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**Impact of musculoskeletal impairments on  
symptoms and health-related quality of life of  
considered healthy people**

**Impacto das deficiências musculoesqueléticas  
nos sintomas e na qualidade de vida em pessoas  
consideradas saudáveis**



Universidade de Aveiro  
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Dissertação apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Fisioterapia- ramo musculoesquelética, realizada sob a orientação científica da Doutora Alda Marques, Professora Coordenadora na Escola Superior de Saúde da Universidade de Aveiro e co-orientação da Doutora Sara Almeida, Epidemiologista Associada do IQVIA.



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**Palavras chave**

Musculoesqueléticas, Deficiências, Qualidade de Vida, Ansiedade, Depressão

**Resumo**

As alterações musculoesqueléticas estão entre as principais causas de deficiências físicas e também podem levar a uma diminuição significativa na qualidade de vida relacionada à saúde. Pessoas com alterações musculoesqueléticas também estão mais propensas a sofrer com outros problemas de saúde mental ou física, que podem resultar em dor crônica. Este estudo tem como objetivo explorar diferenças na qualidade de vida relacionada à saúde e sintomas depressivos e de ansiedade em pessoas consideradas saudáveis, com e sem deficiências musculoesqueléticas. Foi realizado um estudo transversal, após aprovação de um Comitê de Ética. As características sociodemográficas foram obtidas através de entrevista com o paciente. Os dados antropométricos foram obtidos com a medição de peso, altura e IMC. As variáveis clínicas, como medicação e comorbidades foram obtidas através de um questionário estruturado para caracterização da amostra. De seguida, foram aplicados os instrumentos: A versão em português do The World Health Organization Quality of Life (WHOQOL-BREF) e a escala hospitalar de ansiedade e depressão (HADS). A maioria dos participantes tinha entre 40 e 74 anos, mais homens do que mulheres, ensino primário ou secundário completo, eram casados e com excesso de peso. As patologias mais frequentes foram hipertensão arterial, dislipidemia e osteoartrite. Encontrou-se uma associação entre características sociodemográficas, antropométricas e clínicas com a presença ou ausência de deficiências musculoesqueléticas. Participantes com alterações musculoesqueléticas apresentam significativamente menos qualidade de vida nos domínios de saúde física e psicológica e mais sintomas de ansiedade e depressão do que aqueles sem as alterações.

O presente estudo enriquece a literatura sobre a ligação entre saúde mental e qualidade de vida e a presença de uma deficiência física crônica específica, como as musculoesqueléticas. Embora a esperança de vida tenha aumentado, muitas pessoas vivem agora mais tempo em condições de saúde mais precárias. Como as condições musculoesqueléticas podem afetar as pessoas ao longo da vida, a prevenção, a detecção precoce e o tratamento são essenciais para permitir que as pessoas possam viver com boa saúde, permaneçam independentes e em ligação as suas comunidades. Existem também vantagens económicas para a sociedade, como a redução da pressão sobre os serviços de saúde e assistência social e a redução dos custos devido à incapacidade para o trabalho.

**Keywords**

Musculoskeletal, Impairments, Quality of life, Anxiety, Depression

**Abstract**

Musculoskeletal (MSK) disorders are among the main causes of physical impairment and may also lead to a significant decrease in health-related quality of life (HRQoL). People with MSK disorders are also more likely to suffer with other mental or physical health difficulties that might result in chronic pain. This study aims to explore differences in health-related QoL, and depressive and anxiety symptoms, in considered healthy people with and without musculoskeletal impairments.

Was conducted a cross-sectional study, after approval from an Ethics committee. Sociodemographic characteristics were obtained through patient interview. Anthropometrics were obtained through the following measurements: weight, height and BMI. Clinical variables such as medication and co-morbidities were recorded using a structured questionnaire to characterise the sample. Then, the instruments The Portuguese version of The World Health Organization Quality of Life (WHOQOL-BREF), and the hospital anxiety and depression scale (HADS), were applied.

Most of the participants were between 40 and 74 years old, more male than female, had the primary or secondary education level completed, was married, and overweight. The most frequent pathologies were arterial hypertension, dyslipidemia and osteoarthritis. An association between sociodemographic, anthropometric and clinical characteristics and the presence or absence of MSK impairments was found.

Participants with MSK impairments present significant lower QoL in the physical health and psychological domains, and more symptoms of anxiety and depression than those without MSK impairments.

The present research enriches the literature on the link between mental health and QoL and the presence of a particular physical chronic disorder, such as MSK impairments. While life expectancy has risen, many people are now living longer in poorer health conditions. Since MSK conditions can affect people across the life course, prevention, early detection, and treatment is essential to enable people to live in good health, remain independent and connected in their communities. There are also economic advantages for society, such as reducing the pressure on health and social care services and reducing costs because of people being unable to work.

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## **Abbreviations**

BMI – Body Mass Index

COPD – Chronic obstructive pulmonary disease

HADS – The hospital anxiety and depression scale

HRQOL – Health-related Quality of life

MSK – Musculoskeletal

NSAIDs – Non-steroid anti inflammatory

OA – Osteoarthritis

QoL – Quality of life

PHE – Public Health England

RA – Rheumatoid Arthritis

THR – Total Hip replacement

TKR – Total Knee replacement

WHO – World Health Organisation

WHOQOL BREF – The World Health Organization Quality of Life

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## 1. Introduction

Musculoskeletal (MSK) conditions are the leading contributor to disability worldwide (Cieza et al., 2020). While the prevalence of many of these disorders increases markedly with age, and many are affected by lifestyle factors, such as obesity and lack of physical activity, younger people are also affected, often during their peak income-earning years (Cieza et al., 2020). According to the National Health Interview Survey (NHIS) conducted between 2013 and 2015 and commissioned by US health agencies, one out of two American adults suffer with an MSK disorder (AAOS, 2017). Chronic lower back pain, which is one of the most commonly treated conditions by physiotherapists, has been reported as the most common and the main contributor to the overall burden of MSK conditions, therefore the main reason for a premature exit from the workforce. But other MSK disorders such as neck pain, osteoarthritis (OA), and rheumatoid arthritis (RA) have also been found highly prevalent (Murray et al., 2012).

MSK disorders may lead to a significant decrease in quality of life (QoL) due to social withdrawal, reduction in community involvement, inability to work and overall deficits in well-being (Song et al., 2006). Quality of life (QoL) is defined by the World Health Organization Quality of Life (WHOQOL) Group as individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. QoL is, therefore, an important indicator of the burden of musculoskeletal (MSK) disease (Scott, 2000).

Moreover, people with MSK disorders are also more likely to suffer with other mental and physical health difficulties that might result in chronic pain (WHO, 2011). Some MSK disorders can be life-threatening and fatal if left untreated or they are poorly managed (Al Maini et al., 2015; Dadoun et al., 2013; Nüesch et al., 2011). In fact, an association between painful MSK disorders and reduced physical engagement (Klinedinst et al., 2015) which leads to loss of independence and well-being, frailty, functional decline, and symptoms of depression has been demonstrated (Access Economics, 2007b).

MSK health, which includes dexterity and mobility, is essential for sustaining active, productive, and prolonged working abilities (Driscoll, 2011). As global retirement age continues to increase (Access Economics, 2007a), MSK health becomes more important for older working adults (Schofield et al., 2012). Therefore, the early identification of MSK impairments and delivery of effective interventions, including physiotherapy treatment, remains central to both the maintenance of a productive

workforce and the sustained QoL of the individual worker (Driscoll et al., 2014). Therefore, developing more integrated forms of care should be prioritised (Imison et al 2011). Physiotherapists, working in close proximity to community could have an essential role in promoting specific interventions that will encourage individuals to make healthy behaviour changes and healthier lifestyle choices, such as promoting physical activity and aim to do activities to develop or maintain muscle strength (Landi,2014).

The link between MSK disorders and impaired QoL is well established (Antonopoulou et al., 2009; Garnaes et al., 2021; Roux et al., 2005; Schlenk et al., 1997), as QoL among elderly people diagnosed with such disorders was found to be lower compared with the ones without disorders (Bernfort et al., 2015). However, most of this research has focussed on populations where MSK disorders are comorbid with other diseases such as diabetes and cardiovascular disease (Fortin et al., 2004; Gutefeldt et al., 2020; Loza et al., 2009; Makovski et al., 2019) when in fact health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (Callahan D., 1973). Therefore, it is possible to have people with MSK disorders being considered healthy. For those considered healthy, there is a very limited body of research that focuses specifically on the deleterious effects of MSK disorders on the QoL (Cuervo et al., 2020). With the global age expectancy rising and the rapid population ageing, it is vital that people live longer with a good state of health, it seems then of vital importance to implement preventive and early intervention programs to address this problem, where physiotherapy can play an important role by working in close proximity to the community.

Therefore, the present study aimed to explore differences in health-related QoL, and depressive and anxiety symptoms, in considered healthy people with and without musculoskeletal impairments.

## **2. Methods**

### **2.1. Ethics and study design**

A cross-sectional study was conducted. The approval from an Ethics Committee was first obtained (P517-08/2018 AD 6/4/2021). All participants provided written informed consent prior to their participation in the study. This study is reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (STROBE; Elm et al., 2014).

### **2.2. Participants**

Participants were recruited from Portuguese community institutions, day care centres, senior universities and sports centres. A member of staff who was appointed at each recruitment site identified potential eligible participants and provided a brief explanation about the study. Only interested individuals were contacted by the researchers.

Participants were included if they were 40 years old or older, showed a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (Callahan D., 1973), could follow instructions and accepted to participate voluntarily in the study. Exclusion criteria for the study were the presence of an acute disease in the previous month, a significant cardiorespiratory disorder (e.g., chronic obstructive pulmonary disease (COPD), asthma, heart failure, myocardial infarction), musculoskeletal disorders (e.g., rheumatoid arthritis, scoliosis, severe osteoarthritis or amputation), and/or neurological disorders (e.g., stroke), history of neoplastic or immunological diseases and signs of substances abuse (e.g., alcohol, drugs) that could interfere with or limit participation in the study or data collection.

After confirming the eligibility of participation, any doubts were clarified by the research member and the written informed consent was obtained from each participant.

## 2.3. Data collection

Sociodemographic characteristics were obtained through patient interview and included age, sex, marital status, education and work status. Anthropometrics were obtained through the following measurements: weight with scale GIMA, max. 160kg, and height using a measuring tape fixed on the wall, to then compute  $BMI = \text{weight (in kg)} / \text{height}^2 \text{ (in m}^2\text{)}$ . Clinical variables such as medication and co-morbidities were recorded using a structured questionnaire to characterise the sample.

Then, the instruments The Portuguese version of The World Health Organization Quality of Life (WHOQOL-BREF), (WHO, 1996) and the hospital anxiety and depression scale (HADS), (Zigmond & Snaith, 1983), were applied.

### 2.3.1. *WHOQOL-BREF*

The WHOQOL-BREF was used to measure QoL (WHO, 1996). The WHOQOL-BREF, which was published in 1995, is a shorter version of the WHOQOL-100 and both instruments have been developed by the World Health Organisation (WHO, 1997) to measure the QoL of individuals and populations.

The WHOQOL-BREF consists of 26 items to assess perception of QoL in four domains:

1. Physical health (7 items; includes items on mobility, daily activities, functional capacity, energy, pain, and sleep);
2. Psychological health (6 items; includes items that assess self-image, negative thoughts, positive attitudes, self-esteem, mentality, learning ability, memory concentration, religion, and the mental status);
3. Social relationships (3 items; contains questions on personal relationships, social support, and sex life);
4. Environmental health (8 items; covers issues related to financial resources, safety, health, and social services, living physical environment, opportunities to acquire new skills and knowledge, recreation, general environment [e.g., noise, air pollution], and transportation).

It also contains two items on overall QoL and general health.

Responses are given on a 1-5 Likert scale (1 – "disagree" or "not at all"; 5 – "completely agree" or "extremely") and scores are then transformed linearly to a 0–100-scale (Skevington & Tucker, 1999).

The WHOQOL group has rigorously tested and validated WHOQOL-100 and WHOQOL-BREF's psychometric properties (WHO, 1997) and both have been tested in multiple languages, cultural groups, and disease populations. The psychometric properties of the WHOQOL-BREF in terms of item–response distributions, internal consistency reliability, discriminant validity and construct validity have been tested, and results indicate that the WHOQOL-BREF has good to excellent psychometric properties of reliability and performs well in preliminary tests of validity. (Skevington et al.,).

In a study conducted for the adult population, the Internal consistency reliability, for the total sample, values for Cronbach's alpha were acceptable ( $>0.7$ ) for Domains 1, 2 and 4 i.e. physical health 0.82, psychological 0.81, environment 0.80, but marginal for social relationships 0.68. Discriminant validity was found significant ( $p < 0.0001$ ), and was best demonstrated in the physical domain, followed by the psychological, social and environment domains. Regarding the Construct validity, Pearson correlations (one-tailed test) between domains for the total sample were strong, positive and highly significant ( $p < 0.0001$ ), ranging from 0.46 (physical vs. social) to 0.67 (physical vs. psychological). Therefore, the study concluded that The WHOQOL-BREF has shown good psychometric properties (Skevington et al.,).

The psychometric properties of the WHOQOL-BREF have also been tested for the European Portuguese population. The reliability of the instrument was carried out through the analysis of the internal consistency of the WHOQOL-BREF. Cronbach alpha values showed that the instrument presents good indices of internal consistency when considering the set of domains, 0.79, and the 26 items that make up the instrument, 0.92. When analyzed individually, the domains presented quite acceptable Cronbach's alphas, with values ranging between 0.78 for the Domain 4 (Environment) to 0.87 for the Domain 1 (Physical). The Domain 3 (Social Relations) was the one with the lowest value 0.64. (Vaz Serra et al., 2006)

Regarding the test-retest reliability, Pearson's correlations between the values obtained in each domain, in two applications of the instrument, indicate that the WHOQOL-BREF has good temporal stability, with the values of correlation coefficients ranging between 0.65 and 0.85. Correlations between the WHOQOL-100 domains and the WHOQOL-BREF turned out to be all statistically significant, ranging between 0.77 for the Social



Domain and 0.86 for the Psychologic Domain. The discriminative power ( $p < 0.0001$ ) was also evaluated, that is, its ability to differentiate sick individuals ( $n=289$ ) of those belonging to the normal population ( $n=315$ ). Concluding that “the results show that the WHOQOL-BREF has good values of internal consistency, validity discriminant, constructor validity and test-retest stability, making it a good instrument to assess quality of life in Portugal” (Vaz Serra et al., 2006).

### **2.3.2. HADS Scale**

The HADS is a frequently used self-rating scale developed to assess psychological distress in non-psychiatric patients (Zigmond & Snaith, 1983). The HADS aims to measure symptoms of anxiety and depression and consists of 14 items, 7 items for the anxiety subscale (HADS-A) and seven for the depression subscale HADS-D; (Zigmond & Snaith, 1983). The HADS-A subscale focuses mainly on symptoms of generalized anxiety disorder and the HADS-D focuses on anhedonia, the main symptom of depression (Snaith, 2003). Each item is scored on a response-scale with four alternatives ranging between 0 and 3. Scores, therefore, may range from 0 (no symptom load) to 21 (maximum symptom load) of each subscale. The HADS manual indicates that an assessment between 0 and 7 is considered “normal”, between 8 and 10 “mild”, between 14 “moderate” and between 15 and 21 “severe” (Pais-Ribeiro et al., 2007). Overall, the HADS scale has demonstrated satisfactory psychometric properties in different groups, such as primary care patients and in general populations (Bjelland et al., 2002; Iani et al., 2014). A review of more than 200 studies on HADS reliability and validity, concluded that the HADS is a reliable and valid instrument for assessing anxiety and depression in medical patients (Herrmann, 1997). The results showed satisfactory or good item-total correlations within the two subscales. The internal consistency of the English version was found acceptable, with the Cronbach alphas of 0.80 for anxiety and 0.81 for depression subscale. Retest reliability showed a high correlation,  $r > 0.80$ , after 2 weeks. Regarding the factorial validity, the factors remain stable across subgroups, correlate highly with the correspondent subscales ( $r > 0.90$ ), and explain about 50% of variance (Herrmann, 1997). Regarding the Portuguese version of the HADS, good values were also observed for its internal consistency, where the Cronbach's alpha for the anxiety subscale was 0.76 and 0.81 for the depression subscale (Pais-Ribeiro et al., 2007). In order to inspect test – retest

correlations, when comparing two patient groups with different time intervals, the results showed a Pearson correlation of 0.75 for anxiety and 0.75 for depression with 1-week interval for one group. And the other group with a 3-month interval, have demonstrated a correlation of 0.46 for anxiety and 0.43 for depression. Suggesting that the scales measure a state as it is expected. Regarding the factorial validity, the study found a two-factor solution, the first is the depression factor and the second is the anxiety factor, explaining 46.56% of total variance, values similar to those reported by Herrmann (1997). The findings from this study confirm that the Portuguese version of HADS showed psychometric properties similar to the general studies in other languages, and is a reliable and valid instrument for assessing anxiety and depression in medical settings (Pais-Ribeiro et al., 2007).

#### **2.4. Data processing and analysis**

Data analysis was processed and analysed using the SPSS-24.0 (Statistical Package for the Social Sciences) software.

Data were checked for normality using the Kolmogorov-Smirnov test, and given that the  $p$ -value was  $p < 0.05$  for the variables under study, we assumed that the sample did not follow a normal distribution.

Descriptive statistics were used to describe the sociodemographic variables, anthropometric and clinical characteristics, the WHOQOL-BREF and the HADS-A/HADS-D scores. To explore associations between quality of life and symptoms of anxiety and depression in participants with and without MSK impairments, it was used the Mann-Whitney U tests for non-normally distributed and ordinal data, the Chi-square tests for categorical data, and the Pearson correlation coefficient for continuous data. To explore differences between participants with and without MSK impairments, it was used the independent t-tests and the One-way analysis of variance for normally distributed data.

Cut-offs were applied for data interpretation. This facilitated the discussion of results. Frequencies were presented together with the 95% confidence intervals.

For age, data was split in those under 65 or equal or above 65 years old. This age cut-off was used according to The WHO guidelines, that considers elderly if the person is aged 65 years or older.

BMI was also categorized according to the classifications in use by the National Institute of Health (NIH) into:

- Underweight - BMI under 18.5 kg/m<sup>2</sup>;
- Normal weight - BMI greater than or equal to 18.5 to 24.9 kg/m<sup>2</sup>;
- Overweight – BMI greater than or equal to 25 to 29.9 kg/m<sup>2</sup>;
- Obesity – BMI greater than or equal to 30 kg/m<sup>2</sup>.

The cut-off < 60 in the WHOQOL-BREF was also used since this value obtained excellent sensitivity and a predictive value for tracking older adults with probable worse QoL and health dissatisfaction (Silva et al., 2019; Silva et al., 2014).

The cut-off  $\geq 8$  in the HADS-A or in the HADS-D was used to indicate probable presence of anxiety or depression symptoms since this value presented an optimal balance between sensitivity and specificity for both symptoms (Bjelland et al., 2002). The severity of symptoms of anxiety and depression was categorised as ‘mild’ (HADS-A/HADS-D  $\geq 8$  and  $\leq 10$ ), ‘moderate’ (HADS-A/HADS-D  $\geq 11$  and  $\leq 14$ ) or ‘severe’ (HADS-A/HADS-D  $\geq 15$  and  $\leq 21$ ) (Pais-Ribeiro et al., 2007).

### 3. Results

A total of 669 people were identified for eligibility. Based on the exclusion criteria, 206 participants were discarded due to acute disease, decided to drop out of the study or did not fill out the questionnaire. Therefore, a total sample of 493 participants was included (Figure 1).

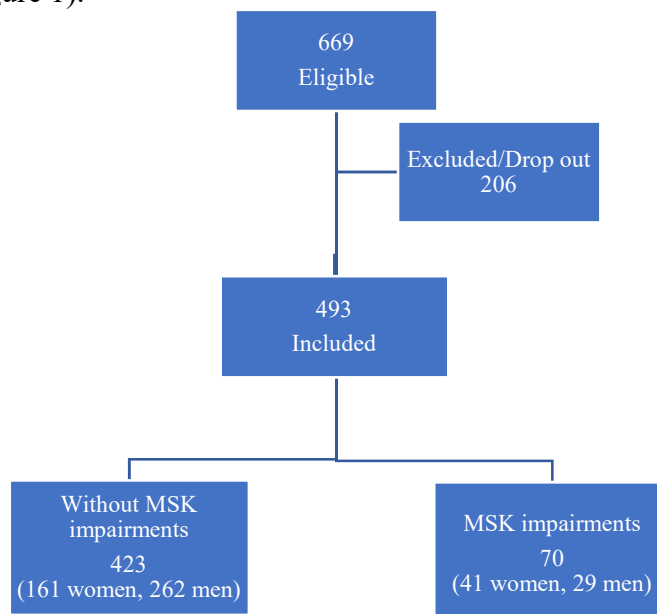


Figure 1: Flowchart of participants inclusion (n=493) with (n=70) and without (n=423) musculoskeletal impairments.

Abbreviation: MSK – Musculoskeletal

### 3.1. Descriptive analyses

Our results showed that most of our sample was between 40 and 74 years old (n=348; 70.6%), was male (n=291; 59%), had the primary or secondary education level completed (n=375; 76%), was married (n=323; 65.5%), and overweight (n=351; 71.2%). They presented mostly arterial hypertension and dyslipidemia (n=427; 86.8%), used medication for these comorbidities (n=358; 83.9%), and never smoked (n=377; 76.6%; Table 1).

An association between sociodemographic, anthropometric and clinical characteristics and the presence or absence of MSK impairments was found (Table 1). Additionally, those with MSK impairments were significantly older and had more females, than those without MSK impairments. For both with and without MSK impairments, it was more frequent for participants to have primary education level, to be married, overweight, to have arterial hypertension and dyslipidemia and to take the respective medication (<0.010). No association was found for smoking status (>0.050).

Table 1: Sociodemographic, anthropometric and clinical characteristics of the total sample (n=493) and association between those with (n=70) and without (n=423) musculoskeletal impairments.

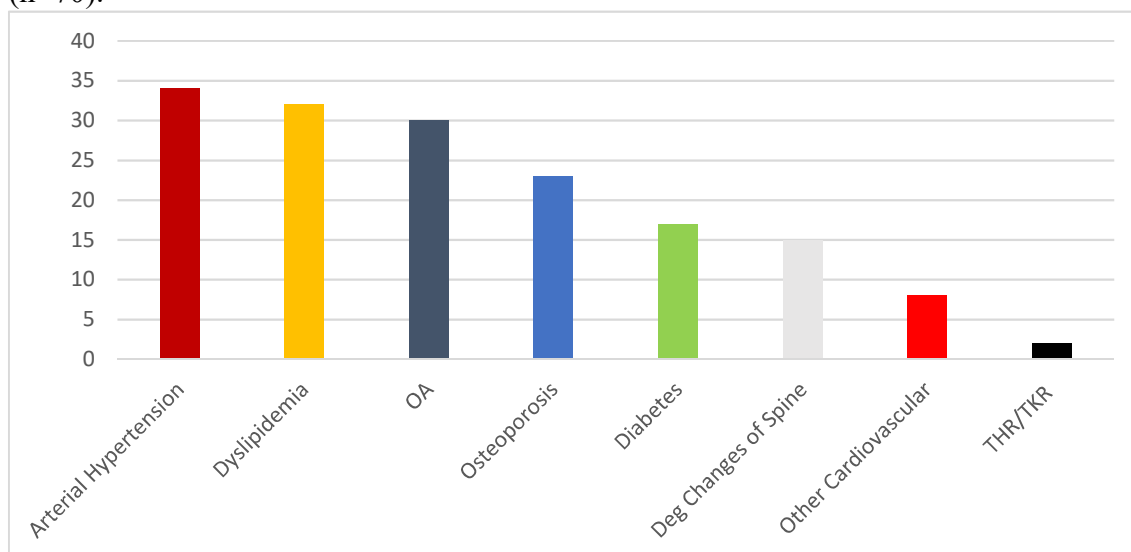
	Total (n=493)	MSK impairments		<i>p</i>
		Yes (n=70)	No (n=423)	
Age, years, Mean (SD)	69.2±10.2	72.3±8.7	68.7±10.3	<b>0.004</b>
Age range, n (%)				
40-64	161(32.7)	15(21.4)	146(34.5)	
65-74	187(37.9)	31(44.3)	156(36.9)	
75-84	107(21.7)	16(22.9)	91(21.5)	
85 or +	38(7.7)	8(11.4)	30(7.1)	
Sex, n (%)				<b>&lt;0.001</b>
Female	202(41.0)	41(58.6)	161(38.1)	
Male	291(59.0)	29(41.4)	262(61.9)	
Education level, n (%)				<b>&lt;0.001</b>
Without formal education	25(5.1)	6(8.6)	19(4.5)	
Primary	259(52.5)	49(70.0)	210(49.6)	
Secondary	116(23.5)	12(17.1)	104(24.6)	
High school	56(11.4)	3(4.3)	53(12.5)	
University	37(7.5)	0(0.0)	37(8.7)	
Marital status, n (%)				<b>&lt;0.001</b>
Single	25(5.1)	4(5.7)	21(5.0)	
Married	323(65.5)	44(62.9)	279(66.0)	
Separated	5(1.0)	0(0.0)	5(1.2)	
Divorced	26(5.3)	2(2.9)	24(5.7)	
Widowed	110(22.3)	20(28.6)	90(21.3)	

Common-law marriage	4(0.8)	0(0.0)	4(0.9)	
BMI, n (%), Mean (SD)	27.5±4.3	28.1±5.2	27.3±4.1	<b>&lt;0.001</b>
Underweight	2(0.4)	0(0.0)	2(0.5)	
Normal weight	140(28.4)	18(25.7)	122(28.8)	
Above normal	232(47.1)	27(38.6)	205(48.5)	
Obese	119(24.1)	25(35.7)	94(22.2)	
Comorbidities, n (%)	380(77.2)	70(14.2)	310(63.0)	<b>&lt;0.001</b>
Diabetes	88(17.9)	17(3.5)	71(14.4)	
Dyslipidaemia	195(39.6)	32(6.5)	163(33.1)	
Arterial hypertension	232(47.2)	34(6.9)	198(40.2)	
Other cardiovascular	40(8.1)	8(1.6)	32(6.5)	
Anxiety	5(1.0)	2(0.4)	3(0.6)	
Depression	10(2.0)	4(0.8)	6(1.2)	
Medication, n (%)	319(74.7)	53(14.3)	267(85.7)	<b>&lt;0.001</b>
Analgesics stupefacient	5(1.2)	1(1.6)	4(1.1)	
NSAIDs	6(1.4)	2(0.5)	4(1.1)	
Medication for gout	15(3.5)	5(1.2)	10(2.3)	
Medication for arthrosis	13(3.0)	11(2.6)	2(0.5)	
Anxiolytics, sedatives, hypnotics	61(14.3)	18(4.2)	43(10.1)	
Antidepressants	40(9.3)	10(2.3)	30(7.0)	
Anti-hypertension	207(48.5)	33(7.7)	174(40.7)	
Anticoagulants	33(7.7)	6(1.4)	27(6.3)	
Anti-dyslipidaemia/statins	151(35.4)	32(7.5)	119(27.9)	
Oral antidiabetic medication	35(8.2)	9(14.8)	26(7.1)	
Smoking status, n (%)				0.260
Never	377(76.6)	60(12.2)	317(64.4)	
Current smoker	20(4.1)	2(2.9)	18(3.7)	
Former smoker	95(19.3)	8(1.6)	87(17.7)	

Abbreviation: MSK – Musculoskeletal; NSAIDs – Non-steroid anti inflammatory  
Age ( $p$ =Mann-Whitney Test); ( $p$ =Chi-Square Independent Test)

The frequency of comorbidities was also analysed in participants with MSK impairments (Figure 2). Top-three most frequent pathologies were arterial hypertension (n=34; 6.9%), dyslipidemia (n=32; 6.5%) and osteoarthritis (n=30; 6.1%).

Figure 2: Frequency of comorbidities in participants with musculoskeletal impairments (n=70).



Abbreviations: OA – Osteoarthritis; THR – Total Hip replacement; TKR – Total Knee replacement

### **3.2. Quality of life and anxiety and depression symptoms in people with and without musculoskeletal impairments**

Results show that participants with MSK impairments showed lower QoL for the physical health ( $p<0.001$ ) and psychological domains ( $p=0.007$ ) than participants without MSK impairments. Most participants with MSK impairments scored below the cut-off point of QoL, in particular for psychological and social domains (21.8%; 19.9%), in contrast with the majority of participants without MSK impairments, who scored above the cut-off point (88.6%; 88.2%). Thus, those without MSK impairments reported feeling better QoL. Detailed analyses can be found in Table 2.

Statistically significant differences were also found for anxiety ( $p=0.028$ ) and depression ( $p=0.015$ ) symptoms, with participants with MKS impairments presenting more symptoms of anxiety and depression than those without MSK impairments. Furthermore, when analysing the HADS scale according to the cut-offs, only depression symptoms showed significant differences according to presence or absence of MSK impairments. This means that most participants with MSK impairments scored above the cut-off point (20.2%), as opposed to people without MSK impairments (88%), showing that the latter had less symptoms of depression in comparison to those with MSK impairments (Table 2).

Table 2: Quality of life and symptoms of anxiety and depression in people with (n=70) and without (n=423) musculoskeletal impairments.

	Total (n=493)	MSK impairments				<i>p</i>	<i>Cut-off</i>	Total (n=493)			<i>p</i>	MSK impairments				<i>p</i>
	M±SD	n	M±SD	n	M±SD			n	%	%		n	%	n	%	
WHOQOL-BREF, n=493																
Physical health domain	59.6 (12.4)	70	54.8 (12.0)	423	59.6 (11.2)	<b>&lt;0.001</b>	<60	279	56.6	<b>0.003</b>	47	16.8	232	83.2	0.073	
							≥60	214	43.4		23	10.7	191	89.3		
Psychological domain	68.6 (12.8)	70	63.8 (13.3)	423	68.0 (10.8)	<b>0.007</b>	<60	133	27.0	<b>0.000</b>	29	21.8	104	78.2	<b>0.005</b>	
							≥60	360	73.0		41	11.4	319	88.6		
Social domain	70.3 (15.4)	70	66.4 (21.3)	423	70.2 (14.8)	0.210	<60	146	29.6	<b>0.000</b>	29	19.9	117	80.1	<b>0.028</b>	
							≥60	347	70.4		41	11.8	306	88.2		
Environment domain	74.0 (12.7)	70	69.4 (14.1)	423	72.7 (12.7)	0.070	<60	75	15.2	<b>0.000</b>	16	21.3	59	78.7	0.081	
							≥60	418	84.8		54	12.9	364	87.1		
HADS, n=476																
HADS anxiety	6.0 (4.1)	67	7.2 (4.4)	409	5.9 (4.0)	<b>0.028</b>	<8	333	70.0	<b>0.000</b>	42	12.6	291	87.4	0.209	
							≥8	143	30.0		25	17.5	118	82.5		
HADS depression	5.4 (4.0)	67	6.4 (4.2)	409	5.2 (4.0)	<b>0.015</b>	<8	357	75.0	<b>0.000</b>	43	12.0	314	88.0	<b>0.040</b>	
							≥8	119	25.0		24	20.2	95	79.8		

Abbreviations: WHOQOL-BREF – The World Health Organization Quality of Life; HADS – Hospital anxiety and depression scale  
(*p*=*Teste Mann-Whitney*); *Cut-offs* (*p*=*Chi-Square Independent Test*)

### 3.3. Quality of life and anxiety and depression symptoms according to sociodemographic variables in people with musculoskeletal impairments

Differences were analysed across QoL domains and symptoms of anxiety and depression (Table 3). Men presented more QoL in the environmental domain ( $t[68]=-2.04, p=0.045$ ) than women, and women had more anxiety symptoms than men ( $t[65]=2.48, p=0.016$ ). People with an high school degree reported slightly more QoL in the social domain ( $F[3, 65]=2,72, p=0.050$ ) than the others. No differences were found for age, marital status, and medication ( $p>0.050$ ).

Table 3: Differences in quality of life domains and symptoms of anxiety and depression according to different sociodemographic variables in people with MSK impairments (n=70).

	n=70	QoL - WHOQOL-BREF								Anxiety and depression symptoms - HADS			
		QoL 1		QoL 2		QoL 3		QoL 4		Anxiety		Depression	
		M±SD	p	M±SD	P	M±SD	p	M±SD	p	M±SD	p	M±SD	p
Age			0.381		0.786		0.258		0.185		0.816		0.696
Under 65	15	13.13(2.30)		14.07(2.60)		15.64(4.20)		14.40(2.29)		7.40(4.45)		6.07(5.02)	
Over 65	55	12.64(1.83)		14.24(2.00)		14.55(2.93)		15.27(2.22)		7.10(4.44)		6.56(4.05)	
Sex			0.856		0.353		0.061		<b>&lt;0.050</b>		<b>&lt;0.050</b>		0.148
Female	41	12.71(2.03)		14.00(2.19)		14.15(3.34)		14.63(2.21)		8.29(4.99)		7.11(4.89)	
Male	29	12.79(1.82)		14.48(2.03)		15.62(2.90)		15.72(2.19)		5.69(3.00)		5.59(3.09)	
Education level			0.210		0.097		<b>≤0.050</b>		0.206		0.750		0.611
Without F.E.	6	12.50(1.64)		14.33(1.37)		14.17(2.86)		16.33(1.03)		8.00(7.16)		7.83(7.96)	
Primary	49	12.71(1.90)		14.16(2.04)		14.69(2.79)		14.86(2.23)		7.28(4.24)		6.22(3.85)	
Secondary	12	12.42(2.07)		13.58(2.61)		14.17(4.47)		14.92(2.64)		6.92(4.12)		7.17(3.81)	
High school	3	15.00(1.73)		17.00(0.00)		19.67(0.58)		17.00(1.73)		4.67(2.08)		4.33(2.52)	
Marital status			0.569		0.834		0.159		0.699		0.526		0.400
Single	4	12.00(0.82)		13.50(1.73)		16.00(4.69)		15.75(2.22)		5.00(0.82)		6.00(4.24)	
Married	44	12.59(1.90)		14.36(1.97)		15.30(2.95)		15.25(2.01)		7.05(4.25)		6.40(4.40)	
Divorced	2	13.50(4.95)		14.00(7.07)		13.50(9.19)		14.50(6.36)		10.50(4.95)		11.50(0.71)	
Widowed	20	13.15(1.90)		14.00(2.08)		13.50(2.69)		14.65(2.43)		7.56(5.18)		6.11(3.98)	
Medication			0.489		0.468		0.251		0.579		0.109		0.126
Don't take	8	13.25(2.44)		14.88(2.85)		16.00(3.67)		15.63(2.00)		4.57(2.30)		4.00(2.00)	
Take	53	12.72(1.96)		14.26(2.10)		14.54(3.27)		15.15(2.27)		7.56(4.75)		6.63(4.41)	

Abbreviations: QoL 1 – Physical health domain; QoL 2 – Psychological domain; QoL 3 – Social domain; QoL 4 – Environment domain; Without F.E. – Without former education. ( $p=Independent\ T-test; One-way\ analysis\ of\ variance$ )



### 3.4. Relationship between quality of life and anxiety and depression symptoms in people with and without musculoskeletal impairments

In the group with MSK impairments, there was a positive and significant moderate correlation between depression and anxiety symptoms ( $p < 0.01$ ) and a negative and significant low correlation between anxiety and the social domain of QoL ( $p < 0.05$ ). This means that greater symptoms of anxiety were associated with greater symptoms of depression and that higher levels of anxiety symptoms were related to worse QoL at the social level.

Regarding the group without MSK impairments, anxiety symptoms were positively correlated with depression symptoms ( $p < 0.01$ ; moderate correlation) and negatively correlated with the physical, psychological, social, and environmental domains of QoL ( $p < 0.01$ ; low correlation). Depression symptoms were also negatively correlated with all domains of QoL ( $p < 0.01$ ; low correlation). Thus, higher levels of depression symptoms, or of anxiety symptoms or of both were associated with a lower QoL in all domains. Detailed information is presented in the Table 4.

Table 4: Correlations between symptoms of anxiety, depression and quality of life in people with (n=70) and without (n=423) musculoskeletal impairments.

	MSK impairments			
	HADS Anxiety		HADS Depression	
	Yes	No	Yes	No
HADS				
Anxiety	-	-		
Depression	0.673**	0.618**	-	-
WHOQOL-BREF				
Physical domain	0.012	-0.157**	-0.190	-0.273**
Psychological domain	-0.066	-0.139**	-0.183	-0.271**
Social domain	-0.241*	-0.187**	-0.181	-0.286**
Environment domain	-0.227	-0.194**	-0.148	-0.235**

\* $p \leq 0.050$ ; \*\* $p \leq 0.010$

## 4. Discussion and Conclusion

This study showed that participants with MSK impairments present significant lower QoL in the physical health and psychological domains, and more symptoms of anxiety and depression than those without MSK impairments. People with MSK pain have been found to report lower health-related QoL, with great emphasis on physical and psychological factors (Garnaes et al., 2021) and are more likely to experience symptoms of emotional distress, including anxiety and severe depression (Antonopoulou et al., 2009) than people

without the MSK disorder. Mental and physical health are fundamentally linked (McEvoy et al., 2005). People living with chronic physical health conditions are known to experience chronic pain and emotional stress, both of which are associated with the development of depression and anxiety, and twice as often as the general population (Patten, 1999; Carney, Jones & Woolson, 2006). Conversely, people living with a serious mental illness are at a higher risk of experiencing a wide range of chronic physical conditions. Co-existing mental and physical conditions can diminish QoL and lead to longer illness duration and worse health outcomes (Patten, 1999).

Although there are several studies showing that the physical dimension of QoL is the most strongly affected by an MSK impairment (Picavet & Hoeymans, 2004; Antonopoulou et al., 2009; Binglefors & Isacson, 2012), other studies have highlighted the impact of MSK impairments also in the psychological and social domains (e.g., Roux et al., 2005; Nicolson et al., 2020). Similar to these researches, when the cut-offs analyses were performed, our results showed that participants with MSK impairments continued to report significantly greater depression symptoms, lower psychological QoL, but also lower social QoL. Therefore, MSK pain is associated with loneliness and perceived insufficiency of social support (Nicolson et al. (2020). The presence of pain and disability due to poor MSK health may limit independence, and their ability to participate in family, social and working life. It causes distress and isolates people from social supports (Carney, Jones & Woolson, 2006). Good MSK health is an important component of maintaining a person's functional abilities throughout the life course (Klinedinst et al., 2015). While life expectancy has risen, many people are now living longer in poorer health conditions. The older a person is, the more likely they are to experience chronic diseases and disabilities such as poor musculoskeletal health (Carney, Jones & Woolson, 2006).

Since MSK conditions can affect people across the life course, prevention, early detection, and treatment is essential to enable people to live in good health, remain independent and connected in their communities. There are also economic advantages for society, such as reducing the pressure on health and social care services and reducing costs because of people being unable to work (Driscoll et al., 2014). Therefore, seems crucial a better integration of mental health support with primary care and chronic disease management programmes, including physiotherapy treatment programs (Fenton,2006). Physiotherapy, like other healthcare professions, is still essentially a service provided by secondary and tertiary care, when a closer working between mental health specialists and other healthcare professionals such as physiotherapists and nurses in proximity to the

community should be prioritised. By better integrating services such as physiotherapy, it is not only possible to make healthcare services more accessible to a wider population, in particular those already suffering from MSK impairments, chronic pain or older population, in order to early diagnose and establish an appropriate plan of care, avoiding delays in assessing essential healthcare interventions or preventing and avoiding further degradation in those already affected (Yohannes et al 2010). This is, in fact, in line with the main goals for health promotion and disease prevention in the elderly, that include reducing premature disability caused by illness, maintaining functional independence, extending life expectancy, and maintaining or enhancing QoL (Harrison, 2001). But also, in addition to that, to reduce costs with absenteeism from work, and healthcare expenses avoiding costly hospitalisations or reduce hospital length of stay, avoid unnecessary surgeries or medication.

There are ongoing discussions about the need to enhance the focus on public health to promote health and healthy ageing (WHO,2015; Chatterji,2015; Fuchs,2013). In order to achieve that, it is then crucial a change of paradigm from a pro injury or disease approach to an essential focus on prevention and health promotion.

The present research enriches the literature on the link between mental health and QoL and the presence of a particular physical chronic disorder, such as MSK impairments. This way, it contributes to a better understanding of the extent of the harmful effect of this disorder on people's daily lives and helps to promote awareness of the non-physical factors associated with it. Healthcare professions such as physiotherapists, are well positioned to deliver preventive care, as they work in close proximity with patients and local communities. There is the need, however for adequate funding for MSK health similarly to the existent to combat the burden of cardiovascular diseases, cancer, diabetes or more recently, mental health (Briggs,2019). There are many advantages of working in close proximity to community, an important one would be demystifying the idea or belief that many people with MSK conditions have, that physical activity will make their condition worse. When it can actually benefit them, and by doing so in an initial stage of patient's journey could make a massive difference in the outcome and symptoms. Also, by supporting people to maintain a healthy weight, which along with the recommendations for physical activity can reduce the risks of MSK conditions such as back and neck pain and OA of the knee and hip (Messier, 2004). Further, encouraging people to quit smoking, which is associated with a progressive decline of the body's major systems, including MSK, is a role that physiotherapists can play with patients (Public Health England, 2015).

Evidence of the benefits of integrating rehabilitation in primary care is still weak. Countries like the England, Fiji, or Canada have already made successful steps in integrating rehabilitation services into primary care (NHS England, 2018; WHO, 2017; Ontario Physiotherapy Association, 2017). When health systems move forward towards integrating rehabilitation into primary care, it will be of utmost importance to embed research and generate evidence. In England the successful pilot was introduced first in 2018, and then commissioned and funded for a 5 years plan, where physiotherapists, mental health practitioners, dietitians or pharmacists are now part of the primary care workforce and working closely in the community (NHS England, 2018). There are however some challenges to overcome, starting from the staff shortage and difficulty to recruit and attract staff and also the need for adequate training prior moving to a primary care role (Deakin, 2022; Waters, 2022). A way of overcoming these challenges could be to incorporate more, and apply advanced technological and digital solutions in rehabilitation (Peretti, 2017; Nelson, 2019). Online programs or telerehabilitation, is being used to deliver healthcare services via information and communication technologies, to support the management of MSK conditions (Cottrell et al., 2016). This could be an excellent alternative to support the demand and staff shortages (Kingsfund,2018), which is a serious problem and affects the quality of care, even more if we think about the rapid ageing population (Care Quality Commission, 2018; WHO, 2016).

There are, however, some limitations in this study to be acknowledged. The fact that there is a discrepant number of participants in each evaluated group, participants with and without MSK impairments, so the differences found should be considered with caution. These limitations should be overcome in future investigations. Furthermore, in future studies, research may be extended to understand causality effects, particularly in assessing the impact of MSK impairments on QoL and mental health. In addition, it may be interesting to assess whether differences in QoL, anxiety and depression arise according to the intensity and/or location of pain.

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