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Association of physical activity, music study hours, and depression symptoms in university students

Associação da atividade física, tempo de estudo musical e sintomas de depressão em universitário

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ABSTRACT
In order to verify the association of music study hours (MS) and physical activity levels (PAL) with depression (DEP) and anxiety (ANX) symptoms, 57 students filled out IPAQ and DASS-21 questionnaires. Over 80% were categorized as active, of which 47.4% performed physical activities (PA) in their free time. 49% presented moderate DEP and ANX symptoms, and 59.9% presented severe DEP and ANX symptoms, with no relations found between PAL + MS and DEP + ANX. Nevertheless, the daily sitting time and total walking time presented a positive association concerning DEP scores; hence, factors concerning lifestyle and PA practice featured greater importance in the prevalence of DEP and ANX in musicians than MS practice.

Keywords: musicians, physical activity, free time, depression.

RESUMO
Buscando verificar a associação do tempo de estudo musical (TEM) e do nível de atividade física (NAF) nos sintomas relacionados à depressão (DEP) e ansiedade (ANS), 57 alunos realizaram o preenchimento dos questionários IPAQ e DASS-21. Mais de 80% dos participantes classificaram-se como ativos, sendo 47,4% realizando AF no tempo livre. Além disso, 49% e 59,9% apresentaram sintomas moderados e graves de DEP e ANS, respectivamente, não sendo evidenciadas relações entre o NAF e TEM com DEP e ANS. No entanto, o tempo sentado diário e do tempo total de caminhada associaram-se positivamente com os escores de DEP. Assim, fatores relacionados ao estilo de vida e a prática de AF mostraram-se mais importantes na prevalência de DEP e ANS em músicos do que a prática do estudo musical.

Palavras-chave: Músicos. Atividade física. Tempo livre. Depressão.

INTRODUCTION

Various changes of daily habits stemming from greater prevalence of sedentary professional activities, advances in the area of health concerning the control of infectious diseases, and everyday facilities brought about by technological advances resulted in changes in the epidemiological profile regarding morbidities and mortality causes in the world.[1]

This setting becomes evident observing the increase of prevalence in diagnosing chronic non-communicable cardiometabolic diseases (NCDs),[2] such as obesity, and psychological disorders,[3] such as depression (DEP) and anxiety (ANX). Such a tendency is also found in Brazil, where the prevalence of morbidities and mortalities resulting from NCDs has been increasing in the past few decades.[4] At the same time, a significant increase is shown in studies and proposals for drug and non-drug therapies aiming to alleviate this situation.[5, 6]

The influence of phenotypic factors, such as sedentary behavior (SB) and eating habits (EH) so far point to a greater incidence of overweightness and obesity in the general population;[2] in Brazil, over half the population features either one or both of these behaviors.[4]

Meanwhile, diagnostics of illnesses connected with psychological disorders present a growth, reaching 14% of Brazilians diagnosed with severe symptoms of DEP.[7, 8]

A recent publishing[8] shows the relation of such a mental issue and lack of motivation to practice physical activities (PA) and/or physical exercises (PE). Yet, despite this symptomatic situation, studies indicate performing PA and/or PE is an important ally both to prevent DEP symptoms and to treat the disorder, regardless of age.[9, 10]

Musical activity is a form of cultural and artistic expression performed all around the world. It is an important vector toward the improvement of the quality of life, especially in the treatment of psychological disorders.[11] However, for professional musicians, such activities can be stressful and may lead such professionals to an important state of physical and psychological unbalance.[12] In the case of musicians, musical activity time and study feature an association with incidence of lesions, especially musculoskeletal ones. Nevertheless, the association of this variable concerning psychological disorders, as well as the association of physical activity levels (PAL) of such a professional as an enhancer or inhibitor of such symptoms is not clear in the literature.

This study aims to assess PAL and the time of music study of undergraduate students of Music and the possible association between these factors in the increase of prevalence of scores concerning depression symptoms.

METHODOLOGY

This study was approved by the Ethics Committee for Research Involving Human Beings of the Federal University of São João del-Rei (UFSJ, Protocol #5.743.556). It is descriptive research featuring a transversal outline and non-probabilistic sampling for convenience.

The study population (N=95) consists of university students taking two or more courses in the undergraduate program in Music at UFSJ. Aiming to reach a representative population, the assumptions were the expectations of 50% frequency, 95% confidence level, 5% sampling error, and 0.8 sampling power. The minimal sample of participants was 63.

All stages took place between March and June, 2023. After the undergraduate program coordination authorized it, the Free and Informed Consent Form was signed by all participants, who then answered the following questionnaires:

Questionnaire for sampling characterization concerning musical study time (MS): This tool sought the variables: (1) Chronological

Age: obtained by an equation considering the participant's birthday and this study's data collection; (2) Body Mass (BM) and Body Height (BH): informed by the participants filling in the form; (3) Music practice time: the form features a blank to fill in with this information, measured in years and months, concerning how long the student has been practicing musical activity; and (4) Musical Study Time (MS): to be filled in with how many daily hours the student dedicates to practicing music.

Questionnaire for sampling characterization concerning physical activity level (PAL): participants filled in the long version of the International Physical Activity Questionnaire (IPAQ), which was validated and translated to Portuguese[14], the language spoken in Brazil. IPAQ asks participants quantitative data expressed in days and hours, concerning the time spent in different everyday physical activities and their intensity. It also asks information on the participants' daily sitting time (DST), both during weekdays and weekends.

Questionnaire for Depression, Anxiety, and Stress Scale (DASS-21): this tool, proposed by Lovibond & Lovibond,[15] was translated and validated in Portuguese. It aims to quantify the participants scores regarding symptoms related to psychological disorders of Anxiety (ANX), Depression (DEP), and Stress (STR). Participants are categorized as normal, moderate, and severe, by means of the normative table.

In order to classify the participants' physical profile, Body Mass Index (BMI; kg/m^2) was adopted, categorized according to the table suggested by the World Health Organization.[16]

To calculate the sampling number of this study and statistical analyses, the statistic programs Epinfo® version 7.2.5.0, and SPSS® version 23.0 (IBM, 2015) were employed, respectively. To describe the collected variables, this research adopted the values of mean central tendency ($\overline{x}$) and standard deviation (s) for continuous variables and relative (f_r) and absolute (f_i) frequency for categorical variables.

Variance normality and homogeneity of the obtained data were checked using Shapiro-Wilk and Levene tests, respectively. To those who did not show normality ($p<0.05$), bootstrapping (1000 resampling; 95% IC BCa) procedures were performed, so as to obtain more reliable results, as well as to correct normality deviations of sample distribution and differences in group sizes, in addition to presenting the trust interval of 95% for the obtained averages.

In order to investigate differences concerning the prevalence of the participants' physical profile type, chi-square adherence test was employed. Furthermore, in order to verify the association between depression scores, and anxiety and stress cores, the chi-square test was applied for independent samples (3x3).

For the analysis of the association between PAL, MS, and the total physical activity practice in different intensities (independent variables) regarding DEP scores (dependent variable), this research adopted multiple regression, using the *enter* method, with all multicollinearity assumptions (VIF), independence of residues (Durbin-Watson) and outliers (collinearity diagnosis) duly verified. For all cases, the significance level adopted was $\alpha=0.05$.

RESULTS

This study featured the participation of 57 students: 34 male (59.65%) and 23 female (40.25%), from the undergraduate program of Music from the Federal University of São João del-Rei (UFSJ). Table 1 shows central tendency values, as well as the confidence index (CI95%) of the parameters of chronological age (years), mass (kg) and body height (cm), Body Mass Index (kg/m^2), musical practice time and musical study time (daily hours).

Table 1. Sampling characterization (n=57)

	x(s)	95% CI	
		Lowest	Highest
Age (years)	28.980 (13.383)	25.904	32.782
Body Height (cm)	170.3 (9.9)	167.7	173.0
Body Mass (kg)	71.4 (17.5)	66.9	76.1
Body Mass Index (kg/m²)	24.44 (4.68)	23.23	25.73
Musical practice time (years)	13,16 (9.83)	10.80	16.16
Musical study time (daily hours)	3.25 (2.21)	2.68	3.86

x: average; s: standard deviation; CI: Confidence interval.

Source: prepared by the authors

In line with the study objective, Figure 1 features the sampling characteristic concerning PAL, in this case, showing greater prevalence [(χ^2 (4)=44,67; p<0,001] of active (21, 36.8%) and very active (26, 45.6%) people.

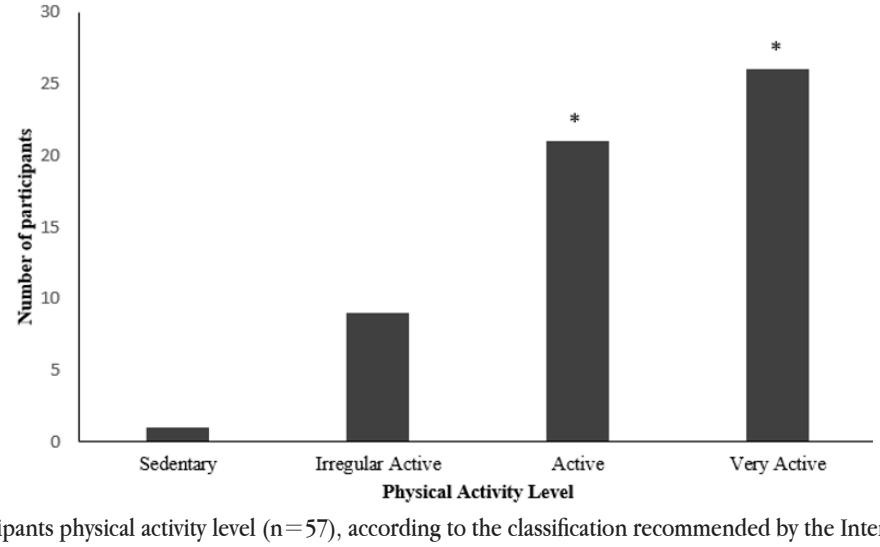

Figure 1. Participants physical activity level (n=57), according to the classification recommended by the International Physical Activity Questionnaire. * p<0,05

Source: prepared by the authors

In turn, Table 2, in line with the study objective, shows values of central tendency (CI 95%) of depression, anxiety, and stress scores, as well as the participants' physical activity practice (PA) in different intensities (daily hours) and sitting time (daily hours).

TABLE 2. Central tendency values and confidence index regarding symptom scores concerning psychological disorders for the participants' PA and sitting time (n=57)

	x(s)	95% CI	
		Lowest	Highest
Psychological disorders			
Depression	13.54 (10.50)	10.16	16.09
Anxiety	12.60 (11.33)	9.86	15.38
Stress	18.35 (12.34)	15.34	21.68
Total PA Time (weekly hours)			
Treading/Walking	33.4 (48.3)	21.4	47.1
Moderate	34.0 (37.9)	24.2	43.7
Vigorous	22.0 (33.4)	14.2	30.9
Sitting time (daily hours)	20.3 (19.9)	15.3	25.4

Legend: x: average; s: standard deviation; CI: Confidence Interval; PA: Physical Activity.
Source: prepared by the authors

Assessing the participants' physical profile, the low sampling number found in borderline classifications of the physical profile (low weight, level 2 obesity, level 3 obesity) did not allow the analysis of the chi-square adherence test. However, when grouping participants regarding the prevalence of overweightness or obesity (BMI > 25kg/m^2), a greater number [($\chi^2(1)=6,33$; $p=0,012$)] of participants with an adequate profile is found (Table 3).

The same table shows the prevalence of participants concerning psychological disorders. In this case, a greater prevalence of participants with no symptoms linked to depression is found ($\chi^2(2)=8,36$; $p=0,016$), as well as low prevalence of moderate stress ($\chi^2(2)=9,58$; $p=0,008$). Although no difference is found concerning the normal and moderate levels, a high number of participants present severe depression (16, 28%) and stress (25, 45.9%) scores.

TABLE 3. Sample categorization according to physical profile and psychological disorders (n=57)

	f_i (f_r)	p
Prevalence of overweightness or obesity		
< 25kg/m²	38 (66.7)*[a]	0.012
≥ 25kg/m²	19 (33.3)	
Psychological Disorders		
Depression		
Normal	29 (50.9)*	0.008
Moderate	12 (21.1)	
Severe	16 (28.0)	
Anxiety		
Normal	24 (40.1)	0.331
Moderate	15 (26.3)	
Severe	18 (31.6)	
Stress		
Normal	24 (40.1)	0.016
Moderate	8 (14.0)*	
Severe	25 (45.9)	

f_i: Absolute frequency, f_r: relative frequency; [a] data expressed in absolute and relative frequency; * significant difference concerning the other classifications. Source: self-elaboration

The application of chi-square test for independent samples found an association among anxiety [($\chi^2(4)=27{,}801$; $p<0{,}001$], stress [($\chi^2(4)=26{,}969$; $p<0{,}001$], and depression scores. Although, in the case of anxiety scores, the expected minimal number of counts was not reached (assumption to verify differences among the counts), an association was found between depression and stress scores concerning normal and severe classifications (Table 4).

Seeking greater strength in the findings concerning associations between independent variables (musical study time and physical activity level) and the dependent variable (depression scores), participants classified as sedentary, irregularly active (A) and irregularly active (B) were grouped, and, for the analysis of musical study time, they were subdivided considering the cutoff of three daily practice hours.

TABLE 4. Association of participants frequency, according to the classification of stress and depression levels:[17]

	Depression		
	Normal	Moderate	Severe
Stress			
Normal (n)	21	3	0
Adjusted residues	4.,7**	-1.4	-4.0
Moderate (n)	3	3	2
Adjusted residues	-0.8	1.2	-0.2
Severe (n)	5	6	14
Adjusted residues	-4.1**	0.5	4.1**

** $p<0{,}01$,

Source: prepared by the authors

In this sense, musical study time variables (β=-0.058; t=-0.428; p=0.670) and PAL (β=0,069; t=0,507; p=0,614) do not show an association with depression scores.

However, considering the sampling characteristic of this study, which shows a high prevalence of active and very active participants, a regression analysis was carried out so as to observe the relation between physical activity practice time in different intensities, as well as the participants' daily sitting time, and their depression scores. In this sense, the multiple regression analysis (enter method) indicated a positive association of daily sitting time in all models, and, curiously, of total weekly walking time in depression scores.

DISCUSSION

This study aimed to analyze the association between physical activity level (PAL) and the musical study time (MS), with the increase in scores concerning depressive disorder symptoms (DEP) in university students of the Undergraduate Program in Music at the Federal University of São João del-Rei (UFSJ).

Based on the assumptions to obtain the minimal sampling number described in the methodology, this study sought the participation of 63 undergraduate Music students. However, only 57 participants (90.48% of the minimum foreseen sampling) accepted to answer the questionnaires, which prevented the due reach of the results in population level. One of the greatest challenges in epidemiological studies is the researchers' success in obtaining the necessary number of participants to enable the study to concisely demonstrate the real situation of a given population group.[17] In this case, the lack of regularity of the students in attending lessons in the classroom, added to the attendance requirements in various places at university or even outside the campus, constituted restricting elements impacting the recruiting of participants. Furthermore, the low population number (98 undergraduate students) corroborated the need for a high sampling percentage (64.29%), seeking a greater foreseeability of the findings in population level. Thus, the obtained data and findings cannot be sent to the target population, making new interventions necessary, with differing practices, so as to succeed in reaching the sampling number.

Concerning the analyzed age and physical profile, the results feature a sampling group aged from 26 to 32, with Body Mass Index between 23.32 kg/m^2 and 25.73 kg/m^2; concerning their professional practices and history, a high professional time is found, between 10.8 and 16.16 years, with MS from 2.68 to 3.86 daily hours.

A divergence is found facing national data concerning the predominant age in undergraduate programs in Brazil (18-24 years of age).[18] An explanation for this divergence may be related to the specificity of the Undergraduate Program in Music, considering that, when analyzing the participants profession time, such students only enter the program after a considerable professional practice time.

Although the average body profile in this study – calculated by means of Body Mass Index – points toward a greater prevalence of participants with the ideal profile (18-25 kg/m^2), 33.3% of the sampling group is found to be either overweight or obese. The attention to the physical profile of the population has been motivated in all segments of society, considering the strong association of this eating disorder with non-communicable cardiometabolic diseases.[3] Furthermore, such disorders have been positively associated to the prevalence of psychological disorders; the impact of the contribution of this factor is the topic of various studies.[6, 19] Even considering that the ideal profile results featured are 17% lower than the estimation of the body profile of Brazilians,[5] such prevalence is high, reinforcing the need for

interventions, preferably of public organs, so as to raise awareness in the population, to improve this eating disorder situation.

MS constitutes a factor of great importance in musicians' professional lives. Auer (1921) and Päivi Arjas (2014) suggest such practice should not exceed 30 or 40 consecutive minutes, added 10 to 15 minute pauses and relaxation before resuming work. Thus, one anticipates that, for a musician to be able to dedicate 4-6 hours of daily studies, an available period of approximately 6 to 7 daily hours is needed.[20] In the same referential, studies by Perlman (2015) corroborate such a proposal, being, in this case, the maximum daily time 5 hours, highlighting the metaphor of the sponge, which, once submerged, will no longer bring any advantage, as it has absorbed all it can.

Verifying the average scores collected concerning symptoms related to stress, anxiety, and depressive psychological disorders, the results found range from 12.6 to 18.35, with a high variability, with coefficients of variation from 70% to 90%. Such heterogeneity was expected, as it is an observational, transversal study of the target group. Hence, to discuss this more deeply, the analysis group was categorized, observing greater prevalence of participants with no symptoms connected to depression, in addition to low prevalence of moderate stress symptoms ($p<0.05$). Nevertheless, 21.1% to 28% of the sample in the study presented moderate and severe symptoms of depressive disorders, respectively; 45.9% declared themselves to have severe stress symptoms, and over 50% of the sample stated they had moderate or severe symptoms related to anxiety.

Recent Brazilian studies have pointed to a prevalence of diagnosis of depression among undergraduate students in Brazil, varying from 9.9% to 12%.[21, 22] In this case, the difference between the numbers found may be related to the undergraduate program in question, as recent studies on music students in Brazil have shown prevalence of anxiety and depression between 40% and 20%.[12, 22] In this sense, the need for proposals of multidisciplinary intervention arises, so as to attenuate this scenario. Such an initiative is ratified with the advent of countless proposals in various studies based on health promotion in various levels of society.[5, 6]

The relation between stress and depression is complex and multifaceted. Chronic stress is noted as possibly a factor for biochemical brain changes, affecting the regulation of mood, associated with depression. Furthermore, individuals exposed to high levels of stress may adopt inefficient coping strategies, such as social isolation, or the use of substances, which can increase the risk of developing depressive disorders.[23]

There is a consensus in the world literature that an active lifestyle and systematized practice of physical activities (PA) contribute significantly to better quality of life. Such benefits have been demonstrated, not only in the prevention and treatment of non-communicable cardiometabolic diseases,[4] but also in clinical essays on patients with psychological disorders.[8, 9]

Analyzing PAL, by means of the International Physical Activity Questionnaire (IPAQ), this research seeks to obtain data regarding various types of physical activity performance in different locations (workplace, commuting, household chores, and free time), as well as data concerning its frequency and intensity.

Using this methodology, some studies have shown a high prevalence of active people in Brazil, considering all types of PA proposed in IPAQ.[25, 26] In this case, this study corroborates such results, as over 82% of the assessed sample was categorized as either active or very active.

However, the same studies referenced here point to a tendency of accentuated decrease concerning the time of PA performance in their free time, as 26.4% ($CI_{95\%}$ 25.9-27.1), 14.0% ($CI_{95\%}$ 13.5-14.4) and 59.5% ($CI_{95\%}$ 58.8-60.2) Brazilians are categorized as active, insufficiently active, or inactive, respectively, considering PA practice.[27]

This decrease was also shown in the study, as 47.4% of the 82.4% of active or very active people featured a time higher than 150 weekly minutes of light or moderate PA, or 75 weekly minutes of vigorous activities (data not shown). Brazilian studies have ratified the association between free time and prevalence of non-communicable cardiometabolic diseases[28, 29] and smaller prevalence of depression and anxiety.[8, 9] Thus, there is need for deepening on what type of PA is practiced and its relation with the improvement of the quality of life. Considering this study, the difference presented may be related to the specificity of this type of student. The undergraduate program in Music is located on UFSJ's Tancredo Neves Campus, which is located rather far from most residential areas of the city: 3 to 7 km of most neighborhoods. Furthermore, this city — São João del-Rei, in the state of Minas Gerais, southeastern Brazil —, despite being located in a very mountainous state, is mostly a rather plain valley, which makes it easier for people to move around using bicycles, or even walking.

Considering the broad subdivision concerning the PAL classification proposed by IPAQ, and seeking better standardization regarding musical practice time, so as to assess the association of these factors with depressive disorders, such variables were subdivided considering the (in)activity and the cutoff MS adopted of three daily hours. Regarding PAL, such categorization matches proposals previously referenced in the literature,[4, 5] and, concerning MS, an average time of three to four daily hours for Music students had been suggested in Cruz's[30] study. Nevertheless, differently from the suggested hypothesis, this study did not find an association between such variables to higher depression scores.

Unfortunately, no studies were found to associate such parameters for musicians. The results of non-association of PAL and depressive disorders described in this study may be related to the significant prevalence of active individuals, in addition to the low absolute sampling number of non-active individuals, keeping statistical analysis from being more robust. Yet, three hours of daily musical practice do not seem to be associated with possible prevalence of depressive disorders. In this case, a high sampling number resulting in the possibility of more robust analyses using longer practice hours should be performed in future researches.

In addition to the initial proposal of the study, and considering the high number of active participants found, there is the suggestion to analyze if different intensities of physical activity and if daily sitting time could be associated with depressive disorders. In this case, the data showed that daily sitting time was associated with depression symptoms, regardless of the intensity of physical activities the participants performed.

In this sense, Maia & Dias[5] observed the existence of an increase in sitting time of their sample after the beginning of the COVID-19 pandemic, and a positive association between this datum with the stress level. In this case, the authors noted the need for monitoring the total time this professional is found in sitting position. Yet, studies with professionals specialized in other types of tools to verify such a tendency should be encouraged.

PA and/or PE, in addition to being an acknowledged recommendation for the prevention of depressive symptoms and to improve the quality of life, is currently an important therapeutic strategy for treating depression. It can be indicated as monotherapy in mild cases, or as a complementing intervention to drug therapy, psychotherapy, and more severe or normal biological ones.[7, 24]

Another important finding concerns the lack of association between moderate and vigorous PA with depressive symptoms. In addition, curiously, the increase of walking time was positively associated with depression symptoms. More than once, the need for greater

detailing of the performed PA is perceived, as PA performed as a means of commuting or in daily chores may not be related to an improvement in the quality of life of the population.

Thus, within the context presented here, although PA is a practice of positive relevance in the quality of life, the mere fact of a homeostatic break coming from this habit may not necessarily represent an improvement in the quality of life. The results found point to a need for discussions and suggestions regarding further detailing on PA performance in people's free time, especially as suggested forms of measuring to make it possible to detail the type, method, frequency, and duration of such activities.

CONCLUSION

Based on the findings, this research concludes that PAL and daily musical practice hours were not factors to explain the increase of scores of symptoms related to depressive disorders. Nevertheless, the practice of physical activities aiming to commute to work or to do household chores, added to the excessive daily sitting time, seems to be associated positively to such scores among undergraduate Music students.

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