

Physical Activity Practice and Healthy Lifestyles Related to Resting Heart Rate in Health Sciences first-year students

[SAMUEL HONÓRIO¹](#), [MARCO BATISTA²](#), RAQUEL SILVA³

¹ *[SHERU \(Sport, Health and Exercise Research Unit\)](#), Instituto Politécnico de Castelo Branco, Portugal (samuelhonorio@hotmail.com)*

² *[SHERU \(Sport, Health and Exercise Research Unit\)](#), Instituto Politécnico de Castelo Branco, Portugal (marco.batista@ipcb.pt)*

³ *Faculty of Health Sciences of University Fernando Pessoa, Oporto, Portugal. Research Centre for Anthropology and Health, University of Coimbra, Portugal. Scientific Commission of the Gymnastics Federation of Portugal, Lisbon, Portugal. (raquel@ufp.edu.pt)*

Corresponding author:

Rua Prof. Dr Faria de Vasconcelos

6000-266 Castelo Branco

Phone: +351 915 662 158

Email: samuelhonorio@hotmail.com

<https://orcid.org/0000-0003-1863-344X>

Abstract

The expression of "lifestyles" describes a frame of expressed behaviours, usually in the form of patterns of consumption, that defines how an individual or social group fits into society. It presents as a focus of interest by researchers in this field, who classically favour the study of alcohol consumption, tobacco, eating habits and physical activity. The aim of this study was to identify the relationship between physical activity and healthy lifestyles, especially in terms of eating habits, tobacco, alcohol consumption, resting habits and resting heart rate in Health Sciences first-year students. A total of 177 students of both genders participated, of which 31 (17.5%) were male and 146 (82.5%) were female, with a mean age of 20.20 years, from 18 to 30 years. The data collection instrument used was the Healthy Lifestyle Questionnaire (EVS), using S.P.S.S. 21.0 for descriptive statistics and the Cronbach's alpha to evaluate the internal consistency of the questionnaires. A level of significance was adopted with a margin of error of 5% for a probability of at least 95% using the Kolmogorov-Smirnov technique and Mann-Whitney test for comparisons between practitioners' students and genders. The results obtained demonstrate more favourable results in all variables in students practicing physical activity with significant differences in eating habits and Resting Heart Rate. In terms of gender there were significant differences in all variables except for eating habits. We conclude that physical activity students present more favourable results in terms of lifestyles combined with lower Resting Heart Rate values considered as positive factors in terms of quality of life.

Keywords: Sports Practice, Lifestyles, Resting Habits, Eating habits, Alcohol Consumption, Resting Heart Rate

Introduction

The practice of physical activity is not only important, but necessary for healthy growth and human development, regardless the type of activity or the sport dimension chosen, and it can also be considered an important element of culture, with relevance in educational programs, but also as an element of comparison, selection and competitiveness, which may lead, in certain circumstances, to excess¹. According to some authors², the increase in sedentary behaviours, as well as the invasion of tasks that can make physical effort unfeasible, represent one of the greatest problem that characterize today's societies, since there are several evidences that highlight the impact of active lifestyles on health. However, the importance of physical activity practice in our society goes beyond the benefits related to the physical health of man, insofar as it allows the individual to value his ego, since it is possible to perceive the development of

socio-affective relations, communication and socialization, adjusting this man to the environment in which he lives¹.

The expression of "lifestyles" describes a set of expressed behaviours, usually in the form of patterns of consumption, that characterize the way an individual or social group fits into society. This was an expression that originated research on non-infectious diseases, especially in the developed countries³. Although, with the advancement of science and the facilitation of human tasks, there is a reduction in mortality from infectious diseases and an increase in longevity, but also, the appearance of chronic degenerative diseases that negatively affect the quality of life. The conception of lifestyles has been evolving, accompanying, in a certain way, the evolution of the own society, expressed in the change of the focus of interest by investigators in this field, that, classically, they privilege the study of alcohol and tobacco, eating habits and physical activity⁴.

According to the relationships between physical activity, resting heart rate (RHR) and overall health, resting heart rate is commonly assessed as an indicator of wellness and well-being. Resting heart rate is increasingly known to have valuable predictive utility in the assessment of a variety of cardiac diseases^{5,6,7}. In the literature, there is much evidence that regular participation in physical activity is an important factor for quality of life⁸, as well as for health promotion, and socially or mentally in the entire population. In fact, when we compared the active and the inactive, we noticed that the active individuals had better levels of cardiorespiratory and muscular fitness, better body composition and bone mineral density, and, fewer symptoms of anxiety and depression⁹. Thus, it is essential to promote physical activity among the youngest, because in some studies¹⁰, young adults are not very active and it is proven that physical inactivity in this age group carries the risk of chronic diseases, as well as reduces life expectancy, since it is closely related to morbidity and mortality. The World Health Organization recommends that all individuals should perform physical activity for the benefits that come from it³.

Although these benefits are well established, there are some factors associated with exercise practice that can affect individuals life quality, such as stress, which is characteristic of the sport environment and can have negative consequences on overall performance and well-being, as well as social, economic and nutritional factors, inadequate rest and monotony of practice, can lead to a fall in quality of life^{11, 12}. Healthy lifestyles are not shaped by denial or avoiding certain permissive habits, are best structured from a set of behaviours that create in the individual interest and that prevail over other less healthy behaviours. To the concept of lifestyle, there are others that are associated with it, to better understand how physical activity

and exercise fit the current model of health, it is important to understand certain specific terms and concepts such as health, physical activity and physical fitness. There is a convincing evidence that regular physical activity protects the body against sedentary habits. The literature has demonstrated that individuals who exercise regularly in moderate activity, show gains both in terms of health and quality of life.¹³ It should also be emphasized that healthy behaviours refer to the conscious effort of individuals to preserve their own health and what it offers. Healthy food is fundamental for a good general health, because energy and nutritional recommendations point to the importance of complying with a nutritional balance between energy intake and energy expenditure¹⁴. Also participating in a regular physical activity can be very enjoyable and an important factor in improving the quality of life, since the physical form maintained throughout life seems to be essential for the body to function in a healthy way. Thus, we can conclude that even small changes in lifestyles can have significantly positive long-term health effects if they are maintained¹⁵. The characterization of lifestyles is fundamental, since inadequate habits can be reflected in health problems, hence a preventive and constructive education coming from both the family environment and the sports environment is important. Sport and physical activity is a basic pillar of education and health promotion, as well as healthy lifestyles.¹⁶ In terms of healthy lifestyles, we can use synonyms such as healthy lifestyles and health-related lifestyle, encompassing both behaviours that enhance health (physical activity practice, nutrition and resting habits), as well as those that are harmful such as tobacco and alcohol¹⁷. Considering that behavioural patterns acquired in the early stages of life are likely to be maintained during adulthood¹⁸, adolescents and young adults who hold an educational pattern integrating healthy lifestyles will tend to be adults with a lower probability of exposure to risk factors. Lifestyles are determined by four dimensions, which correspond to eating habits, which are subdivided into balanced diet, tobacco and alcohol consumption, resting habits and respect for meal times, adequate energy and nutritional values¹⁹.

However, considering the evidence regarding the negative health effects associated with elevated resting heart rate in adolescents and young adults^{20,21} the RHR is a relevant to this study that this issue must be considered in healthy lifestyles, such as health-related physical fitness components. It is important to verify the relationship between healthy lifestyles components and RHR, since it is possible to identify modifiable factors in the adolescents and young adults population by means of low-cost, easily administered instruments and to propose strategies with the objective of preventing health problems associated with high RHR²². A higher RHR is directly associated with indicators of cardiovascular diseases, such as increased

blood pressure levels, elevated blood glucose, higher total cholesterol concentrations and elevated triglycerides ^{20,21,22}.

¹³In a study that analysed the resting heart rate in young adults as a lifestyle predictor and have concluded that exercise was a significant aspect of subjects' lifestyles, with 90% of subjects reporting regular weekly exercise. Students who exercised (n = 407) had lower resting heart rates (72.3 ± 10.5 bpm) than students who reported no regular exercise (n = 46, 79.0 ± 11.0 bpm).

Most of the findings related to RHR come from investigations aimed to establish a relationship between RHR and risk factors for cardiovascular diseases, such as blood pressure and inflammatory markers. The literature has reported that adolescents and young adults with better performance in physical fitness tests have lower odds of high blood pressure, hypercholesterolemia, and cardiovascular dysfunction, as well as lower RHR ^{23,24}. The health-related issues have positive changes in RHR. In addition, excess body fat is associated with higher blood pressure, that will increase RHR ²⁵.

Material and Methods

The methodology used in the execution of this research was selected from the determination of the objectives of the study, using the quantitative method, which is characterized by the use of quantification, both in the collection and in the treatment of information, where we will use statistical techniques, aiming at results that avoid possible distortions of analysis and interpretation, as well as providing a higher safety margin ²⁶. Regarding the participants, we used a random sampling technique, that is, a procedure to be used in choosing the elements that make up the sample ²⁷. This type of sample can be used successfully in situations where it is more important to grasp general ideas, to identify critical aspects than scientific objectivity itself.

Participants

The participants were 177 students enrolled in the first year of Health Sciences courses who volunteered to participate in this study. They are aged between 18 and 30 years, with a mean age of 20.20 ± 3.04 , of which 146 (87.5%) are female and 31 (17.5%) are male.

Inclusion and exclusion criteria

Participants that were included in the study attend the 1st year of Health Sciences Schools degrees, with ages between 18 and 30 years old. Participants who attend the 2nd, 3rd or 4th years

of those bachelor's degrees were excluded, or those who attend the 1st year with less than 18 years of age or over 30 years.

Ethical Procedures

All subjects participated freely in the study, giving their consent by signing an informed consent term. Before starting to collect data subjects were informed of the scope and objectives of our study, as well as the confidentiality of the individual data and the results of the tests performed. Data collection was carried out by the researcher himself for the application of the instrument and clarification of doubts. The students were approached in classrooms at the end of their teaching with the authorization of the teacher, as a way of inviting them to participate in this research. They were properly informed of the purpose of the study and that the collaboration was voluntary and anonymous. It was asked to students the opinion about what was being questioned, and that it would be important for them to be as sincere as possible. The questionnaires were self-filled in our presence and returned at the same time, making them reach us when they were completely filled, in an envelope, guaranteeing total anonymity. After the questionnaires were processed, they were destroyed. The study was approved by the Ethics Commission of the University Fernando Pessoa (Oporto, Portugal).

Statistical Procedures

All variables of the questionnaire in this study were treated statistically using the SPSS for Windows (version 21.0). This statistical treatment consists of a descriptive analysis and the Cronbach's alpha was calculated to evaluate the internal consistency of the questionnaires. A level of significance was adopted with a margin of error of 5% for a probability of at least 95% using the Kolmogorov-Smirnov technique and Mann-Whitney test for comparisons between practitioners and non-practitioners' students and genders regarding their eating habits, tobacco and alcohol consumption, resting habits and resting heart rate.

Instruments and Data Collection

In order to collecting data and according with what we intend to evaluate, we used to characterize the habits and lifestyles of the students, we used the Healthy Lifestyles Questionnaires (EVS)²⁸, translated and validated for the Portuguese language²⁹. The original questionnaire consists of 30 items, however after the necessary adaptations, only 20 items were used, with questions that refer to different factors, such as: balanced diet, respect for meal times, tobacco consumption and resting habits. In terms of reliability the indices of internal

consistency were considered acceptable. For heart rate measurement a digital cardiofrequencimeter (Polar Flow), was used, according to the following protocol: the students were lied down on their back, relaxed, in a private classroom, after a 30m period of rest. Then, they putted on the soft strap with the heart rate sensor; after about 1 minute, they breathed calmly and didn't look at the monitor. The investigator registered the value of the lowest heart rate. RHR varies from person to person, but according to the Seattle Criteria³⁰ the average RHR range from 60 to 90 beats per minute (BPM). In the case of a heart rate <50 bpm, the participant repeated the ECG after mild aerobic activity.

Results

Next, we present descriptive statistics with measures of central tendency and specific tests.

Table 1 – Descriptive statistics and Alpha Cronbach values of the variables under study.

Variables	N	Minimum	Maximum	Mean	Std. Deviation	α Cronbach
Eating habits	177	1.00	5.00	3.17	0.83	0.65
Tobacco consumption	177	1.00	3.80	1.72	0.60	0.60
Alcohol consumption	177	1.00	4.20	1.75	0.87	0.60
Resting habits	177	1.00	4.20	1.96	0.58	0.85
Resting heart rate (RHR)	177	59	114	77.59	11.07	--

We started the description of our sample with reference to the descriptive values of each variable, and considered the practice of habits of healthy lifestyles according to the gender of the students, and it was possible to observe through table 2 that the masculine gender presents values ($X = 3.19 \pm \sigma = 0.65$), in resting habits ($X = 2.17 \pm \sigma = 0.85$) and RHR ($X = 72.7$) in relation to the female gender, which in turn presents higher values ($X = 1.67 \pm 0.60$), and in alcohol consumption ($X = 1.68 \pm \sigma = 0.60$). There are significant differences in all variables except for eating habits.

Table 2 - Mean values and standard deviation of the variables analysed in all students according to gender.

Gender		Eating habits	Tobacco	Resting habits	Alcohol	RHR
Male (n=32)	Mean	3.19	1.98	2.17	2.05	72.76
	Std. Deviation	0.92	0.62	0.43	0.76	11.23
Female (n=145)	Mean	3.16	1.67	1.91	1.68	78.42
	Std. Deviation	0.82	0.58	0.60	0.88	10.87
Total (n=177)	Mean	3.17	1.72	1.96	1.75	77.59
	Std. Deviation	0.83	0.60	0.58	0.87	11.07

	Sig.*	0.87	0.00*	0.02*	0.03*	0.03*
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*Mann-Whitney Test ($\sigma \leq 0.05$)

Table 3 – Means, standard deviations and significance values of healthy lifestyles between practitioners' students of physical activity and non-practitioners' students.

		Eating habits	Tobacco	Resting habits	Alcohol	RHR
Practitioners Students (n=83)	Mean	3.33	1.70	2.00	1.67	71.27
	Std. Deviation	0.85	0.52	0.57	0.80	10.45
Non-practitioners students (n=94)	Mean	3.03	1,74	1.91	1.81	82.08
	Std. Deviation	0.80	0.66	0.59	0.93	9.19
Total	Mean	3.17	1.72	1.96	1.75	77.59
	N	177	177	177	177	177
	Std. Deviation	0.83	0.60	0.58	0.87	11.07
Sig.		0.02*	0.55	0.15	0.46	0.00*

*Mann-Whitney ($\sigma \leq 0.05$)

According to table 3, all variables are more favourable in the group of students practicing physical activity. There is more concern about eating habits (mean = 3.33), with significant differences between groups, lower tobacco consumption (mean = 1.70), more resting periods (mean = 2.00), lower consumption of alcohol (mean = 1.67) and resting heart rates, also with significant differences between exercise practitioners and non-practitioners students.

Table 4 - mean values and standard deviation of the variables analysed between male students and female students.

		Eating habits	Tobacco	Rest habits	Alcohol	RHR
Males with practice (n=23)	Mean	3.33	1.88	2.17	1.80	67.2
	Std. Deviation	0.86	0.52	0.42	0.66	2.06
Males with no practice (n=9)	Mean	2.83	2.22	2.17	2.68	81.7
	Std. Deviation	1.00	0.80	0.48	0.62	10.81
Sig.		0.58	0.23	0.96	0.006*	0.007*
Females with practice (n=60)	Mean	3.32	1.64	1.94	1.62	72.4
	Std. Deviation	0.85	0.50	0.41	0.84	1.61
Females with no practice (n=85)	Mean	3.05	1.69	1.89	1.72	82.12
	Std. Deviation	0.78	0.63	0.60	0.91	9.08
Sig.		0.05*	0.815	0.50	0.56	0.00*
Males with practice (n=23)	Mean	3.33	1.88	2.17	1.80	67.2
	Std. Deviation	0.86	0.52	0.42	0.66	2.06
Females with practice (n=60)	Mean	3.32	1.64	1.94	1.62	72.4
	Std. Deviation	0.85	0.50	0.41	0.84	1.61
Sig.		0.97	0.05*	0.37	0.10	0.11

**Mann-Whitney ($\sigma \leq 0.05$)*

Table 4 shows that in the comparison between the male group, the ones with practice have more favourable values in all variables (except in rest habits with an equal value) having significant differences in the alcohol consumption ($p=0.006$) and resting heart rate ($p=0.007$). The same aspect is observable also in the comparison between the female gender with significant differences in eating habits ($p=0.05$) and RHR ($p=0.00$) as well. It means that the students with practice that evidence more healthy lifestyles have also a lower RHR considered adequate according to the Seattle criteria. Between male and female students with practice only show significant differences in tobacco consumption, with a higher incidence among male students. In eating habits, both genders have similar values, resting habits are more valued by male students, as well as lower resting heart rates, but they consume more alcohol than the female gender. These results agree with those of table 3, showing that physically active students present greater care and more favourable lifestyles, together with a resting heart rate with values considered as a [favourable](#) predictor for less probability of having [cardiovascular diseases](#). In these young adults, the exercisers students show lower RHR, which according to some studies,^{31,32} exercise and lower resting heart rate is a useful indicator of overall cardiovascular health.

Discussion

The results of this research are presented through the comparison between practitioners and non-practitioners and students' gender in relation to lifestyles. According to genders comparison, the male gender presents values more favourable values in the eating habits, resting habits and RHR than the female gender. However, male gender presents higher values of alcohol and tobacco consumption with significant differences. In the comparison between practicing and non-practicing students, those who practice physical activity present the best lifestyles with differences in eating habits and RHR. This results allow us to mention that male gender gives more importance to energy and nutritional consumption, since it is essential for the maintenance of performance, body composition and health, seeking in dietary restriction a mean of adjusting body weight and optimizing sports performance^{19,33}. Thus, we can say that the results obtained in this study do not resemble others³⁴, since they verified that the female gender makes a more balanced diet, consuming fruit and vegetables more often than the male gender. In turn, it is the male gender that consumes more tobacco, a situation that also occurs in this study.

According to another study carried ³⁵, it is the men who presented the most favourable values, since this is directly related to eating habits, where there were also more regular resting habits in men. In another study ³⁶, female individuals presented a lower mean of resting habits than the male, due not only to hormonal factors, but also to dating relationships, domestic and financial responsibilities ³⁷. Other studies ^{38,39} report that the most frequent problems of insomnia are in fact related to poor hygiene of sleep, thus, heavy other stimulants, may hinder the onset of sleep, since B vitamins and calcium favour sleep, whereas alcohol, caffeine and nicotine harm it ⁴⁰. Having said this, we can conclude that a good lifestyle later has advantages on the quality of sleep.

Sharing other analysis ⁴¹, we think that life habits tend to appear united or grouped, both in the case of habits related to healthy lifestyles, and in the case of those that are considered risky, they found that in the comparison between practitioners and non-practitioners, these last ones exhibited other health risk behaviours: physical inactivity, inadequate diet, consumption of other drugs, etc. ⁴². It was verified that, according to this study, that the practicing individuals present better indices of lifestyles allied to a lower RHR.

Finally, and taking another approach ⁴³, where the same healthy lifestyles were studied between competitors and non-competitors of surf, the same trends were observed, that is, the practicing individuals present better indices in all the studied variables. This study has also associated the variable of RHR. Several authors ^{44,45} point that the increase in stroke volume leads to a decrease in the number of beats required to maintain cardiac output, decreasing the metabolic load of the heart, contributing to lower RHR ^{44,45}. Healthy lifestyles such as the mentioned, are linked to physical activity and related to lower RHR, considered as healthy factor for life quality and less chances to develop cardiovascular diseases. An explanation is that moderate to higher levels of physical activities decreases parasympathetic nervous system activity, which reduces the RHR ⁴⁶. Other authors found that the improvement of cardiorespiratory fitness in adolescence and young adults reflects better cardiovascular health indicators, such as healthy blood pressure levels, favourable lipid profile, and lower risk of morbidity and mortality in adult life ^{47,48}. In this way, promoting the improvement of these healthy lifestyles will lead these individuals to a healthier context throughout life.

Conclusions

Our study goals were to identify the differences between male and female students, and practitioners and non-practitioners of physical activity, especially at the level of their lifestyles. Students practicing physical activity showed more favourable values in all variables with

significant differences in eating habits and RHR. In terms of gender comparison, males were more careful about diet, with hours of resting and lower values of RHR, although without significant differences, only showed higher values in tobacco and alcohol consumption. Although the literature shows a certain frequency, that there are differences related to gender, in the variables studied, it is curious to observe that male gender has higher values, except for tobacco and alcohol consumption. However, there is no doubt that in the comparison between practitioners and non-practitioners of physical activity, and between genders, there are better indices of lifestyles in the student practitioners, so the variable of physical activity is determinant for a healthy life.

This study also demonstrated that RHR as a positive association with physical activity and the lifestyles variables under study. RHR measurement is a viable alternative for use in large health monitoring systems because they are easier to employ. Is important in this early adulthood the practice of these healthy lifestyles in an educational context by maintaining these lifestyles through life, and as future health professionals to induce these behaviours in their students.

According to this its valid to state that low cardiovascular disease risk profile (no prior myocardial infarction and the simultaneous presence of untreated cholesterol, untreated blood pressure, no smoking, and no diabetes mellitus) in young adults has been demonstrated to be associated with lower mortality and morbidity rates, higher life expectancy, lower lifetime risk for cardiovascular disease, and further, higher quality of life in older age. The practice of healthy lifestyle factors like no smoking, vigorous or moderate physical activity, no excessive alcohol drinking, and a balance diet during young adulthood are strongly associated with achievement of the low risk profile in middle age. Our study indicates that the healthy lifestyle factors practiced are positive linked to a lower resting heart rate. These data suggest that these students, and future professionals, should encourage their patients/students to adopt a healthy lifestyle starting at a young age or to improve their lifestyle as early as possible to maximize the benefits of the low cardiovascular risk profile in terms of healthy longevity.

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