PHYSICAL ACTIVITY, ANXIETY, DEPRESSION AND BODY IMAGE IN TRANS INDIVIDUALS: AN EXPLORATORY STUDY

Master's Thesis

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"…tenho em mim todos os sonhos do mundo."

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RESUMO

A atividade física, a saúde mental e a imagem corporal são alguns dos tópicos de saúde importantes na população transgénero que têm sido discutidos recentemente e parecem desempenhar um papel crucial na qualidade de vida desta população. No entanto, apesar do crescente corpo de literatura sobre a saúde de indivíduos trans, existe uma lacuna notável na caracterização abrangente e detalhada desta população, particularmente no que diz respeito à sua satisfação com a imagem corporal, aos sintomas depressivos e ansiosos, e ao envolvimento na atividade física. Assim, este estudo tem como objetivo elucidar a interação complexa desses fatores e as suas implicações para o bem-estar das pessoas trans. Num estudo transversal, 75 indivíduos transgénero portugueses (M=23,68; DP ± 6,59) foram recrutados para participar neste estudo. Os participantes responderam a três questionários válidos e fiáveis relacionados com a avaliação da atividade física (IPAQ), sintomatologia depressiva e ansiosa (HADS) e satisfação com a imagem corporal (BISQp). Os indivíduos trans mostraram um gasto energético total de 3316,40 METS, apresentaram pontuações acima do ponto médio especialmente para os sintomas ansiosos, indicando um nível moderado de sintomatologia e baixos níveis de satisfação com a imagem corporal. A satisfação com a imagem corporal esteve negativamente associada à ansiedade ($r = -0,441$, $p < 0,01$) e à sintomatologia depressiva ($r = -0,600$, $p < 0,01$). Além disso, a satisfação com a imagem corporal explica 40% da variância na sintomatologia depressiva e 24% da variância na sintomatologia da ansiedade entre indivíduos trans. A implementação de programas inclusivos que promovam a aceitação da imagem corporal e estratégias de *coping*, particularmente no contexto do exercício físico, pode ajudar a aliviar o sofrimento relacionado com

a insatisfação com a imagem corporal, ao mesmo tempo que aborda os sintomas subjacentes de ansiedade e depressão.

Palavras-chave

Atividade física, imagem corporal, ansiedade, depressão, transgénero.

ABSTRACT

Physical activity, mental health, and body image are some important health topics in the transgender population that have been recently discussed and appear to play a crucial role in the quality of life of this population. However, despite the growing body of literature on transgender health, there exists a notable gap in a thorough and comprehensive characterization of transgender individuals, particularly concerning their satisfaction with body image, depressive and anxious symptoms, and engagement in physical activity. Therefore, this study aims to elucidate the complex interplay of these factors and their implications for the well-being of trans individuals. In a cross-sectional study, 75 Portuguese transgender individuals (M=23,68; SD ± 6,59) were recruited to participate in this study. The participants completed three valid and reliable questionnaires related to the assessment of physical activity (IPAQ), depressive and anxious symptomatology (HADS) and satisfaction with body image (BISQp). Trans individuals showed a total energy expenditure of 3316.40 METS, had scores above the midpoint especially for anxious symptoms, indicating a moderate level of symptomatology and low levels of satisfaction with body image. Satisfaction with body image was negatively associated with anxiety ($r = -0, 441$, $p < 0.01$) and depression symptomatology ($r = -0, 600$, $p < 0.01$). Additionally, satisfaction with body image explains 40% of the variance in depressive symptomatology and 24% of the variance in anxiety symptomatology among trans individuals. The implementation of inclusive programs that promote body acceptance and coping strategies, particularly within the context of physical exercise, may help alleviate distress related to body image dissatisfaction while also addressing underlying anxiety and depression symptoms.

Keywords:

Physical activity, body image, anxiety, depression, transgender.

LIST OF PUBLICATION

The present dissertation is comprised of the following paper:

- **Oliveira, J.,** Monteiro, D., Jacinto, M., Matos, R., Amaro, N., Rodrigues, F., Antunes, R. (Under Review in Healthcare). Physical Activity, Anxiety, Depression and Body Image in Trans Individuals: An Exploratory Study.

GENERAL INDEX

TABLE INDEX

ABBREVIATIONS

AGIE = Age of Gender Identity expression

APGI = Age of Perception of Gender Identity

BGT = Beginning Age of Gender Transition

BISQp – The Body Image Satisfaction Questionnaire Portuguese Version

GI = Gender identity

HADS – Hospital Anxiety and Depression Scale

IPAQ – International Physical Activity Questionnaire

LGBTQ+ – Lesbian, Gay, Bisexual, Transgender, Queer Plus

METS – Metabolic Equivalent of Task.

SAB = Sex Assigned at Birth

SBI = Satisfaction with Body Image.

TEE = Total Energy Expenditure

TRANS – Transgender

INTRODUCTION

The present dissertation was developed in the scope of the master's degree in Exercise Prescription and Health Promotion, of the School of Education and Social Sciences, Polytechnic of Leiria. This work employs a cross-sectional approach to identify and analyze concerns associated with both physical and psychological health and explore potential relationships among transgender individuals.

The transgender community often experiences discrimination (Owen-Smith et al., 2017), abuse (Lombardi et al., 2002), and violence (Klemmer et al., 2021; Lombardi et al., 2002; Reisner et al., 2016), and encounters barriers to accessing healthcare and employment opportunities (Klemmer et al., 2021). These systemic and sociocultural barriers collectively create a hostile environment that negatively impacts the lives and the mental and physical health of transgender people. As a result, this population exhibits a high prevalence of anxiety and depression symptomatology (Bouman et al., 2017; Budge et al., 2013; Connolly et al., 2016), along with greater dissatisfaction with body image (McGuire et al., 2016; Witcomb et al., 2015) and harmful exercise behaviors (Schweizer et al., 2023).

Physical activity, exercise behaviors, and sports participation among the transgender population constitute a recent and complex topic in the literature. This population tend to exhibit both sedentary and excessive exercise behaviors, which can compromise their health (Schweizer et al., 2023). However, it is widely recognized that physical activity and exercise confer significant benefits for overall health and well-being, as observed in the cisgender population (Malm et al., 2019). These benefits include improvements in cardiovascular health (Nystoriak & Bhatnagar, 2018) and mental health (Carek et al., 2011), as well as prevention and management of various diseases such as cardiovascular disease, diabetes, and obesity (Melmer et al., 2018). These data are particularly important for the trans population, who have a higher risk of cardiovascular disease as a side effect of hormone treatment (WPATH, 2012) and high levels of symptomatology related to mental health (Bouman et al., 2017; Budge et al., 2013; Connolly et al., 2016). However, trans individuals encounter additional challenges when trying to find safe and welcoming spaces to exercise, due to discrimination and a lack of understanding of their specific needs (Jones et al., 2017; Oliveira et al., 2022).

In the studies developed by Jones et al. (2017) and Oliveira et al. (2022), the results suggest that trans people have more barriers than reasons to engage in physical exercise and sport. The barriers most mentioned in the literature are related to body image, fear of suffering some kind of prejudice, inappropriate facilities (e.g., changing facilities) and sports participation policies and regulations (Elling-Machartzki, 2017; López-Cañada et al., 2021; Pérez-Samaniego et al., 2019). On the other hand, the desire to achieve a specific body image (Oliveira et al., 2022) and the pursuit of mental well-being are the most predominant and important reason reported in literature (Oliveira et al., 2023). While body image is simultaneously presented as both a primary motivator and a significant barrier to engaging in physical activity among transgender individuals, mental health emerges as the principal motivation for physical activity.

The recognition of this interplay between body image, mental health, and physical activity underscores the necessity of integrating the topic and field of physical activity and exercise into discussions and research surrounding the physical and mental well-being of transgender individuals. However, research on the physical and mental health of the transgender community involving the field of physical activity and exercise is still relatively scarce and encounters numerous challenges, including methodological limitations. Thus, it is essential to acknowledge the importance of addressing these limitations to advance our understanding of physical and mental health in the transgender community and develop effective interventions that involve physical activity and exercise and promote healthier lifestyles and enhancing the overall well-being of this population.

This dissertation aims to provide new evidence and create opportunities for future research on the mental and physical health of transgender individuals. In this sense, this work involves the Chapter 1 – "Physical Activity, Anxiety, Depression and Body Image in Trans Individuals: An Exploratory Study" and focuses on:

(1) Developing a comprehensive and thorough characterization of transgender individuals concerning their physical and psychological health.

(2) Exploratory analysis explaining the interaction of physical activity (PA), anxiety, depression and satisfaction with body image in transgender individuals.

CHAPTER 1 – PHYSICAL ACTIVITY, ANXIETY, DEPRESSION AND BODY IMAGE IN TRANS INDIVIDUALS: AN EXPLORATORY STUDY

ABSTRACT

Physical activity (PA), mental health, and body image are some important health topics in the transgender population that have been recently discussed and appear to play a crucial role in the quality of life of trans population. This study aims to elucidate the complex interplay of these variables and their implications for the well-being of trans individuals. Methods: In a cross-sectional study, 75 Portuguese transgender individuals (M=23,68; SD ± 6,59) were recruited to participate in this study. The participants completed three questionnaires related to the assessment of physical activity (IPAQ), depressive and anxious symptomatology (HADS) and satisfaction with body image (BISQp). Results: Trans individuals showed a total energy expenditure of 3316.40 METS, had a moderate level of anxiety symptomatology and low levels of satisfaction with body image. Satisfaction with body image was negatively associated with anxiety ($r = -0, 441$, $p < 0.01$) and depression symptomatology ($r = -0, 600$, $p < 0.01$). Additionally, satisfaction with body image explains 40% of the variance in depressive symptomatology and 24% of the variance in anxiety symptomatology among trans individuals. Conclusions: The implementation of inclusive programs that promote body acceptance and coping strategies, particularly within the context of physical exercise, may help alleviate distress related to body image dissatisfaction while also addressing underlying anxiety and depression symptoms.

Keywords: Physical activity, body image, anxiety, depression, transgender.

INTRODUCTION

The term transgender or trans refers to a person whose gender identity differs from the sex that was assigned to them at birth (American Psychological Association, 2015; CoE, 2016; WPATH, 2012). A trans man is an individual with female birth-assigned sex but identifies as male, and a trans woman is a person with a male birth-assigned sex but identifies as female (CoE, 2016). The term cisgender or cis refers to a person who identifies with the biological sex they were assigned at birth (American Psychological Association, 2015; CoE, 2016). In 2018, the ICD-11 presented a significant change in the approach to transgender identities and gender diversity. In contrast to previous versions, the ICD-11 no longer uses terms like "transsexualism" and "gender identity disorder". Instead, it introduces the concept of "gender incongruence" to describe situations where an individual's gender identity does not align with the sex assigned at birth. Additionally, the ICD-11 also acknowledges and encompasses a diverse range of gender identities beyond the binary classification of male and female (World Health Organization, 2018). In recent years, there has been increasing recognition of non-binary identities within the transgender community. A survey conducted in the United Kingdom revealed that approximately 52% of transgender respondents identified as non-binary (Government Equalities Office, 2018). This highlights the diversity within transgender experiences, which extends beyond traditional binary notions of gender to encompass a spectrum of identities including non-binary and genderqueer individuals. This diversity challenges conventional understandings of gender as a strictly binary concept and underscores the importance of acknowledging and affirming non-binary and genderqueer identities within discussions on transgender issues (Monro, 2019; Richards et al., 2016).

Trans populations often experience discrimination (Owen-Smith et al., 2017), difficulties in accessing healthcare (Safer et al., 2016) and report numerous obstacles to engaging in physical activity (PA) (Oliveira et al., 2022), which explains high prevalence of mental health problems, namely anxiety and depression (Anderssen et al., 2020; Bouman et al., 2017; Klemmer et al., 2021; Owen-Smith et al., 2017), greater dissatisfaction with body image related to gender dissociation and dissatisfaction with body shape (McGuire et al., 2016; Witcomb et al., 2015) and lower levels of PA (Jones,

Haycraft, Bouman, & Arcelus, 2018). In fact, PA, mental health, and body image are some important health topics in the transgender population that have been recently discussed and appear to play a crucial role in the quality of life of this population (Bouman et al., 2017; Gilani et al., 2021; Jones et al., 2016; Reisner et al., 2016).

The recent systematic review by Schweizer and colleagues (Schweizer et al., 2023) suggests that transgender individuals have PA levels below recommendations and lower levels compared to cisgender individuals. This can be explained by the existence of significant barriers that hinder more frequent engagement in PA in this population, namely body dissatisfaction and discomfort, discrimination and anxiety about others' reactions and lack of safe and comfortable spaces (Oliveira et al., 2022). This is particularly concerning given the significant relationship established in the literature between PA and mental health.

The regular role of PA in individuals' quality of life has been studied over time, and its benefits for physical and psychological well-being are evident (Malm et al., 2019). Specially concerning mental health, regular PA is associated with improved mental well-being and the prevention of anxiety and depression disorders (Carek et al., 2011; Ströhle, 2009). In contrast, sedentary behavior and physical inactivity have been reported as risk factors for depression and anxiety (Huang et al., 2020), and body image appears to moderate this relationship (Han et al., 2023). Individuals who do not engage in PA have a higher prevalence of depressive and anxious symptoms compared to regularly active individuals (Mello et al., 2013). These data are particularly important for populations with a high prevalence of depressive and anxious symptoms, such as the transgender community (Bouman et al., 2017; Reisner et al., 2016). Additionally, in cisgender samples, higher levels of anxiety and depression appear to be associated with greater dissatisfaction with body image (Barnes et al., 2020; Satghare et al., 2019), which can in turn be positively influenced by PA (Sabiston et al., 2019). In fact, in the study by Bassett-Gunter and colleagues (Bassett-Gunter et al., 2017), the results suggest a positive relationship between PA and body image, mainly among men.

Body image, intricately linked with societal norms and expectations, appears to play a pivotal role in the physical and particularly in mental health of transgender individuals. In the study conducted by Röder and colleagues (Röder et al., 2018), the results revealed that less satisfaction with body image significantly predicted lower health-

related quality of life (HRQoL) outcomes. Similar results were also found in other studies, where the findings clearly demonstrate significant correlations between self-esteem, depression, and body image in individuals with gender dysphoria (Kakaei et al., 2023).

The relationship between body image and anxiety and depression in transgender individuals is bidirectional and complex. Previous research indicate that poor body image can contribute to heightened negative emotions regarding specific gender characteristics and body parts (Vocks et al., 2009). In fact, the parts of the body that caused most dissatisfaction among trans individuals are beard, body hair, skin, adam's apple, chest/breast, stomach, waist, hips and bottom (Witcomb et al., 2015). Additionally, findings revealed that anxiety (both regarding self-image and social situations) and perfectionism (both criticism and control) were identified under body dissatisfaction, suggesting that symptoms of anxiety can exacerbate body image concerns, leading to a vicious cycle of negative self-perception and emotional distress (McGuire et al., 2016).

Current Study

Existing literature has demonstrated negative correlations between anxiety and depression and satisfaction with body image and PA (Han et al., 2023), as well as positive correlations between satisfaction with body image and PA (Barnes et al., 2020). However, despite the growing body of literature on transgender health, there exists a notable gap in a thorough and comprehensive characterization of transgender individuals, particularly concerning their satisfaction with body image, depressive and anxious symptoms, and engagement in PA. This study seeks to address this gap by conducting an exploratory analysis to elucidate the complex interplay of these factors and their implications for the well-being of trans individuals, based on a detailed characterization of the sample. The insights gained from this research could lead to a rigorous and scientific knowledge about the extent and multifaceted nature of mental health and body image concerns within this community and contribute to the destigmatization of transgender identities and the development of tailored interventions to promote mental well-being and quality of life.

In Portugal, legislation has been implemented granting the right to self-determination of gender identity and gender expression, along with protections for individuals' sexual

characteristics. Moreover, legal recognition of gender identity is provided for transgender youth between the ages of 16 and 18 (Matos, 2023). However, the Portuguese society continues to face challenges in accepting and integrating transgender individuals. Research has highlighted that discrimination against transgender individuals by healthcare professionals is perceived by a significant portion of those seeking care and access to gender-affirming healthcare services, through the Portuguese National Health Service, may be limited and subject to long waiting periods (Rodrigues et al., 2020). Additionally, transgender individuals in Portugal encounter extensive societal challenges and discrimination, making them one of the most marginalized and excluded populations in the country (Nogueira et al., 2010). Specific legislation addressing the participation of transgender individuals in sports is currently lacking (Matos, 2023).

The primary aim of this study is to identify levels of PA, anxious and depressive symptomatology and satisfaction with body image, and to examine the relationship between these three variables. We hypothesize that (a) transgender individuals will report high levels of anxious and depressive symptoms, low levels of PA and satisfaction with body image satisfaction; (b1) Negative and significant correlation will emerge between PA and anxious and depressive symptomatology, as the literature has reported in different samples (e.g., (Mello et al., 2013; Pearce et al., 2022; Wanjau et al., 2023)); (b2) Negative and significant correlation will emerge between anxious and depressive symptomatology and satisfaction with body image, supported by previous studies (e.g.,(Barnes et al., 2020; Hong et al., 2023; Strübel et al., 2020)).

MATERIALS AND METHODS

STUDY DESIGN AND PARTICIPANTS

This cross-sectional study conducted in Portugal aims to examine the relationship between physical activity, mental health and body image in transgender people. The sample consisted of a total of 75 Portuguese transgender individuals (23.68 ± 6.59 years of age), of which 62 (82.7%) were trans men and 13 (17.3%) were trans women. A majority of 54 participants (72%) were in the process of transitioning. The mean age at transition initiation was 21.37 ± 6.44 years old. Participants reported recognizing their gender identity misalignment at a mean age of 16.09 ± 7.05 years old. Furthermore, they

began openly and consciously expressing their gender identity on average at 18.39 ± 7.45 years old.

All participants were fully informed about the nature of the study and the procedures for data recording. Before completing the survey, informed consent was obtained from each participant individually. All participants participated in this study voluntarily and confidentiality and anonymity were guaranteed. They were also informed that they could withdraw from the study at any time. The sample size for regression analysis was calculated using G*Power 3.1.9.7 (Faul et al., 2009), based on the following input parameters: effect size (f2 = 0.3), $\alpha = 0.05$, and statistical power = 0.95. The minimum required sample size was determined to be 55 subjects, which was adhered to in the current study.

Procedure: Data Collection

Prior to data collection, ethical approval was obtained from the Ethics and Scientific Committee of the Polytechnic of Leiria, under reference number CE/IPLEIRIA/47/2023. The present study was conducted in accordance with the Declaration of Helsinki (Association, 2013).

For data collection, a Google form was used as the survey platform. The survey consisted of sociodemographic questions and questionnaires validated for the Portuguese population that assessed 3 domains: levels of PA, anxiety and depressive symptoms and satisfaction with body image. Respondents took an average time of 10 min to complete the survey. Additionally, Portuguese LGBTQ+ associations and institutions were contacted, and meetings were conducted. During these meetings, the researchers elucidated the study's objectives and addressed any inquiries. Subsequently, support for conducting the study was solicited from these associations and institutions in order to publicize the study and recruit participants, through their networking and digital platforms.

Instruments

Physical Activity

To assess participants' levels of physical activity, the short form of the International Physical Activity Questionnaire (IPAQ), validated for 12 countries, including Portugal,

was used (Craig et al., 2003). The questionnaire comprises a total of nine questions related to activities performed in the last seven days prior to questionnaire application (Craig et al., 2003). The questions assess principles of physical activity, such as walking, moderate-intensity activities, and vigorous activities, including their frequency and duration. Coding involves estimating energy expenditure based on levels of physical activity. Specifically, the obtained data are converted into MET (Metabolic Equivalent of Task) minutes per week. To calculate MET minutes per week, one multiplies the MET values (walking = 3.3; moderate-intensity physical activity = 4; vigorous physical activity = 8) by the number of minutes of activity performed each day over the last 7 days.

Depressive and Anxious Symptomatology

The Portuguese version of the Hospital Anxiety and Depression Scale (HADS)(Pais-Ribeiro et al., 2007) was used to assess depressive and anxious symptomatology. This scale consists of 14 items, with 7 items dedicated to measuring anxiety symptoms (e.g., "I feel tense or nervous") and the other 7 to measuring depression symptoms (e.g., "I have lost interest in my physical appearance"). Each item is scored on a Likert scale ranging from 0 to 3, with higher scores indicating greater symptom severity. Subsequently, the scale yields two dimensions: depression symptomatology and anxiety symptomatology. The total depression score is calculated as the sum of questions 2, 4, 6, 8, 10, 12, and 14, while the total anxiety score is the sum of questions 1, 3, 5, 7, 9, 11, and 13. The dimensions are individually categorized as follows: ≤7 points – Absence of symptomatology; 8-10 points – Mild symptomatology; 11-14 points – Moderate symptomatology; 15-21 points – Severe symptomatology. Internal consistency in this study proved to be good (anxiety α =.83; depression α =.81).

Satisfaction with Body Image

The Body Image Satisfaction Questionnaire Portuguese Version (F. Rodrigues et al., 2021) was used to rate participants' satisfaction towards different body parts (e.g., nose, hair, shoulders) as well as their overall body image satisfaction (e.g., vitality, body shape, looks). The questionnaire comprises 23 items related to facial parts (item examples: teeth, hair, eyes, nose), body parts (item examples: glutes, arms, chest), and overall appearance (item examples: physical fitness, height, vitality, body shape). The

questions are presented on a Likert scale with a five-point range from 1 ("I don't like and would like to be different") to 5 ("I consider myself favored"). Thus, body image satisfaction is derived from the average of the 23 items, and the higher this average, the greater the individual's satisfaction with their body image. Internal consistency in this study proved to be good (face α =.85; upper trunk α =.76; lower trunk α =.87; legs and glutes α =.88; body appearance α =.83).

Statistical Analysis

Data analyses were performed using IBM SPSS software for Windows (Version 29.0, IBM Corp, Armonk, NY, USA). Counts (and proportions), means, standard deviations (SD) 95% confidence interval (95% CI) and medians (interquartile range, IQR) were calculated to describe both categorical and continuous variables for the total sample. Possible missing values and outliers were also searched in the data. Pearson´s correlations coefficients were also used to determine the association between all variables under analysis. The correlation coefficients were interpreted using the proposed thresholds by Hopkins and colleagues (Hopkins et al., 2009): trivial ($r< 0.1$), small ($0.1 < r < 0.3$), moderate ($0.3 < r < 0.5$), large ($0.5 < r < 0.7$), very large ($0.7 < r < 0.9$) and nearly perfect ($r \geq 0.9$). The multivariate regression analysis was fitted to explain the anxious and depressive symptomatology based on predictive factors, namely satisfaction with body image relative to the face, upper trunk, lower trunk, legs and glutes, and body appearance. For all tests, the level of significance was set at $p < 0.05$ to reject the null hypotheses (Ho, 2013).

Results

Descriptive Statistics

Data inspection did not reveal missing values and outliers. The sample characteristics are presented in Table 1. Regarding PA, the highest values are found in moderate-intensity PA (1262.67 METS), followed by vigorous-intensity PA (1195.73 METS) and light-intensity PA (858.73 METS). Trans individuals showed a total energy expenditure of 3316.40 METS. Descriptive statistics also indicated higher values for anxiety symptoms (11.67) comparing to depression symptoms (7.41). Moreover, the sample had scores above the midpoint especially for anxious symptoms, indicating a moderate level of symptomatology. Finally, regarding satisfaction with body image, the overall mean

score was low (SBI – Global = 2.82), with the lower trunk (SBI – Lower Trunk = 2.18) and upper trunk (SBI – Upper Trunk = 2.51) components having the lowest scores. Conversely, satisfaction with body image related to the face had the highest score (SBI – Face = 3.51).

Table 1. Descriptive statistics (n = 75).

	N (%)	**Mean**		**Median (IQR)**
		Mean ± SD	**(95% CI)**	
Age (years)		23.68 ± 6.59	(22.76 to 26.27)	22.50 (6)
SAB				
Female	13 (17.3)			
Male	62 (82.7)			
GI				
Female	62 (82.7)			
Male	13 (17.3)			
APGI (years)		16.09 ± 7.045	(14.33 to 18.20)	15 (6)
AGIE (years)		18.39 ± 7.452	(16.51 to 20.69)	18 (6)
Are you currently in the process of transitioning?				
Yes	54 (72)			
No	21 (28)			
BGT (years)		21.37 ± 6.44	(19.70 to 23.03)	19 (5)
PA (METS)				
Light PA		858 ± 1455.29	(523.17 to 1192.83)	495 (676.50)
Moderate PA		1262.67 ± 2103.23	(778.76 to 1746.58)	560 (1200)
Vigorous PA		1195.73 ± 1879.49	(763.30 to 1628.16)	0 (1680)
TEE		3316.40 ± 3537.58	(2502.48 to 4130.32)	1830 (4638.00)
Mental Health				
Anxious symptomatology		11.67 ± 4.29	(10.68 to 12.65)	11 (6)
Depressive symptomatology		7.41 ± 4.19	(6.45 to 8.38)	8 (6)
Satisfaction with Body Image				

SBI – Face	3.51 ± 0.85	(3.32 to 3.71)	3.43 (1.43)
SBI – Upper Trunk	2.51 ± 1.06	(2.27 to 2.75)	2.33 (1.67)
SBI – Lower Trunk	2.18 ± 1.08	(1.93 to 2.43)	2 (1.75)
SBI – Legs and Glutes	2.60 ± 1.22	(2.31 to 2.88)	2.67 (2)
SBI – Body Appearance	2.71 ± 0.97	(2.48 to 2.93)	2.83 (1.33)
SBI Global	2.82 ± 0.81	(2.63 to 3.01)	2.74 (1.22)

Notes: SAB = Sex assigned at birth; GI = Gender identity; APGI = age of perception of GI; AGIE = Age of GI expression; BGT = Beginning age of gender transition; PA = Physical Activity; TEE = Total Energy Expenditure (METS); SBI = Satisfaction with Body Image.

Bivariate Correlations

As expected, significant bivariate correlations emerged (see Table 2). Global satisfaction with body image was negatively associated with anxiety ($r = -0.441$, $p < 0.01$) and depression symptomatology ($r = -0.600$, $p < 0.01$). All components of PA were also negatively associated with anxious and depressive symptoms, however these results were not statistically significant.

Table 2. Bivariate correlations across study variables.

Variables	1	2	3	4	5	6	7
1. Light PA	1						
2. Moderate PA	0.174	1					
3. Vigorous PA	0.018	0.161	1				
4. TEE	0.525**	0.752**	0.634**	1			
5. Anxiety symptomatology	-0.036	-0.115	-0.120	-0.148	1		
6. Depression symptomatology	-0.061	-0.164	-0.010	-0.128	0.613**	1	
7. SBI Global	-0.118	0.065	0.077	0.031	-0.441**	-0.600**	1

Notes: PA = Physical Activity; TEE = Total Energy Expenditure (METS); SBI = Satisfaction with Body Image; * $p < 0.05$; * * $p < 0.01$.

Multiple Regressions

Model 1 (Table 3) with all the predictors together (SBI—Face; SBI—Upper Trunk; SBI—Lower Trunk; SBI—Legs and Glutes; SBI—Body Appearance) to explain the variable anxious symptomatology, significantly fitted the data ($F = 4.39$; $p = 0.002$), jointly explaining 24% of the variance of anxious symptomatology. Additionally, the

regression coefficient results of the different body image subscales for anxiety were negative and significant ($p < 0.05$).

Table 3. Multiple regression analysis for anxiety symptomatology.

	R	**R^2**	**Adj.R^2**	**ΔR^2**	**F**	**df1**	**df2**	***p***	**DW**
Model 1	0.49*	0.24	0.19	0.24	4.39	5	69	0.002	2.43
	β	***t***	***p***	**VIF**	**Tolerance**				
SBI – Face	- 0.22	-1.63	0.03	1.62	0.62				
SBI – Upper Trunk	-0.32	-1.88	0.02	2.03	0.49				
SBI – Lower Trunk	-0.39	-1.82	0.01	2.35	0.43				
SBI – Legs and Glutes	-0.31	-1.59	0.01	2.49	0.40				
SBI – Body Appearance	-0.44	-2.36	<0.001	2.12	0.47				

Notes: SBI = satisfaction with body image; R2 = r-square; Adj R2 = adjusted r-square; ΔR2 = differences in r2; df = degrees of freedom; β = standardized coefficients; t = t test; R2 = adjusted r-square—explained variance; Δ = differences; F = changes in significance; df = degrees of freedom; p = significance value; * $p < 0.05$.

Model 2 (Table 4) with all the predictors together (SBI—Face; SBI—Upper Trunk; SBI—Lower Trunk; SBI—Legs and Glutes; SBI—Body Appearance) to explain the variable depressive symptomatology, significantly fitted the data ($F = 9.23$; $p < 0.001$), jointly explaining 40% of the variance of depressive symptomatology. Additionally, the regression coefficient results of the different body image subscales for depression were negative and significant ($p < 0.05$).

Table 4. Multiple regression analysis for depressive symptomatology.

	R	**R^2**	**Adj.R^2**	**ΔR^2**	**F**	**df1**	**df2**	***p***	**DW**
Model 2	0.63*	0.40	0.36	0.40	9.23	5	69	<0.001	2.28
	β	***t***	***p***	**VIF**	**Tolerance**				
SBI – Face	-0.52	-2.14	<0.001	1.62	0.62				
SBI – Upper Trunk	-0.31	-1.63	0.01	2.03	0.49				
SBI – Lower Trunk	-0.46	-1.84	<0.001	2.35	0.43				
SBI – Legs and Glutes	-0.39	-1.64	0.01	2.49	0.40				
SBI – Body Appearance	-0.58	-2.75	<0.001	2.12	0.47				

Notes: SBI = satisfaction with body image; R2 = r-square; Adj R2 = adjusted r-square; ΔR2 = differences in r2; df = degrees of freedom; β = standardized coefficients; t = t test; R2 = adjusted r-square—explained variance; Δ = differences; F = changes in significance; df = degrees of freedom; p = significance value; * $p < 0.05$.

DISCUSSION

There is a lack of exploratory studies providing a detailed characterization of the transgender population concerning their body image, levels of anxiety and depression, and engagement in PA, while simultaneously exploring the relationship between these health topics. To fill this gap in the literature, this study aims to identify levels of PA, anxious and depressive symptomatology and satisfaction with body image in trans individuals and to examine the interplay between these variables.

PHYSICAL ACTIVITY

Regarding PA levels, current evidence-based recommendations suggest that for substantial health benefits, adult individuals should do at least 150 minutes of moderate-intensity PA or 75 minutes of vigorous-intensity PA or an equivalent combination of moderate and vigorous-intensity PA achieving at least 600 MET min/week (DiPietro et al., 2019). However, major health gains occurring at a total activity level of 3000-4000 MET min/week (Kyu et al., 2016). In the current study, the levels reported by participants range from 2502 to 4130 MET min/week, with highest values in moderate-intensity PA, which suggests significant PA practice in this population with benefits. Similar results related to the levels of PA in transgender samples were also found in another studies. In the recent work by Ceolin and colleagues (Ceolin et al., 2023), the transgender individuals reported values of PA between 525.00 and 2772.00 METS, with no statistically relevant differences between the trans and cis sample. Data from the Minnesota Transgender Youth Survey also revealed that the majority of individuals (50.2%) are physically active for at least 60 minutes on 3 or more days per week (Bishop et al., 2020). These are positive and quite surprising results, considering that previous evidence has consistently identified lower PA levels in trans individuals and reinforce the significant difference between the trans and cis population in this topic. Smalley and colleagues (Smalley et al., 2016) found that only 36.9% of trans men, and 24.3% of trans women met the lowered recommendation of 20 minutes per day, three days per week of PA. Similar, Cunningham and colleagues (Cunningham et al., 2018) reported no PA in the past month for 43.3% of trans women and 31% of trans men.

The inconsistency of the results of this study with the majority of the literature could be explained by the bivalent way in which physical activity can be perceived by the trans population. In the recent scoping review by Schweizer and colleagues (Schweizer et al.,

2023), the results suggest that trans people engage in low levels of PA or in compulsive exercise, which reflect the complexity of this topic and the diverse experiences within the transgender community. It's essential to recognize that the relationship between trans individuals and PA is not uniform. Some may find joy and empowerment in PA, while others may struggle due to various barriers and challenges, which may contribute to increased health risks in this population.

Anxiety and Depression

In the present study, anxiety values were higher than depression. There was a moderate anxious symptomatology and a normal depressive symptomatology found in the sample, according to the reference values of Pais-Ribeiro and colleagues (Pais-Ribeiro et al., 2007). This has been observed in previous studies. The results of a German Survey indicate that the prevalence of probable depression was 33.3% and it was 29.6% for probable anxiety in a sample of trans individuals (Hajek et al., 2023). In the study of Jones and colleagues (Jones, Haycraft, Bouman, Brewin, et al., 2018), which also used the HADS to assess depressive and anxious symptomatology, similar results were reported, particularly concerning depressive symptoms. The high values found in our study, especially regarding anxious symptoms, are not surprising and are in line with the literature. Bouman and colleagues (Bouman et al., 2017) indicates that transgender people (particularly trans males) have higher levels of anxiety symptoms suggestive of possible anxiety disorders compared to the general population. In fact, transgender people are disproportionately burdened by poor mental health issues, compared to cisgender people (Reisner et al., 2016).

However, it was expected that participants in the current study would demonstrate lower levels of anxiety and depression, given the high levels of PA previously mentioned and the established relationship between these three variables (Mello et al., 2013). This could be explained by the framework of Hendricks' adapted Minority Stress Model (Hendricks & Testa, 2012). This model posits that transgender individuals face unique stressors and challenges related to their gender identity. Factors such as discrimination, stigma, gender dysphoria, and lack of social support, which most cisgender individuals do not face, can all contribute to elevated levels of anxiety and depression among transgender individuals, regardless of their level of PA. While PA has beneficial effects on mental health in the cisgender sample, it may not fully mitigate the impact of these

stressors in the transgender population. Thus, this could also explain the lack of significant correlations between PA and anxiety and depression in our study.

BODY IMAGE

Regarding the values of satisfaction with body image, the results of our study demonstrated reduced values in all the components (face, upper trunk, lower trunk, legs and glutes, body appearance), resulting in a low global SBI. These findings are in line with several studies, which results showed that body image concern was significantly higher in transgender participants compared to cisgender participants (Mofradidoost & Abolghasemi, 2020; Owen-Smith et al., 2018). In our study, it was also reported that the upper trunk and lower trunk were the body areas where participants expressed the least satisfaction with their body image. This implies that transgender individuals may experience dissatisfaction with various components of their bodies, but certain areas are significant sources of distress, namely the chest or breast area, hips, and overall body shape. This has been observed in the study of van de Grift and colleagues (T. C. van de Grift et al., 2016), where the hip region and chest size were noted as components of body image with lower satisfaction levels. Similarly, Pulice-Farrow and colleagues (Pulice-Farrow et al., 2020) and Witcomb and colleagues (Witcomb et al., 2015) also found greatest body dissatisfaction in chest and in gender-identifying body parts, particularly among trans males.

The low levels of satisfaction with body image observed in transgender individuals can be explained by the Tripartite Influence Model (Thompson et al., 1999), which identifies three primary influences shaping body image perception: media messages, interpersonal influences, and internalization of societal appearance ideals. In fact, traditional and digital media often perpetuate idealized beauty standards that do not represent the diversity of bodies and gender identities within the transgender community. This lack of positive and inclusive representation can lead to feelings of inadequacy and dissatisfaction with body image. Furthermore, interpersonal influences play a critical role, as negative comments and judgments to conform to conventional gender norms can have a significant impact on self-image and contribute to body dissatisfaction among transgender individuals. Additionally, the internalization of social appearance ideals that conflict with a person's gender identity can lead to internal struggles and decreased self-esteem. Pressure to conform to cisgender beauty norms

may further exacerbate feelings of body image dissatisfaction in transgender individuals.

In fact, some studies suggest that hormone therapy may alleviate body image dissatisfaction and gender dysphoria in certain transgender adults, potentially facilitating the cultivation of a positive body image (Grift et al., 2017; Vries et al., 2014). In this study, although 72% of the participants are currently undergoing transition, the average age at the onset of transition was 21 years, with a mean participant age of 23 years. This demographic profile suggest that a substantial portion of the sample is situated in the early phases of transition. Consequently, the relatively low levels of satisfaction reported may be attributed to the fact that many individuals have yet to experience significant and visible bodily changes associated with hormone therapy, such as changes in fat distribution, muscle mass, and secondary sexual characteristics. In this sense, access to affirming healthcare services is crucial for transgender individuals in managing their satisfaction with body image. Medical interventions such as hormone therapy and gender-affirming surgeries can be essential steps in aligning an individual's physical body with their gender identity and alleviating dysphoria.

Relationship between Anxiety, Depression and Satisfaction with Body Image

The study revealed significant correlations between satisfaction with body image and levels of anxiety and depression, with both anxiety and depression showing negative associations with body image satisfaction. This is not surprising, given that body image is multidimensional construct that involves thoughts, feelings, and perceptions about the body (Cash, 2004) and many transgender individuals experience gender dysphoria, which can trigger a cascade of negative psychological processes (Dube et al., 2024). Additionally, the fact that the sample is in the early stages of the transition process seems to enhance the clarity and significance of the relationship between mental health outcomes and body image satisfaction. In fact, an incongruent physical appearance may result in more difficult psychological adaptation and in more exposure to discrimination and stigmatization (van de Grift et al., 2016).

Similar results have also been found in other studies, which show that dissatisfaction with body image can lead to feelings of shame and depression, especially when trans individuals face pressure to conform to body ideals (Hong et al., 2023; McGuire et al.,

2016; Strübel et al., 2020). A multiple group analysis indicated that thin-ideal and muscular-ideal internalization were linked to body shame and depression through body monitoring and appearance comparison among trans individuals (Strübel et al., 2020). This finding suggests a potential explanation for why global satisfaction with body image accounted for 60% of the variance in depressive symptomatology in our study.

These results can also be understood through the lens of Objectification Theory, which proposes that individuals, particularly women, are frequently objectified and judged based on their physical appearance. This objectification can lead to various negative consequences, including body dissatisfaction, self-objectification, and mental health issues (Fredrickson & Roberts, 1997). The internalization of societal ideals of beauty and gender norms can contribute to body dis satisfaction and self-objectification in transgender individuals, as they often face judgment based on their physical appearance for not conforming to stereotypical norms of masculinity or femininity and feel pressure to be accepted and legitimized in society. Comiskey's model (Comiskey et al., 2020) highlights how transgender women are subjected to objectifying gazes and judgments based on societal beauty standards and traditional gender norms, which further contribute to body dissatisfaction, self-objectification, and negative psychological outcomes such as anxiety and depression. This understanding, grounded in Objectification Theory, underscores the importance of addressing societal pressures and challenging restrictive beauty standards in mental health interventions, particularly for individuals vulnerable to anxiety and depression.

Practical Implications

The results of this study provide a comprehensive and insightful understanding of the relationship between the transgender population and various health issues, while also illuminating the complex interplay between PA, satisfaction with body image, and mental health in transgender individuals. The insights from this study hold particular significance within the context of Portugal's evolving socio-cultural and legal landscape regarding transgender rights and healthcare. By enhancing our understanding of these relationships, researchers, health professionals, and Portuguese policymakers can develop more effective strategies to support the mental health and well-being of transgender individuals.

Reevaluating existing policies and implementing new ones to ensure equitable access to gender-affirming healthcare services is essential within the Portuguese context. Efforts should target reducing discrimination in healthcare settings and investing in education and training for healthcare providers on transgender issues and identities. The professionals should consider assessing and addressing both mental health and body image concerns as part of comprehensive care. Providing inclusive and accessible healthcare that address body dissatisfaction in the interventions for people with gender dysphoria is crucial for transgender individuals in managing their satisfaction with body image and to improve mental health outcomes. Furthermore, the development and implementation of inclusive programs that promote body acceptance and coping strategies, particularly within the context of physical exercise, may also help alleviate the distress related to body image dissatisfaction while also addressing underlying anxiety and depression symptoms.

Specific legislation and policies are needed within the Portuguese context to protect and promote the participation of transgender individuals in physical exercise and sports. This legislation should ensure that gyms and exercise professionals do not focus their evaluation exclusively on the participants' body image and aesthetics but instead adopt an inclusive approach that acknowledges and celebrates the diversity of bodies while prioritizing the promotion of overall well-being. Creating safe and appropriate spaces, such as inclusive bathrooms and changing facilities, is crucial to fostering transgender individuals' participation in physical exercise and sports in Portugal. Regular monitoring of variables related to mental health and body image satisfaction by multidisciplinary teams involving psychologists, physicians, and other professionals is also essential.

Having a broad and specific knowledge of the characteristics and concerns of this population is important not only for establishing treatment plans but also for preventing the emergence of mental health disorders, body image disturbances, and complications arising from sedentary behavior or compulsive exercise. The practical implications of the results of this study and the broader literature on physical and psychological health among the transgender population are important and should be considered, especially by Portuguese health professionals, policymakers, and community organizations.

Limitations and Future Directions

One limitation of the present study is the absence of exploration into diverse profiles within the sample and the lack of control for other areas of mental health among the participants. Future studies should investigate potential differences in body image satisfaction, PA levels, and symptoms of anxiety and depression based on gender identity (e.g., trans men, trans women, non-binary individuals), generational cohorts (e.g., younger, older adults), and stages of gender transition (e.g., pre-transition, transitioning, post-transition). The study may not control all the potential confounding variables that could influence the relationship between PA, anxiety, depression, and body image. Factors such as access to gender-affirming healthcare, social support, and experiences of discrimination could impact the outcomes among transgender individuals. Furthermore, the study had a cross-sectional design, which entails data collection at a singular time point. This approach does not facilitate the establishment of direct causal relationships, so longitudinal/experimental studies should be considered. For example, a longitudinal study could be conducted to evaluate the effects of an exercise program on transgender individuals and to examine changes in the variables over time, exploring potential causal relationships between exercise and health outcomes. Additionally, future research should analyze the moderating effect of satisfaction with body image, along with the use of more robust methods for monitoring physical activity (e.g., accelerometers) and include a larger sample and involve the analysis of individuals at different stages of transition. By examining individuals across various stages of their transition process, researchers can identify any variations, which facilitates a better understanding of the mechanisms underlying the relationships between PA, satisfaction with body image, and mental health outcomes among transgender individuals.

Conclusions

The results suggest that transgender individuals meet the WHO's PA recommendations of at least 600 MET minutes per week. However, they exhibit elevated levels of anxiety symptoms and low levels of body image satisfaction, particularly in specific body parts, such as the upper trunk and lower trunk. The results also show that satisfaction with body image was negatively associated with both anxiety and depression symptomatology. Thus, satisfaction with body image explains 40% of the variance in

depressive symptomatology and body appearance explains 24% of the variance in anxiety symptomatology among trans individuals.

GENERAL CONCLUSIONS

The results revealed throughout this dissertation not only consolidate the evidence previously established in the literature but also provide new and important insights regarding the physical and psychological health of transgender individuals. Consequently, considering the principal objectives and outcomes of this work, the conclusions can be succinctly into four key points:

i) Trans individuals may demonstrate ambivalent attitudes towards physical activity, characterized by either reduced levels of engagement or involvement in compulsive exercise.

ii) The positive effects of physical activity on mental health may not translate similarly for transgender individuals, likely due to the presence of unique stressors such as discrimination and gender dysphoria.

iii) Trans individuals exhibit high levels of anxiety symptoms and low levels of satisfaction with their body image, particularly concerning gender-identifying body parts.

iv) Global satisfaction with body image explains 60% of the variance in depressive symptomatology and body appearance explains 46% of variance in anxiety symptomatology among trans individuals.

This work makes a valuable contribution towards future research and contributes to increasing knowledge about the needs and concerns of trans individuals. In fact, the findings provide valuable insights for action and offer numerous practical implications that should be considered by professionals, associations, and institutions working with the transgender population. Specifically, health and sports professionals (e.g., coaches, fitness and sports managers, physical education teachers), as well as policymakers should collaborate in a multidisciplinary approach aimed at alleviating anxiety symptoms, promoting body image acceptance, and fostering more active and healthy lifestyles in this population. Therefore, this work suggests a series of practical implications that can be translated into policies and strategies:

i) Ensuring improved monitoring of LGBTQIA+ individuals within the National Health Service, by reinforcing units with specialized services in the health of transgender individuals.

ii) Investing in the education and training of healthcare and exercise professionals regarding transgender issues and identities, focusing on providing a inclusive and accessible healthcare. In the context of physical exercise, creating safe and appropriate spaces such as inclusive bathrooms and changing facilities can be an important strategy for transgender people.

iii) Integration of mental health screening and support services into fitness and sports programs for transgender individuals. Some strategies can be incorporate regular mental health assessments as part of fitness and sports programs for transgender individuals and establish collaborative partnerships with mental health professionals.

iv) The development and implementation of inclusive programs that promote body acceptance and coping strategies, within the context of physical exercise. The integration of psychologists within gym environment can be a strategy for developing activities that promote body awareness and body self-compassion, while engaging in physical activity. For example, psychologists may lead pre or post workout mindfulness sessions.

v) In the context of physical exercise, gyms should not focus their evaluation exclusively on the participants' body image and aesthetics. Instead, the focus should be on the process, emphasizing improvements in mood, energy levels, stress reduction, self-confidence, and overall well-being. It is important that exercise professionals develop training plans tailored to the person's needs, preferences, motivations, and goals.

Despite all the findings found in this work that translate a set of practical implications, there are also some limitations that must be addressed and considered in future research. One of the main limitations of this study focuses on the exclusion of various confounding factors that could potentially influence the association between PA, anxiety, depression, and body image. Specifically, variables such as access to gender-affirming healthcare, social support, and experiences of discrimination could exert

significant influence on outcomes within the transgender community. Furthermore, the study had a cross-sectional design, which involves data collection at a singular time point. This approach does not facilitate the establishment of direct causal relationships. These limitations must be taken into consideration by researchers who should, in future studies:

i) Prioritize and include a comprehensive assessment of confounding variables, through assessment instruments appropriate to the reality and context of the trans community, thereby enhancing the validity and applicability of findings regarding the relationship between PA and mental health outcomes among trans individuals. For example, include quantitative measurement instruments that assess disparities in health care, the quality, quantity, and perception of social support from diverse sources such as family, friends, and partners, and that quantify the frequency and impact of discrimination situations in different domains of life. Also, qualitative methods such as interviews or focus groups may offer deeper insights into these topics.

ii) Conducting longitudinal studies with a larger sample size. Participants engage in a physical exercise program over several months, during which variables such as anxiety, depression, and body image will be monitored and evaluated at multiple time points. Additionally, it's crucial to develop randomized controlled trials (RCT), where participants could be randomly assigned to either an exercise group or a control group (no intervention or a different form of intervention). This approach is important for evaluating the effects of an exercise program on transgender individuals and for examining changes in variables over time, exploring possible causal relationships between exercise and health outcomes.

iii) Integrating objective measures of PA, such as accelerometers or fitness trackers, which can enhance the precision and reliability of the data and allows for more accurate assessments of the dose-response relationship between PA and mental health outcomes.

iv) Have multidisciplinary research teams, including exercise specialists, psychologists, and physicians to develop research projects focused on the physical and psychological health of transgender people.

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