basic psychological need satisfaction can prospectively predict subsequent well-being, illustrating the value of designs capable of establishing temporal precedence. Future research should therefore test the proposed pathway using longitudinal, experimental, or cross-lagged designs.

An additional finding requiring consideration was the significant association between sex and subjective well-being in the final model ($B = -0.231$, $p = 0.030$). This association was not statistically significant in the initial sociodemographic block but became significant after the psychological variables were introduced. This pattern indicates that the association between sex and subjective well-being was sensitive to the inclusion of psychological variables and should therefore be interpreted cautiously.

The emergence of this association in the final model does not by itself establish a sex-based difference in well-being, nor does it identify the mechanism responsible for the observed coefficient. It may reflect differences in the distribution or relationships among psychological variables across sex groups, but the present design does not permit this possibility to be tested directly. Future studies should therefore examine whether motivational regulation and psychological need satisfaction operate differently across sex groups using interaction or multigroup models specifically designed to test such differences.

The findings have implications for community-based exercise programming. Public health interventions commonly emphasize measurable behavioral targets such as frequency, duration, and intensity of physical activity. These indicators remain essential for population health surveillance and exercise prescription. Nevertheless, the present findings suggest that the psychological quality of participation deserves greater attention when the intended outcome includes subjective well-being.

For gym professionals and exercise practitioners, this means creating environments that support autonomy, competence, and relatedness. Autonomy may be supported by offering meaningful choices and acknowledging participants' perspectives; competence may be strengthened through appropriately challenging tasks, constructive feedback, and recognition of progress; and relatedness may be promoted through respectful interpersonal relationships and a sense of social inclusion. SDT-based interventions have provided evidence that changes in the social and motivational environment can influence need satisfaction and motivation in physical activity contexts.

Importantly, these implications should not be interpreted as suggesting that motivational strategies should replace the promotion of sufficient physical activity. Rather, the findings support a complementary approach in which achieving adequate physical activity is combined with the creation of psychologically supportive exercise environments. Such an approach may be particularly relevant in community settings where sustained participation and psychological well-being are both important outcomes.

This study has several strengths. First, it integrated psychological, behavioral, physiological, and sociodemographic variables within the same analytical framework, allowing their relative explanatory contributions to be examined rather than considered in isolation. Second, the study combined validated self-report measures with an objective assessment of body composition. Third, the use of multiple imputation addressed the substantial amount of missing information in MVPA and body composition variables and avoided the substantial loss of participants associated with the original complete-case analysis. The final multivariable analysis therefore retained information from the full cohort through 50 multiply imputed datasets rather than relying on the original listwise-deletion sample of 168 participants.

Several limitations nevertheless need to be considered. First, the cross-sectional design prevents conclusions about temporal ordering or causality, particularly regarding the indirect association between basic psychological need satisfaction, self-determined motivation, and subjective well-being. Second, the convenience sampling strategy and recruitment from community gyms in a single Portuguese municipality limit the generalizability of the findings to other populations and settings. Third, although body composition was assessed objectively, bioimpedance-derived indicators are estimates rather than direct measures of body compartments and may be influenced by measurement conditions. Fourth, MVPA was based on self-reported information and may therefore be affected by recall or reporting bias. Finally, although multiple imputation represents a more robust approach than listwise deletion for handling incomplete observations, its validity depends on the adequacy of the imputation model and the assumptions concerning the missing-data mechanism.

Future research should therefore combine longitudinal or experimental designs, objective measures of physical activity, and more diverse community samples. Such studies should also investigate whether changes in psychological need satisfaction and motivational regulation precede changes in subjective well-being and whether these pathways differ according to sex, age, exercise modality, or training context.

5. Conclusions

This study examined the relative contribution of psychological, behavioral, and physiological factors to subjective well-being among community gym users. Basic psychological need satisfaction and self-determined motivation showed the greatest explanatory contribution to subjective well-being, whereas MVPA and body composition indicators did not provide significant incremental contributions after the psychological variables were considered. In addition, a statistically significant indirect association was observed between basic psychological need satisfaction and subjective well-being through self-determined motivation, although the cross-sectional design does not allow this association to be interpreted causally.

Overall, the findings suggest that the psychological experience of exercise may be more informative for understanding subjective well-being than the volume of physical activity or body composition alone. These results support the relevance of creating exercise environments that satisfy autonomy, competence, and relatedness and foster more self-determined forms of motivation.

Author Contributions: Conceptualization M.B., J.F. and H.L. The methodological framework was defined jointly by M.B., J.F., M.M. and V.S. Software development and computational procedures were carried out by M.B., while validation of all analytical processes was ensured by M.B., J.F. and H.L. Formal analysis was conducted by M.B. and J.F., and the investigation and field data collection were performed by V.S., E.T. and P.R. Resources for the study were provided by M.B., and data curation was undertaken by J.F., A.C. and E.T. The original draft of the manuscript was prepared by J.F. and M.B., and the review and editing of the final version involved M.B., J.F. and P.R. Visualization of the results was developed by J.F., while project supervision was carried out by H.L. and P.R. Project administration was the responsibility of M.B. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the Polytechnic University of Castelo Branco (Portugal) (OPINION No. 107 CE-IPCB/2023, 12 July 2023).

Informed Consent Statement: All participants were treated in accordance with the ethical standards of the American Psychological Association regarding informed consent, confidentiality, and anonymity. Written informed consent was obtained from all participants prior to data collection.

Data Availability Statement: The data supporting the findings of this study were fully recorded and securely stored by the research team. Due to confidentiality and ethical restrictions associated with human participants, the datasets are not publicly available. However, the authors will make the anonymized data available to the scientific community upon reasonable request.

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Abbreviations

The following abbreviations are used in this manuscript:

BPNES	Basic Psychological Needs Exercise Scale
BPNS	Basic Psychological Needs Satisfaction
MVPA	Moderate to Vigorous Physical Activity
SDI	Self-Determination Index
SWB	Subjective well-being

References

1. Diener, E.; Emmons, R.A.; Larsen, R.J.; Griffin, S. The Satisfaction with Life Scale. *J. Personal. Assess.* **1985**, *49*, 71–75. [CrossRef]
2. Diener, E.; Oishi, S.; Tay, L. Advances in subjective well-being research. *Nat. Hum. Behav.* **2018**, *2*, 253–260. [CrossRef]
3. Biddle, S.J.H.; Ciaccioni, S.; Thomas, G.; Vergeer, I. Physical activity and mental health in children and adolescents: An updated review of reviews and an analysis of causality. *Psychol. Sport Exerc.* **2019**, *42*, 146–155. [CrossRef]
4. World Health Organization. *WHO Guidelines on Physical Activity and Sedentary Behaviour*; World Health Organization: Geneva, Switzerland, 2020.
5. Teixeira, P.J.; Carraça, E.V.; Markland, D.; Silva, M.N.; Ryan, R.M. Exercise, physical activity, and self-determination theory: A systematic review. *Int. J. Behav. Nutr. Phys. Act.* **2012**, *9*, 78. [CrossRef]

6. Ntoumanis, N.; Ng, J.Y.Y.; Prestwich, A.; Quested, E.; Hancox, J.E.; Thøgersen-Ntoumani, C.; Deci, E.L.; Ryan, R.M.; Lonsdale, C.; Williams, G.C. A meta-analysis of self-determination theory-informed intervention studies in the health domain: Effects on motivation, health behavior, physical, and psychological health. *Health Psychol. Rev.* **2021**, *15*, 214–244. [CrossRef]
7. Deci, E.L.; Ryan, R.M. The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychol. Inq.* **2000**, *11*, 227–268. [CrossRef]
8. Ryan, R.M.; Deci, E.L. *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*; Guilford Press: New York, NY, USA, 2017.
9. Domingues, A.; Santos, J.; Batista, M.; Serrano, J.; Honório, S.; Petrica, J. Mediation effects of basic psychological needs and motivation among coach leadership style on the subjective well-being of adapted sports athletes' members of the Special Olympics. *PLoS ONE* **2024**, *19*, e0298297. [CrossRef]
10. Batista, M.; Jimenez-Castuera, R.; Petrica, J.; Serrano, J.; Honório, S.; Paulo, R.; Mendes, P. Self-determined motivation and well-being in Portuguese active adults of both genders. *BMC Health Serv. Res.* **2016**, *16*, 103.
11. Batista, M.; Rojo-Ramos, J.; Castillo-Paredes, A.; Galán-Arroyo, C. The importance of physical education and the intention to be physically active as predictors of subjective well-being in secondary school adolescents. *Front. Sports Act. Living* **2026**, *8*, 1748124. [CrossRef]
12. Ato, M.; López-García, J.J.; Benavente, A. A classification system for research designs in psychology. *An. Psicol.* **2013**, *29*, 1038–1059. [CrossRef]
13. Cubo Delgado, S.; Martín Marín, B.; Ramos Sánchez, J.L. *Métodos de Investigación y Análisis de Datos en Ciencias Sociales y de la Salud*; Pirámide: Madrid, Spain, 2011.
14. Vlachopoulos, S.P.; Michailidou, S. Development and initial validation of a measure of autonomy, competence, and relatedness in exercise: The Basic Psychological Needs in Exercise Scale. *Meas. Phys. Educ. Exerc. Sci.* **2006**, *10*, 179–201. [CrossRef]
15. Moutão, J.; Cid, L.; Alves, J.; Leitão, J.; Vlachopoulos, S.P. Validation of the Basic Psychological Needs in Exercise Scale in a Portuguese sample. *Span. J. Psychol.* **2012**, *15*, 399–409. [CrossRef]
16. Cid, L.; Monteiro, D.; Teixeira, D.; Teques, P.; Alves, S.; Moutão, J.; Silva, M.; Palmeira, A. The Behavioral Regulation in Exercise Questionnaire (BREQ-3) Portuguese version: Evidence of reliability, validity and invariance across gender. *Front. Psychol.* **2018**, *9*, 1940. [CrossRef]
17. Neto, F. The Satisfaction with Life Scale: Psychometric properties in an adolescent sample. *J. Youth Adolesc.* **1993**, *22*, 125–134. [CrossRef]
18. Laranjeira, C.A. Preliminary validation study of the Portuguese version of the satisfaction with life scale. *Psychol. Health Med.* **2009**, *14*, 220–226. [CrossRef]
19. Watson, D.; Clark, L.A.; Tellegen, A. Development and validation of brief measures of positive and negative affect: The PANAS scales. *J. Personal. Soc. Psychol.* **1988**, *54*, 1063–1070. [CrossRef]
20. Galinha, I.C.; Pais-Ribeiro, J.L. Contribuição para o estudo da versão portuguesa da Positive and Negative Affect Schedule (PANAS): II—Estudo psicométrico. *Anál. Psicol.* **2005**, *23*, 219–227. [CrossRef]
21. Hayes, A.F. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*, 3rd ed.; Guilford Press: New York, NY, USA, 2022.
22. Curran, P.J.; West, S.G.; Finch, J.F. The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychol. Methods* **1996**, *1*, 16–29. [CrossRef]
23. Hair, J.F.; Black, W.C.; Babin, B.J.; Anderson, R.E. *Multivariate Data Analysis*, 8th ed.; Cengage Learning: Belmont, CA, USA, 2019.
24. Nunnally, J.C.; Bernstein, I.H. *Psychometric Theory*, 3rd ed.; McGraw-Hill: New York, NY, USA, 1994.
25. White, I.R.; Royston, P.; Wood, A.M. Multiple imputation using chained equations: Issues and guidance for practice. *Stat. Med.* **2011**, *30*, 377–399. [CrossRef]
26. Preacher, K.J.; Hayes, A.F. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav. Res. Methods* **2008**, *40*, 879–891. [CrossRef]
27. Buecker, S.; Simacek, T.; Ingwersen, B.; Terwiel, S.; Simonsmeier, B.A. Physical activity and subjective well-being in healthy individuals: A meta-analytic review. *Health Psychol. Rev.* **2021**, *15*, 574–592. [CrossRef]
28. Claes, S.; De Wit, S.; Le Clercq, B.; Annemans, L. What moves you? The relation between exercise motivation and well-being using a person-centered approach. *BMC Public Health* **2026**, *26*, 497. [CrossRef]