

THE ROLE OF MOTIVATION AND LIFE SATISFACTION ON CHILEAN UNIVERSITY STUDENTS' PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR

O PAPEL DA MOTIVAÇÃO E SATISFAÇÃO COM A VIDA NA ATIVIDADE FÍSICA E COMPORTAMENTO SEDENTÁRIO DE ESTUDANTES UNIVERSITÁRIOS CHILENOS

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RESUMO

A motivação é elemento fundamental para a prática de atividade física e o sentimento de satisfação com a vida. Contudo, pouco se sabe sobre o papel de tais variáveis psicológicas no estilo de vida de estudantes universitários chilenos. Este estudo teve como objetivos analisar as relações entre a satisfação com a vida e as regulações da motivação, e comparar tais variáveis em função do nível de atividade física e do comportamento sedentário de estudantes universitários. A amostra foi composta por 95 estudantes universitários chilenos (63,2% do gênero feminino), com idade média de $20,92 \pm 1,98$ anos. Os instrumentos avaliados foram o IPAQ, a Escala de Satisfação com a Vida e o Questionário de Regulação do Comportamento do Exercício. Medidas descritivas, coeficientes de correlação de Pearson e testes t de Student foram utilizados para analisar os dados. Os resultados revelaram correlações positivas e significativas entre satisfação com a vida e regulação intrínseca ($r = 0,44$), integrada ($r = 0,38$) e identificada ($r = 0,41$). Os estudantes com alto nível de atividade física obtiveram maiores pontuações para regulação intrínseca, integrada e identificada. Os indivíduos que reportaram menor comportamento sedentário possuíam maior regulação identificada. Desse modo, sugere-se que a regulação motivacional dos estudantes pode ser diferente em algumas dimensões, sendo que os indivíduos com maior nível de atividade física semanal demonstram regulações motivacionais mais adaptativas. A regulação identificada também parece desempenhar um papel importante para a redução do comportamento sedentário.

Palavras-chave: Motivação. Exercício físico. Satisfação pessoal. Comportamento sedentário. Estudantes universitários.

ABSTRACT

Motivation is a fundamental element for the practice of physical activity and the feeling of satisfaction with life. However, little is known about the role of such psychological variables in the lifestyle of Chilean university students. This study aimed to analyse the relationship between life satisfaction and the regulations of motivation and to compare such variables by physical activity level and sedentary behaviour of university students. The sample comprised 95 Chilean university students (63.2% female), with a mean age of 20.92 ± 1.98 years. The instruments were the IPAQ, the Satisfaction with Life Scale, and the Behavioural Regulation in Exercise Questionnaire. Descriptive measures, Pearson's correlation coefficient, and Student's t-tests were used to analyse the data. The results revealed positive and significant correlations between life satisfaction and intrinsic ($r = 0,44$), integrated ($r = 0,38$), and identified ($r = 0,41$) regulation. Students with high levels of physical activity scored higher for intrinsic, integrated, and identified regulation. Those who reported low sedentary behaviour showed higher identified regulation. Therefore, it is suggested that students' motivational regulation may differ on some dimensions as those with higher levels of physical activity show more adaptive motivational regulation. Identified regulation also seems to play an important role in decreasing sedentary behaviour.

Keywords: Motivation. Exercise. Personal satisfaction. Sedentary behaviour. University students.

Introduction

Physical inactivity is a relevant issue in public health, and it is also associated with poor quality of life, disabilities, poor health, and premature death¹. Technology and high economic incentives have contributed to low levels of physical activity; energy expenditure was reduced both in activities of daily living and in work activities². Despite the scientific evidence that highlights the benefits of physical activity, a sedentary lifestyle is currently one of the most prevalent risk behaviours, both in Chile and worldwide³.

Young people stand out as an important group for the promotion of adequate levels of physical activity since they are in a fundamental phase of life to develop healthy lifestyles

that, later, will be practised in the family, social and work environment⁴. This fact is in line with the results of studies that suggest a relationship between the lifestyle established in the university phase and the habits evidenced in the young-adult phase⁵.

Encouraging physical activity in university students would allow the generation of healthy habits in the future. In this way, motivation is a determining factor for maintaining an active life. In the literature, there are studies interested in verifying the effectiveness of strategies aimed at motivating the practice of sports, physical activity and physical exercise, based on different theoretical models⁶, among which the Self-determination Theory⁷ stands out, which has been widely used in the context of sport and physical activity.

Self-determination concerns a set of behaviours and capabilities that support an individual to be the intervening agent of his future, that is, to act directly in procedures and circumstances in a purposeful and intentional way⁷. Self-determination can be considered a central element for the practice of physical exercises and sports regularly, enhancing the benefits of these activities for health.

It is noticeable that people have needs inherent to the condition of human life. According to Deci and Ryan⁸, needs refers to essential conditions for psychological development, human integrity and well-being. Authors point out that competence, relationship and autonomy needs are linked to well-being.

Motivation is linked to needs and can be considered an element capable of conditioning behaviour patterns in search of desirable results, playing an important role in biological, cognitive and social regulation⁹. For Deci and Ryan⁸, intrinsic motivation concerns the psychological needs of individuals, perceived as primary. The extrinsic is related to external factors, and social conditions that encourage certain behaviours. According to the authors, identification is the process by which people recognize the value of behaviour, such as, for example, the importance of regular physical activity for health and well-being⁸.

The motivation taxonomy proposed by Deci and Ryan⁹ suggests four motivation regulations: external, introjected, identified and integrated. According to the authors, external regulation occurs through imposing factors (e.g., parental control to perform school tasks). Introjected regulation, on the other hand, is a relatively controlled form, in which behaviours occur to ward off guilt or anxiety and is related to ego enhancements, such as pride and personal acceptance. In some research, external regulation (control by interpersonal relationships) and introjected regulation (control by personal interior) were associated due to the more controlling nature of such regulations⁸.

Motivation is a well-investigated element in psychology studies in different scenarios. In the last decade, work¹⁰, family⁷ and education¹¹ were studied. Several scientific studies have demonstrated the benefits of physical activity for reducing sedentary lifestyle and for muscular and functional development, as well as for reducing symptoms of anxiety, stress and insomnia, and for increasing psychological well-being and life satisfaction^{12,13}.

The negative psychological effects of social isolation resulting from the COVID-19 pandemic have been recently reviewed^{14,15}, including symptoms of post-traumatic stress, confusion, and anger, among others, and the benefits of practising physical activity as an effective strategy to face the psychological effects of the pandemic^{16,17}. In this sense, since the onset of COVID-19, studies have drawn attention to different mental health indicators, and that health literacy and physical activity have a protective effect on depression, general psychological health and quality of life¹⁸.

Although research has already demonstrated the benefits of physical activity and intrinsic motivation for life satisfaction in university students¹⁹, little is known about the relationship between life satisfaction and motivation, as well as whether the levels of satisfaction with life and motivation may vary according to the amount of physical activity

and sedentary behaviour of university students. Therefore, the object of the research was to analyse the relationships between satisfaction with life and the dimensions of motivation and to compare these variables as a function of the level of physical activity and sedentary behaviour of Chilean university students. According to the objectives and theoretical support, four hypotheses were defined: 1) more autonomous motivational regulations will be related to satisfaction with life; 2) students with greater intrinsic motivation will demonstrate a high level of physical activity; 3) students with greater satisfaction with life will demonstrate a high level of physical activity and; 4) students will demonstrate similar levels of satisfaction with life as a function of sedentary behaviour.

Methods

Sample

A descriptive, cross-sectional study was developed between April to May 2022, in a non-probabilistic sample of 95 students from a university in central-south of Chile.

Participants were recruited accidentally. Of the total sample surveyed, 63.2% are women, 34.7% are men, and 2.1% did not identify with any of these genders. Students from seven faculties (forestry sciences, agricultural sciences, business sciences, health sciences, legal and social sciences, engineering and psychology) and three professional schools (music, architecture and design) were invited to participate in the study during 2022.

All participants were informed about the type of study to be developed and its respective objectives. Then each of them signed the informed consent to authorize the anthropometric assessment and the application of questionnaires for the different variables. The study was approved by the local ethics committee.

Most students were enrolled in Psychology (n = 17), Architecture (n = 14) and Commercial Engineering (n = 13) courses.

The inclusion criteria used were: enrolment at the university valid for the period in which the forms were completed, age ≥ 18 years, agreeing to voluntarily participate in the study and signing the free and informed consent form that authorizes the use of information for scientific research purposes. Those students who, at the time of data collection, had medical leave or physical disability were excluded.

Instruments

Sociodemographic information was collected through an identification form with questions about gender (male, female, I prefer not to say), age and the undergraduate course the participant was enrolled in.

A SECA 803 scale (SECA Corp., Germany) with a precision of 100 grams was used to measure body mass. Height was measured using a SECA 206 wall measuring tape (SECA Corp., Germany) with millimetre precision. The nutritional status was determined by the body mass index (BMI) and the participants were classified as underweight ($< 18.5 \text{ kg/m}^2$), normal weight (between 18.5 kg/m^2 and 24.9 kg/m^2), overweight (between 25.0 kg/m^2 and 29.9 kg/m^2) and obesity ($\geq 30.0 \text{ kg/m}^2$). The volunteers were evaluated under normal conditions of temperature and humidity by a professional trained in anthropometric evaluation.

The level of physical activity was verified using the International Physical Activity Questionnaire - Short Version (IPAQ-SF)²⁰, adapted for the Spanish context²¹. The questionnaire consists of six questions related to vigorous, moderate, and walking physical activity (e.g., "During the last 7 days, how many days did you perform vigorous physical activity, such as lifting heavy weights, digging, doing aerobic exercises or riding a bike briskly?") and a question regarding sedentary behaviour (i.e., "During the last 7 days, how

much time did you spend sitting down during a working day?”), which was used to classify individuals in less than four hours sitting and more than four hours sitting.

For each intensity of physical activity, metabolic equivalents (METs) were calculated (MET vigorous = 8 * days/week * minutes/day; MET moderate = 4 * days/week * minutes/day; MET walking = 3.3 * days/week * minutes /day) and then summed to estimate the total energy cost, in MET-min/week. Participants were categorized into three levels of physical activity, low, moderate and high, according to the IPAQ protocol²² (Chart 1). Finally, the low and moderate categories were merged due to the small number of participants in the low category (n = 6).

Level of Physical Activity	Condition
Low	<ul style="list-style-type: none"> • Does not meet the moderate or high categories
Moderate	<ul style="list-style-type: none"> • At least 3 days of vigorous physical activity for at least 20 minutes/day • At least 5 days of moderate physical activity • At least 5 days of walking for at least 30 minutes/day • At least 5 days of weekly physical activity considering all intensities and achieving a minimum of at least 600 MET-min/week
High	<ul style="list-style-type: none"> • At least 3 days of vigorous-intensity activity achieving a minimum total physical activity of at least 1500 MET-min/week • At least 7 days of weekly physical activity considering all intensities and achieving a minimum of at least 3000 MET-min/week

Figure 1. Classification of the physical activity level of university students according to the IPAQ protocol

Source: Adapted from Di Blasio et al.²²

Life satisfaction was assessed using the Life Satisfaction Scale (SWLS)²³, adapted for the Chilean context by Bilbao-Ramirez et al.²⁴. This instrument consists of five items with response options on a seven-point Likert scale ranging from 1 (I do not agree at all) to 7 (I strongly agree). The life satisfaction score is generated through the sum of the items, and the higher the score, the more satisfied with life the individual feels.

The Behavioral Regulation in Exercise Questionnaire - 3 (BREQ-3)²⁵, adapted for the Spanish language²⁶, was used to measure the motivational continuum of the Self-Determination Theory⁸. The questionnaire consists of 23 items divided into six dimensions: intrinsic regulation, integrated regulation, identified regulation, introjected regulation, external regulation and amotivation. Items are answered on a five-point Likert scale ranging from 0 (not at all true) to 4 (completely true) and the scores for each dimension are obtained through the means of the items.

Procedures

This research is an extract from a larger study to verify the effectiveness of a physical activity program developed within the university. Data collection was carried out for two weeks, in which the anthropometric characteristics were evaluated in the first week and the questionnaires were applied in the second week. All study procedures strictly followed the requirements established by the university's sports program. Participants were instructed about the research objectives and data collection before applying the instruments. The questionnaires were answered individually and the participants took about 15 minutes to complete them. The present study complies with the ethical standards established in the 1964 Declaration of Helsinki and subsequent amendments.

Statistical analysis

Data analysis was conducted in R Software for Statistical Computing (v. 4.1.3). Data

distribution was verified using graphical visualization (i.e., quantile-quantile graph), assuming a normal distribution. As descriptive measures, mean and standard deviation were calculated for interval variables and absolute and relative frequencies for categorical variables. Pearson's correlation coefficient was used to measure the strength and direction of the bivariate relationships between satisfaction with life and dimensions of motivation. The internal consistency of the Life Satisfaction Scale and the Behavioral Regulation in Exercise Questionnaire - 3 was verified using Cronbach's α coefficient, and values above 0.70 were considered acceptable²⁷.

To analyse the difference between satisfaction with life and the dimensions of motivation as a function of the level of physical activity and sedentary behaviour, Levene's tests were used for homogeneity of variances and Student t-tests for comparison of averages. Cohen's d was used as a measure of effect size and was classified according to Sawilowsky²⁸: very small ($d < 0.1$), small ($0.1 < d < 0.5$), medium ($0.5 < d < 0.8$), large ($0.8 < d < 1.2$), very large ($1.2 < d < 2.0$), huge ($d > 2.0$). The significance level adopted in all analyses was $p < 0.05$. To adjust the p-values in cases of multiple tests, the method by Holm²⁹ was used.

Results

Regarding the characteristics of the participants (Table 1), the university students included in the study were, on average, 20.92 ± 1.98 years old. Most participants achieved low/moderate levels of physical activity (54.7%) and reported spending more than 4 hours sitting daily (62.1%).

Table 1. Descriptive measures of the characteristics of university students (n=95)

	N = 95
Age (years), Average \pm SD	20,92 \pm 1,98
Body Mass (kg), Average \pm SD	69,50 \pm 15,71
High (m), Average \pm SD	1,66 \pm 0,09
Gender, n (%)	
Female	60 (63,2%)
Male	33 (34,7%)
Prefer not to say	2 (2,1%)
Nutritional Status (BMI), n (%)	
Underweight	3 (3,2%)
Normal weight	51 (53,7%)
Overweight	23 (24,2%)
Obesity	18 (18,9%)
Physical Activity Level, n (%)	
Low/Moderate	52 (54,7%)
High	43 (45,3%)
Sedentary Behaviour (per day), n (%)	
Less than 4 hours	36 (37,9%)
More than 4 hours	59 (62,1%)

Note: SD: Standard Deviation. BMI: Body Mass Index

Source: Authors

The average level of satisfaction with the students' lives was 22.30 ± 8.59 (Table 2). Satisfaction with life correlated positively and significantly with intrinsic regulation [$r(93) = 0.44$], integrated [$r(93) = 0.38$] and identified [$r(93) = 0.41$]. Intrinsic regulation was positively and significantly correlated with integrated regulation [$r(93) = 0.80$; $p < 0.001$] and identified [$r(93) = 0.85$; $p < 0.001$]. Significant correlations were also found between external regulation and amotivation [$r(93) = 0.74$; $p < 0.001$]. Cronbach's α coefficients were considered acceptable for all scales ($\alpha > 0.70$).

Table 2. Descriptive measures and correlation matrix of satisfaction with life and dimensions of motivation of university students (n=95)

	Average \pm SD	α	1	2	3	4	5	6
1. Satisfaction with life	22,03 \pm 8,59	0,96						
2. Intrinsic regulation	2,54 \pm 1,12	0,93	0,44**					
3. Integrated regulation	2,00 \pm 1,10	0,89	0,38*	0,80**				
4. Identified regulation	2,58 \pm 1,13	0,90	0,41**	0,85**	0,78**			
5. Introjected regulation	1,21 \pm 1,04	0,79	0,24	0,26	0,38*	0,39		
6. External regulation	0,74 \pm 0,80	0,82	0,18	0,09	0,13	0,06	0,62**	
7. Amotivation	0,60 \pm 0,85	0,86	0,10	0,05	0,11	-0,01	0,44**	0,74**

Note: SD = Standard Deviation. α = Cronbach alfa coefficient. * $p < 0,01$. ** $p < 0,001$. Pearson correlation coefficient. The p-values were adjusted using the Holm method⁴⁵

Source: Authors

Significant differences were found when comparing the averages of motivation regulations as a function of the students' physical activity level (Table 3). The most physically active individuals demonstrated greater intrinsic regulation [Cohen's $d = 0.75$], integrated [Cohen's $d = 0.97$] and identified [Cohen's $d = 0.79$] than students with low physical activity level/moderate. No significant difference was observed when the means of satisfaction with life were compared ($p = 0.09$).

Table 3. Comparison of the means of satisfaction with life and dimensions of motivation according to the level of physical activity of university students (n = 95)

	High, N = 43	Low/Moderate, N = 52	Cohen's d (95% CI)	p'
	Average \pm SD	Average \pm SD		
Satisfaction with life	24,21 \pm 8,56	20,23 \pm 8,26	0,47 (0,06; 0,88)	0,09
Intrinsic regulation	2,97 \pm 0,93	2,18 \pm 1,14	0,75 (0,33; 1,17)	0,002*
Integrated regulation	2,53 \pm 0,96	1,57 \pm 1,03	0,97 (0,54; 1,39)	<0,001*
Identified regulation	3,04 \pm 0,90	2,21 \pm 1,17	0,79 (0,37; 1,21)	0,001*
Introjected regulation	1,20 \pm 0,91	1,21 \pm 1,14	-0,01 (-0,42; 0,39)	>0,9
External regulation	0,67 \pm 0,77	0,80 \pm 0,83	-0,17 (-0,57; 0,24)	>0,9
Amotivation	0,55 \pm 0,70	0,64 \pm 0,96	-0,11 (-0,52; 0,29)	>0,9

Note: Student t-test with Holm⁴⁵ correction for multiple comparisons. * $p < 0.05$

Source: Authors

Concerning comparisons of the means of satisfaction with life and dimensions of motivation as a function of sedentary behaviour (Table 4), students who reported sitting for less than 4 hours a day had greater integrated regulation for physical activity (2.40 ± 1.11) than individuals with more than 4 hours per day of sitting time (1.76 ± 1.03), $p = 0.035$. The effect size was considered medium [Cohen's $d = 0.61$].

Table 4. Comparison of the means of satisfaction with life and dimensions of motivation according to the sedentary behaviour of university students (n = 95)

	Less than 4 hours, N = 36	More than 4 hours, N = 59	Cohen's d (95% CI)	p'
	Average \pm SD	Average \pm SD		
Satisfaction with life	23,58 \pm 8,70	21,08 \pm 8,45	0,29 (-0,13; 0,71)	0,67
Intrinsic regulation	2,69 \pm 1,12	2,44 \pm 1,12	0,23 (-0,19; 0,64)	0,67
Integrated regulation	2,40 \pm 1,11	1,76 \pm 1,03	0,61 (0,18; 1,03)	0,035*
Identified regulation	2,80 \pm 1,11	2,45 \pm 1,13	0,31 (-0,11; 0,72)	0,67
Introjected regulation	0,97 \pm 0,96	1,35 \pm 1,07	-0,37 (-0,78; 0,05)	0,52
External regulation	0,58 \pm 0,86	0,84 \pm 0,76	-0,32 (-0,74; 0,10)	0,67
Amotivation	0,51 \pm 0,90	0,65 \pm 0,82	-0,16 (-0,58; 0,25)	0,67

Note: Student t-test with Holm⁴⁵ correction for multiple comparisons. * $p < 0.05$

Source: Authors

Discussion

This study aimed to analyse the relationships between satisfaction with life and the dimensions of motivation and to compare these variables as a function of the activity level and sedentary behaviour of Chilean university students. The results showed that higher scores of satisfaction with life were related to higher scores of intrinsic, integrated and identified regulation, which can be understood as more adaptive motivational regulations since they tend to be autonomously regulated³⁰. Still, university students who reported high levels of physical activity had, on average, greater intrinsic, integrated and identified regulation when compared to other students. There was no effect of physical activity level on life satisfaction. Regarding sedentary behaviour, participants who reported remaining seated for less than four hours a day demonstrated greater integrated regulation for physical activity.

The Self-Determination Theory argues that an understanding of human motivation requires attention to the psychological needs of competence, autonomy and relatedness. For the authors, the theory is primarily committed to explaining the psychological processes that promote ideal conditions for cognitive functioning and health⁸. Psychological procedures are essential to explain motivation and, subsequently, autonomy and well-being with life.

When presenting the taxonomy of human motivation, Prudencio et al.³¹ explain that, in external regulation, behaviour occurs because of external demand, aiming to acquire positive results (rewards) or prevent negative results (punishments). In introjected regulation, on the other hand, there is a regulation of the individual, by an external cause, aiming to avoid feelings of guilt, anxiety and shame. For the authors, in the identified regulation, the activity is endowed with self-determination, through the identification of the action, guided by values or requirements. Integrated regulation demonstrates the most complete and autonomous way of appropriating external demands, that is, full acceptance of the subject in carrying out a certain behaviour or activity.

Regarding university students who reported a high level of physical activity, this study showed that such individuals demonstrated greater intrinsic, integrated and identified regulation when compared to other students, which could improve their quality of life when performing physical activity. This result is in line with what was found by Concha et al.⁴, who revealed that Chilean university students with higher levels of physical activity have a better quality of life. On the other hand, it is important to consider each stage of change to intervene in the physical activity of university students, as stated by Herazo-Beltrán et al.³². There was no effect of the level of physical activity on satisfaction with life, which contrasts with the findings by Faúndez¹³ with university students. These results may be different due to the effect of the pandemic on psychological health, as suggested by studies such as Carriedo et al,¹⁵ and Violant-Holz et al,¹⁶ which conclude that the COVID-19 pandemic and confinement measures caused psychological discomfort. Furthermore, it has been demonstrated that, during quarantine, adults increased their sedentary time and reduced their levels of Physical Activity, presenting controversial psychological results.

The results point out that university students spend most of their time in sedentary behaviour. As Solís-Urra³³ points out, sedentary behaviour is highly relevant in the context of university students. Although data suggest that this population is capable of fully complying with the physical activity recommendations proposed by the WHO³⁴, the long hours of study and the lifestyle can make it difficult to adhere to more active behaviour. On the other hand, Peterson et al³⁵, when studying sedentary behaviour in university students, suggest the need to implement interventions that focus on establishing healthy habits to provide greater physical and mental well-being. In this sense, Morales et al.³⁶ recommend the implementation of effective physical activity programs in universities, motivating students to increase the level of physical activity to moderate and vigorous levels, to reduce

cardiovascular risk.

An interesting question about those who practice physical activity, especially those who have a higher level, is their relationship with the motivation to practice. According to Varela et al.³⁷, young people who have healthier practices are those who are satisfied with the changes achieved so far and those they intend to maintain, which could explain the results of this study regarding the motivation for intrinsic regulation. Furthermore, the authors point out that few college students perform physical activity and that, for the prevention and reduction of a sedentary lifestyle, it is necessary to consider aspects of motivation to modify this behaviour.

Despite the efforts, this study has limitations. The cross-sectional design does not allow the causal inference of the results obtained and the retrospective nature of certain questions added to the social desirability may have impaired the veracity of the answers³⁸. Furthermore, the classification of the level of physical activity used in the study may have affected the results. Since the sample size was not enough to establish a reasonable number of participants in the low category of the IPAQ²² protocol, the low and moderate categories were merged, which may have produced more heterogeneous groups and reduced the ability to detect differences in levels of life satisfaction in this sample. Therefore, it is suggested that further studies use larger samples and calibrate more homogeneous groups so that a more robust analysis can be performed. In addition, other classifications of physical activity proposed in the literature should be explored³⁹. Sedentary behaviour, measured solely as the amount of time the individual remains seated, can limit the understanding of this concept, and it is suggested that further research perform greater detail on this behavior⁴⁰ and use specific instruments to measure it.

Conclusion

It is concluded that satisfaction with life is positively related to more autonomous motivational regulations. Students' motivational regulation may be different in some dimensions, with individuals with a higher level of weekly physical activity demonstrating more adaptive motivational regulations. The identified regulation also seems to play an important role in reducing sedentary behaviour. As practical implications, nourishing oneself with elements that facilitate the development of more autonomous motivational regulations, such as practising physical activity because the activity is following the values or for the pleasure of practising it, can help the student to maintain levels high for this behaviour.

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