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ABSTRACT

Studies have suggested that in the general population, the lack of physical activity (PA) can lead to depression (D). Similar studies have been performed among adult cancer survivors, mostly in North America. The results of those studies may not necessarily be applicable to populations from all over the globe, due to variations in culture, diet, etc. As an example, the association between PA and D among cancer survivors residing in South American countries has not yet been investigated. The purpose of this study is to utilize the Brazilian National Health Survey to investigate this association among Brazilian cancer survivors (BCS). The present study included data collected from 930 adult BCS, respondents to the national household-based survey conducted in Brazil from August 2013 until February 2014. Multivariable weighted logistic regression analysis were performed to investigate the association between PA and D among BCS, while adjusting for possible confounders such as: age, gender, race, education, health insurance, marital status, time since cancer diagnosis, and comorbidities. All statistical analyses were performed using SAS v9.4. Statistical significance level was set to 0.05. The results include descriptive statistics, unadjusted and adjusted odds ratios. Present study findings open a door for future investigations trying to better understand the risk factors associated with D among BCS.

INTRODUCTION

A better understanding of the relationship between PA and D is important because D affects around 350 million people worldwide¹ and has become the leading cause of disability in developed nations². In addition, D is predicted to be the second leading cause of disability in developing nations by 2020³. While the association between PA and D has been well-studied in the general population, few studies have focused their attention to understanding this relationship among cancer survivors. In 2012 it was estimated that 8 million out of 14.1 million new cancer cases worldwide occurred in economically developing countries where 82% of the world's population is located⁴. Prior research has shown that a significant percentage of cancer survivors are at risk for psychological sequelae, which in turn can lead to reduced quality of life⁵ and suicide ideation⁶. While D among cancer survivors has been largely investigated in United States⁷, there is a lack of research in this field in South American countries such as Brazil. The goal of the present study is to investigate the prevalence of current D and the association between current PA and D in a large, population-based representative sample of BCS.

METHODS

The sample for this study was based on the “Pesquisa Nacional de Saúde” (PNS) – a national health survey conducted in Brazil in 2013-2014⁸ by the Brazilian Ministry of Health in partnership with the Brazilian Institute of Geography and Statistics. Out of 60,202 individuals who participated in the PNS survey, 59,179 were excluded from the present study having never been diagnosed with cancer. Pregnant women at the time of the survey (N=3) and individuals with less than 1 year since initial cancer diagnosis (N=90) were also excluded from this study. The final study sample size was 930. Multivariable logistic regression models were conducted to investigate the association between current PA and D among BCS while adjusting for possible confounders: age, gender, race, marital status, education, insurance, and having one or more D related comorbidities (diabetes, cardiac problems, asthma, arthritis or rheumatism, and pulmonary impairment). The multiplicative interaction effect between gender and PA was also investigated and where found significant a gender-subgroup analysis was performed. Statistical analyses were performed in SAS v9.4 (SAS Institute, Cary, NC, USA).

CONCLUSION

To our knowledge, this study is the first to examine the association between PA and D in a representative sample of BCS. Findings from this study show that current PA is not significantly associated with current D in female BCS, but has the potential to be significantly associated with current D in male BCS. In summary the present study extends on the body of existing literature and brings to the attention an important cultural aspect that can play an essential role on the impact that PA may have on the psychological well-being of BCS. More studies will need to be performed to better understand this association and possible causality among BCS.

RESULTS

Characteristics	Overall (N = 930)		Current Depression				p-value	
	Unweighted counts	Weighted		Yes (N = 84)		No (N = 846)		
		Median	Interquartile range	Median	Interquartile range	Median		Interquartile range
Age at survey	930	61.23	59.26 - 63.20	57.79	56.48 - 59.09	61.54	59.53 - 63.55	0.54*
Time since initial cancer diagnosis	930	6.08	2.12 - 12.54	9.5	3.41 - 18.18	5.89	2.04 - 12.25	0.0008*
	Unweighted counts	Weighted		Weighted		Weighted		
		Percent	95% CI for Percent	Percent	95% CI for Percent	Percent	95% CI for Percent	
Gender								
Female	614	58.69	53.88 - 63.50	83.59	73.06 - 94.12	56.88	51.88 - 61.88	0.0003**
Male	316	41.31	36.50 - 46.11	16.41	5.88 - 26.94	43.12	38.12 - 48.12	
Race								
White	579	68.44	64.56 - 72.31	60.92	46.33 - 75.51	68.98	64.95 - 73.02	0.0274**
Brown	279	23.46	19.94 - 26.97	19.69	11.54 - 27.83	23.73	19.98 - 27.48	
Other	72	8.10	5.77 - 10.45	19.39	3.45 - 35.34	7.29	5.06 - 9.51	
Marital status								
Married	420	57.85	53.38 - 62.31	53.47	39.60 - 67.34	58.17	53.51 - 62.82	0.7690 **
Separated, divorced or widower	306	26.17	22.53 - 29.81	30.55	20.07 - 41.03	25.85	22.05 - 29.66	
Single	204	15.98	12.23 - 19.73	15.98	3.87 - 28.09	15.98	12.07 - 19.89	
Education								
Less than high school	522	57.41	52.45 - 62.37	68.95	56.80 - 81.09	56.57	51.29 - 61.85	0.1003**
Completed high school	181	18.79	14.99 - 22.59	18.18	7.16 - 29.21	18.84	14.80 - 22.87	
More than high school	227	23.80	19.13 - 28.46	12.87	6.39 - 19.35	24.59	19.65 - 29.53	
Health insurance								
Yes	399	44.40	39.79 - 49.02	31.9	19.28 - 44.52	45.31	40.49 - 50.14	0.0621**
No	531	55.60	50.98 - 60.21	68.1	55.48 - 80.72	54.69	49.86 - 59.51	
Number of comorbidities								
0	561	62.30	57.88 - 66.72	45.74	31.24 - 60.23	63.50	58.96 - 68.05	0.0165**
≥ 1	369	37.70	33.28 - 42.12	54.26	39.77 - 68.76	36.50	31.95 - 41.04	
Physically active								
Yes	286	31.95	27.18 - 36.71	25.51	12.69 - 38.32	32.41	27.39 - 37.44	0.3503**
No	644	68.05	63.29 - 72.82	74.49	61.68 - 87.31	67.59	62.56 - 72.61	

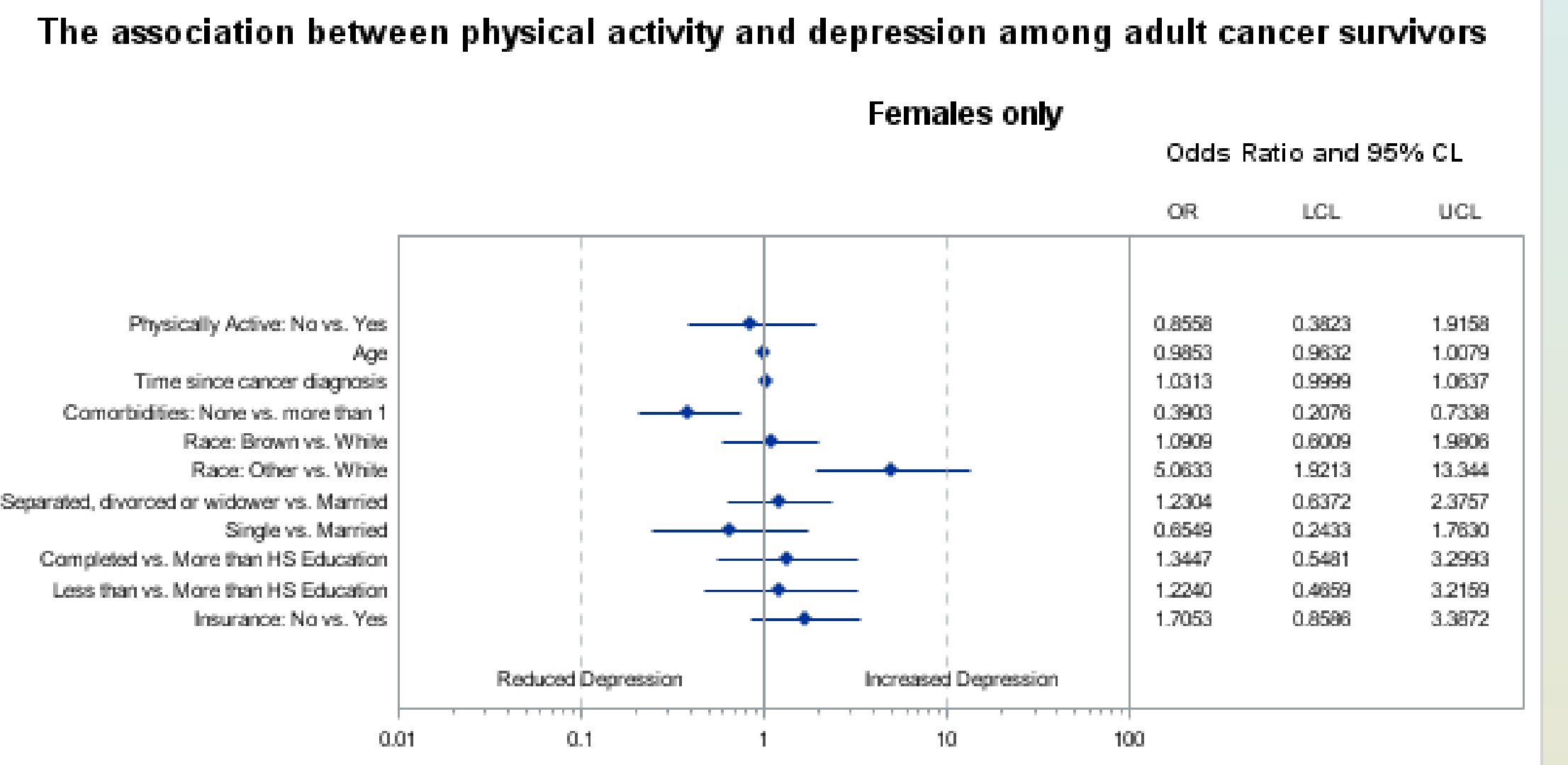
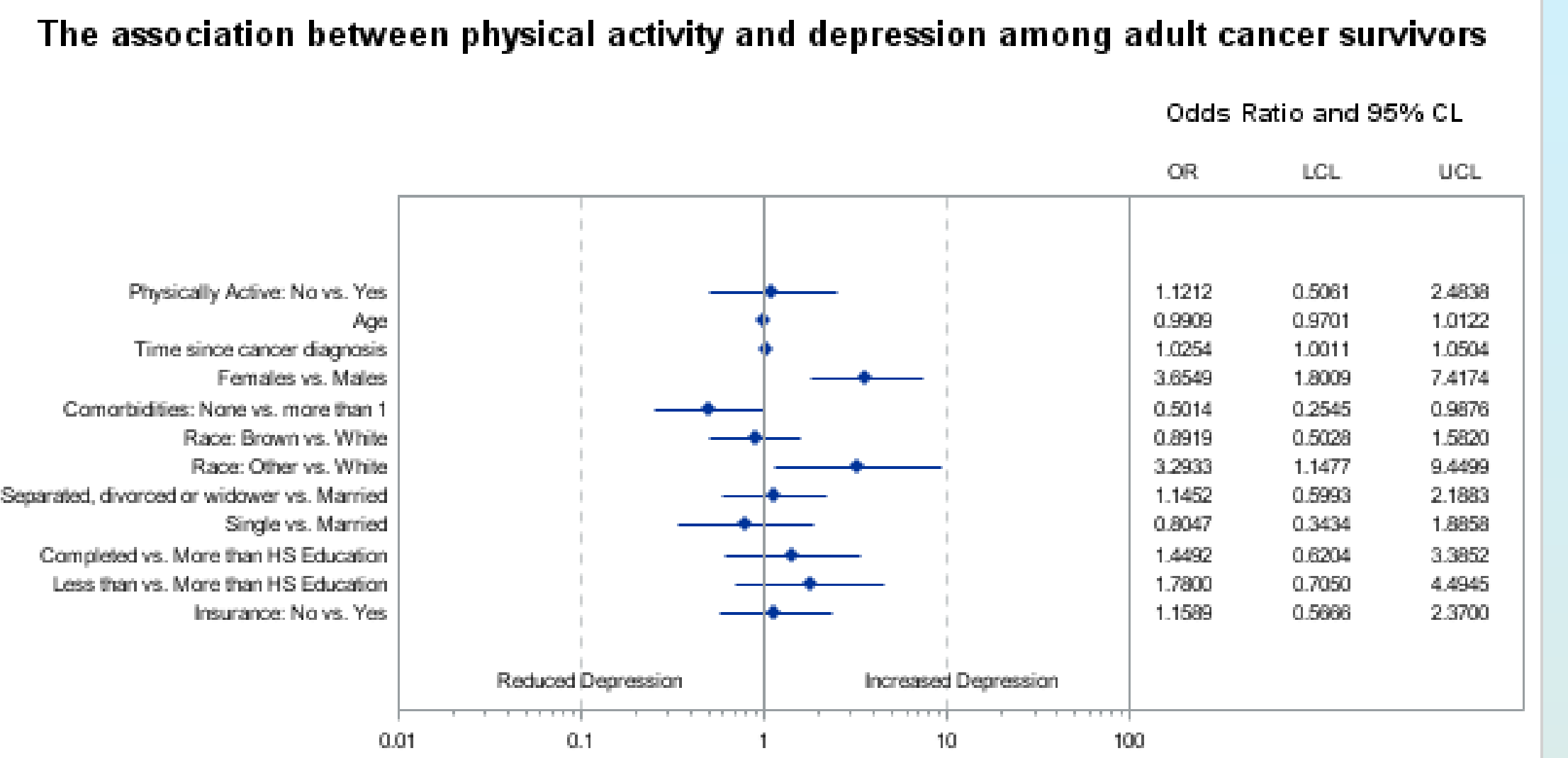
* Based on unadjusted weighted logistic regression
** Based on the Rao-Scott Chi-Square Test, which is the design adjusted equivalent of the Pearson Chi-square test

Exposure of interest		Unweighted counts	Symptoms of current depression	
			UOR (95% CI)	AOR (95%)
Physical activity among adult BCS	Yes	286	Ref	Ref
	No	644	1.4 (0.69, 2.86)	1.12 (0.51, 2.48)
Physical activity among adult BCS - Females only	Yes	194	Ref	Ref
	No	420	1.31 (0.64, 2.68)	0.86 (0.38, 1.92)
Physical activity among adult BCS - Males only	Yes	92	Ref	N/A*
	No	224	12.62 (1.72, 92.64)	

UOR = Unadjusted Odds Ratio; AOR = Adjusted Odds Ratio; Adjustment was made for gender, age, race, marital status, education, insurance and number of comorbidities; * Adjusted analyses could not be performed due to a very small number of individuals having the outcome of interest - current depression (N=8)

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