ORIGINAL RESEARCH ARTICLE

The same storm but not the same boat: Effects of COVID-19 stay-at-home order on mental health in individuals with overweight

Mara C. Lofrano-Prado[1] [ID] | Wagner Luiz do Prado[2] | Joao Paulo Botero[3] |
Michelle L. Cardel[4] | Breno Q. Farah[5] | Max D. Oliveira[6] | Gabriel G. Cucato[7] |
Marilia A. Correia[6] | Raphael M. Ritti-Dias[6]

[1]Mentone, California

[2]Department of Kinesiology, California State University-San Bernardino, San Bernardino, California

[3]Human Movement Science and Rehabilitation Graduation Program, Sao Paulo Federal University, São Paulo, Brazil

[4]Department of Health Outcomes and Biomedical Informatics and Pediatrics, University of Florida College of Medicine, Gainesville, Florida

[5]Universidade Federal Rural de Pernambuco, Recife, Brazil

[6]Universidade Nove de Julho, São Paulo, Brazil

[7]Department of Sport, Exercise and Rehabilitation, Northumbria University, Newcastle upon Tyne, UK

Correspondence
Wagner Luiz do Prado, Department of Kinesiology, California State University San Bernardino, University Parkway 92407, CA 5500.
Email: wagner.prado@csusb.edu

Summary

Objective: To describe the effects of stay-at-home orders and social distancing during the coronavirus disease (COVID-19) outbreak on mental health and to compare these outcomes between individuals with normal weight and overweight.

Methods: This cross-sectional study included 1857 Brazilian adults, who were invited through social media to answer an online questionnaire from 5 May 2020 to 17 May 2020. The instrument included questions related to health behaviour, mental health (anxiety, depression, self-esteem, sadness and stress) and overall health. Overweight was defined as body mass index (BMI) $\geq$ 25 Kg/m^2. Multiple logistic regression was conducted to identify whether overweight is associated with mental health variables.

Results: Women reported increased anxiety (36.5% vs 22.2%, $P < .01$), depression (16.2% vs 8.8%, $P < .01$), low self-esteem (19.8% vs 10.6%, $P < .01$), sadness (17.7% vs 10.2%, $P < .01$), and stress (29.5% vs 19.3%, $P < .01$) relative to men. Women with overweight are more likely to report higher feeling of anxiety (OR 1.62, CI 95% 1.22-2.14), depression (OR 1.79, CI 95% 1.25-2.55), low self-esteem (OR 1.82, CI95% 1.28-2.58) and sadness (OR 1.51, CI 95% 1.08-2.10), adjusted for age, social isolation days, educational level, chronic diseases, smoke, alcohol intake and physical activity.

Conclusion: Women, specially those with overweight are more vulnerable to the deleterious effects of stay-at-home orders on mental health during the COVID-19 pandemic.

KEYWORDS

coronavirus infections, overweight, psychological distress, psychology, quarantine

1 | INTRODUCTION

The 2019 new coronavirus disease (COVID-19) pandemic is the largest outbreak in decades.[1] With the lack of specific pharmacological treatment and vaccine options to prevent the spread of COVID-19, both "stay-at-home" measures and social isolation has been proposed by the World Health Organization in order to flatten the curve of COVID-19 infection and reduce the spread of the virus. While studies suggest a mitigating effect of social distancing on the disease spread,[2,3] boredom, frustration and a sense of isolation may lead to unintended consequences on mental health.[4,5]

Sex and weight status have been associated with adverse mental health outcomes.[6] Specifically, women and individuals with overweight have an increased risk to develop mental struggles, such as depression and anxiety.[7] Therefore, it is plausible to speculate that these groups are more likely to suffer deleterious effects of living through a pandemic and social isolation on mental health. In this study, we describe the effects of stay-at-home orders and social distance during the COVID-19 outbreak on mental health and to compare these outcomes between individuals with normal weight and overweight. We posit that women and individuals with overweight will be negatively affected by stay-at-home orders and social isolation resulting from COVID-19.

2 | MATERIALS AND METHODS

2.1 | Sample and ethics

This survey was conducted in Brazil between 5 May 2020 and 17 May 2020. Participants were invited through social media (Facebook, Twitter, Instagram and WhatsApp) to answer an online questionnaire. This study was approved by the Universidade Nove de Julho' Ethics Committee (CAAE #30890220.4.0000.5511). Consent was provided and participants did not identify themselves in the survey. All procedures follow the Declaration of Helsinki. Inclusion criteria was limited to adults ages 18 or older and completing all responses within the survey.

2.2 | Procedures

After ethics approval, a questionnaire (in Portuguese) in Google Forms was presented to participants with 70 questions divided into seven domains: (a) personal information; (b) COVID-19 personal care; (c) physical activity; (d) eating behaviour; (e) health risk habits; (f) mental health; (g) overall health. For the purpose of the present study relevant questions in the following domains were included: (a) personal information, (b) Covid-19 personal care, (c) physical activity, (e) health risk habits, (f) mental health and (g) overall health domains.

2.3 | Domains

2.3.1 | Mental health

This domain is composed of 6-self-reported items to identify individuals' feelings related to the COVID-19 pandemic. The following questions were used: (1) Due to COVID-19, are you feeling more anxious than usual?, (2) Due to COVID-19, are you feeling more sad than usual?, (3) Due to COVID-19, are you feeling more stressed than usual?, (4) Due to COVID-19, are you feeling more depressed than usual? and (5) Due to COVID-19, are you feeling lower self-esteem than usual? Responses included a Likert scale with responses ranging from "No, a little, sometimes, very often, or always."

What is already known about this subject?

- Overweight has been associated with increased risks of biological health-related complications by COVID-19.
- Women with obesity/overweight have an increased risk to develop mental struggles, such as depression and anxiety.

What this study adds?

- Women with overweight are more likely to report higher levels of anxiety, depression and sadness, and lower self-esteem relative to women with normal weight.
- The present data provide the opportunity to make meaningful change at the policy level, and demonstrate need for increasing mental health resources during these difficult times.

2.3.2 | Personal information

From this domain three self-reported information was collected including: (1) Sex (possible answers: "woman or man"), (2) Date of birth (DD/MM/YYYY) and (3) Educational level (open question).

2.3.3 | Overall health

This domain assesses the presence of diagnosed diseases. From the list of diseases, the participant was asked to mark all that apply. (Possible answers: Hypertension, diabetes, high cholesterol, high triglycerides, depression, arthritis/osteoarthritis/rheumatism, asthma, cardiopathy or other). In this domain, we also asked "what is your weight (in kilograms)?" and "what is your height (in centimetres)?"

2.3.4 | COVID-19 personal care

The question "how long have you (in days) experienced social isolation? was included as an open question.

2.3.5 | Physical activity

The questions included: (1) How many times are you exercising a week? (possible answers: "none, 1, 2, 3, 4, 5, 6, 7"), (2) For how long are you exercising daily? (possible answers: "none, less than 30 min, between 30 and 60 minutes, more than 60 minutes"), and (3) What is the intensity of the physical activity? low: standing work, light household chores; medium: walking and other moderate activities; high:

jogging, running or other intense activities (possible answers: "low, medium/moderate, high, i am not exercising").

2.3.6 | Health risk behaviour

This domain aimed identify health-related behaviours. Questions included: (1) Do you smoke? (possible answers were: "yes or no"), and (2) Do you drink alcohol? (possible answers were: "yes or no");

2.3.7 | Overweight definition

Height and weight were self-reported (overall health domain) and used for standard BMI calculation (kg/m^2). Following the WHO recommendations,[8] overweight was defined as BMI ≥ 25 Kg/m^2.

2.4 | Statistical analysis

Frequency and mean (95% confidence interval) were used for descriptive analyses. Multiple logistic regression was conducted to identify the extent to which weight status is associated with mental health variables during COVID-19 (changes in of anxiety, depression, self-esteem, sadness and stress). Multiple logistic regression was adjusted

for confounders (age, social isolation days, educational level, pre-existing depression, chronic disease status, smoker, alcoholic beverages and physical activity level). In multivariate models we also tested for interactions of sex for the studied variables. The Hosmer-Lemeshow test was used to assess the model's goodness-of-fit. The significance level was set at $P < .05$ for all analyses. All statistical analyses were made in the Statistical Package for the Social Sciences software -SPSS/PASW version 20 (IBM Corp, New York).

3 | RESULTS

Participants include 1895 adults, but 46 did not answer all questions and were not included in the present analyses. The final sample was composed of 1854 adults living in Brazil. Table 1 includes participant characteristics and psychological variables of subjects included in this study according to sex and weight status. Overweight women and men were significantly older ($P < .001$), higher body mass index ($P < .001$), had spent less days in social isolation ($P = .026$), were more likely to chronic diseases ($P < .001$) compared to normal weight. Overweight women were more likely be physically active and to report increases in anxiety, depression, low self-esteem, sadness and stress related to COVID-19 than normal weight women ($P < .001$). Consume alcohol was higher in overweight men than normal ones ($P < .001$).

TABLE 1 Participant characteristics and psychological variables stratified by sex

Variables	Men (n = 769)			Women (n = 1085)		
	Normal	Overweight	P	Normal	Overweight	P
Age (years old)	34.8 ± 13.3	42.0 ± 13.2	<.001	35.4 ± 11.8	40.1 ± 13.0	<.001
Social isolation (days)	41.9 ± 16.3	43.3 ± 14.3	.243	44.7 ± 13.5	44.1 ± 15.7	.500
Body index mass (kg/m^2)	23.0 ± 1.6	29.3 ± 3.7	<.001	22.0 ± 1.9	29.1 ± 4.5	<.001
Pre-existing chronic disease (% Yes)	20.2	35.5	<.001	25.6	43.6	<.001
Pre-existing depression (% Yes)	2.3	3.0	.590	5.4	8.3	.053
Pre-existing diabetes (% Yes)	1.1	1.8	.504	0.8	1.9	.152
Smoker (% Yes)	8.0	6.9	.574	3.5	5.1	.203
Alcohol intake (% Yes)	65.4	77.4	<.001	60.7	60.5	.943
Physically inactive (% Yes)	64.9	69.0	.244	69.3	81.2	<.001
Weight status						
Overweight (% Yes)	–	67.3	–	–	69.8	–
Class 1 obesity (% Yes)	–	25.7	–	–	23.2	–
Class 2 obesity (% Yes)	–	5.4	–	–	4.4	–
Class 3 obesity (% Yes)	–	1.6	–	–	2.6	–
Mental health variables in relations to COVID-19						
Increased anxiety (% Yes)	21.4	22.9	.635	33.7	40.3	.029
Increased depression (% Yes)	9.2	8.9	.902	14.0	19.7	.013
Lower self-esteem (% Yes)	9.9	10.5	.819	14.7	21.8	.003
Increased sadness (% Yes)	11.8	10.3	.505	17.5	22.7	.035
Increased stress (% Yes)	19.5	19.5	.984	29.0	30.2	.690

Note: Data presented as mean ± SD or frequency.

TABLE 2 Crude and adjusted odds ratios (OR) and confidence interval (CI 95%) for the association between overweight and mental health variables in men and women

		Men		Women	
		Crude OR (CI 95%)	Adjusted OR (CI 95%)	Crude OR (CI 95%)	Adjusted OR (CI 95%)
Increased anxiety (% Yes)	Normal weight	1	1	1	1
	Overweight	1·09 (0·76-1·57)	1·29 (0·87-1·93)	1·32 (1·03-1·70)	1·63 (1·22-2·16)
Increased depression (% Yes)	Normal weight	1	1	1	1
	Overweight	0·97 (0·58-1·63)	1·18 (0·67-2·10)	1·51 (1·09-2·08)	1·88 (1·30-2·70)
Lower self-esteem (% Yes)	Normal weight	1	1	1	1
	Overweight	1·06 (0·65-1·74)	1·51 (0·88-2·60)	1·61 (1·18-2·21)	1·90 (1·34-2·69)
Increased sadness (% Yes)	Normal weight	1	1	1	1
	Overweight	0·85 (0·53-1·37)	1·13 (0·68-1·90)	1·39 (1·02-1·87)	1·57 (1.12-2·10)
Increased stress (% Yes)	Normal weight	1	1	1	1
	Overweight	1·00 (0·69-1·46)	1·30 (0·86–1·97)	1·06 (0·81-1·38)	1·20 (0·90-1·61)

Note: CI 95% to 95% confidence intervals. Adjusted for age, social isolation days, educational level, chronic diseases, smoker, alcoholic intake, pre-existing depression, and physical activity level.

There was an interaction between sex and overweight status for mental health variables ($P < .001$). Amongst women, overweight was positively associated with increased anxiety, depression, and sadness, and lower self-esteem ($P < .050$ for all). Stress was not significantly associated with weight status. Amongst men, overweight was not significantly associated with mental health variables. For all regressions, the Hosmer-Lemeshow test was not significant. (Table 2)

4 | DISCUSSION

In this study, we examine the extent to which stay-at-home order and social isolation during the COVID-19 pandemic affected self-reported mental health changes amongst men and women with varying weight status. We observed that during the COVID-19 pandemic (1) women reported worse mental health compared to men, (2) women with overweight are more likely to report higher levels of anxiety, depression, and sadness, and lower self-esteem relative to women with normal weight and (3) weight status is not associated with mental health amongst men.

A systematic review showed the overall prevalence of depressive symptoms amongst Brazilian adults prior to the initiation of COVID-19 was 14% (95% CI 13-16; I2 = 99.5%). The prevalence of 1-year major depressive disorder amongst Brazilian adults was 8% (95% CI 7-10; I2 = 86.7%), and the prevalence was higher amongst Brazilian woman in both depressive symptoms and major depressive disorder.[9] A 2019 study amongst adults in Sao Paulo (n = 5037) found 19.9% presented with an anxiety disorder, and anxiety disorders were more frequent in women.[10]

From a biological perspective, studies have demonstrated that men are facing more health complications and hospitalization,[11] as well as higher risk to death related to the COVID-19 compared to women.[12] However, our data suggests that women are more vulnerable than men to being adversely affected in mental health outcomes resulting from COVID-19. Our results are consistent with findings from a survey conducted with 52 730 individuals in China during the COVID-19 pandemic, which found that women had significantly higher psychological distress than their male counterparts did. One potential explanation is that women may suffer more due the dramatic changes in lifestyle habits during the pandemic, such as isolation, disproportionate burden on home and childcare demands, resulting in impaired mental health outcomes.[13,14]

Overweight status has been associated with increased risks of biological health-related complications by COVID 19.[11,15] Noteworthy, individuals with obesity are more likely to present with adverse mental health problems.[16] A recent online survey conducted with a local clinical sample of adult patients with obesity (n = 123; 87% female) demonstrated COVID-19 stay-at-home orders adversely affected several health-related outcomes, including anxiety (72.8%) and depression (83.6%).[17] Our results add new data to the current literature showing that women with overweight present 62% more chance to present feelings of anxiety, 79% more chance to present feeling of depression, 82% more chance to present feelings of sadness and 51% more chance to present feelings of decreased self-esteem than their normal weight peers as a result of COVID-19.

The quarantine and social isolation have a differential negative impact on mental health by sex. Though all participants were in the same storm of COVID-19, women, particularly those with overweight, appear to be in a different boat, and are more susceptible to mental health suffering during the outbreak. Clinicians may better serve by being aware of potential vulnerabilities patients are facing in order to provide the adequate support to minimize the side-effects of stay-at-home order and social isolation due to the COVID-19 pandemic.

Remote strategies to tackle psychological consequences during COVID-19 pandemic, especially amongst women with overweight could be useful. Evidence demonstrates telemedicine including psychosocial interventions, particularly cognitive behavioural therapy via telephone or videoconference, can improve quality of life, depression, and anxiety in clinical populations.[1,18] Even with insufficient data for the effectiveness of eHealth interventions for individuals with overweight, this can be considerate as alternative strategy during the COVID-19 pandemic.[19]

Also, we can suggest that family and friends must be aware of these issues and try to support their beloved ones.

It is important to note that our use of self-reported height and weight can lead to an underestimation of BMI. In addition, we assessed self-reported changes in depression, anxiety, self-esteem and sadness, but this data is not diagnostic, nor can it be related to diseases or symptoms of mental health disorders. The use of non-validated questionnaires to assess the psychological outcomes, the lack of information about mental health status for participants prior to stay-at-home orders, and the lack of data related to household size and socioeconomic status are limitations of the present study. Moreover, the population recruited for this study is not a representative sample, thus results may not be widely generalizable.

Our data suggest that women are more susceptible to the deleterious effects of stay-at-home orders and social isolation and women with overweight are at a greater risk to face mental health problems than normal weight peers.

ACKNOWLEDGEMENTS

CONFLICTS OF INTEREST

The authors declared no conflict of interest.

AUTHOR CONTRIBUTIONS

Mara C. Lofrano-Prado and Wagner L. Prado designed the study. Wagner L. Prado, Raphael M. Ritti-Dias, Marilia A. Correia, Gabriel Cucato and Joao Paulo Botero contributed to the design and implementation of the research. Breno Q. Farah and Max D. Oliveira performed the analysis and designed the figures. Mara C. Lofrano-Prado, Wagner L. Prado and Michelle Cardel analysed the data. Mara C. Lofrano-Prado and Wagner L. Prado wrote the article with input from all authors. All authors contributed to manuscript revision, read and approved the submitted version.

ORCID

Mara C. Lofrano-Prado https://orcid.org/0000-0002-8296-3024

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SUPPORTING INFORMATION

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