







Health risk behaviors before and during COVID-19 and gender differences

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Abstract

Changes in routines and habits, fear of contamination from the coronavirus disease 2019 (COVID-19) virus, and economic crisis have resulted in significant impacts upon individuals' lives, health, and risk behaviors. The present study aims to analyze health risk behaviors and gender differences of Portuguese adults before and during the COVID-19 pandemic. A quantitative analysis using SPSS v. 26 software presents the evaluation of 5746 responses ($M = 48.5$ years, $SD = 14.3$), of which 67.7% were female. *t* Test was used to study differences in means before and during the pandemic and analysis of variance test to analyze gender differences. In the comparative study before and during the pandemic showed a decrease in the number of meals per day, physical activity and perception of sleep quality; an increase in tobacco use, beer consumption, and media use (TV, mobile phone, social networks, and online games). Gender differences study demonstrated that the number of meals per day suffered a decrease from pre to pandemic in women, while increasing in men, becoming prominent in the second moment under study. Both genders had an increase in consumption behaviors and substance use, but women revealed a decrease in the consumption of wine during the pandemic, while men revealed more consumption behaviors in the variables under study. The use of media also changed, with men showing a

higher level in TV hours per day, social networks and online games before the pandemic and in TV hours per day and games/online during the pandemic. Women stand out in the use of mobile phone per day during the pandemic. Daily physical activity decreased during the pandemic, as did sleep quality. Males revealed a higher practice of physical activity at both periods, as well as sleep quality. Based on the results presented, it is expected that considerations and actions in the scope of public health policies and health prevention and promotion, will be rethought and adapted to the specificities of each gender.

KEYWORDS

COVID-19, first wave, health and risk behaviors, pandemic, Portugal

1 | INTRODUCTION

Declared a pandemic in March 2020 by the World Health Organization, the new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) coronavirus is responsible for more than 828,173 cases, and 16,923 deaths in the country (DGS, 2021). With an impact on the most diverse areas of an individuals' lives, as a result of the implementation of social isolation and confinement measures, to contain the virus spread (DGS, 2021), health and risk behaviors in the context of the pandemic have been focus of several studies (e.g., Arora & Grey, 2020; Busse et al., 2021; López-Bueno et al., 2020).

Restrictions in daily activities and habits have negatively influenced the practice of an active and healthy lifestyle, with an increase in sedentary behaviors, changes in eating patterns, and body weight (Martínez-de-Quel et al., 2021; Maugeri et al., 2020; Rodgers et al., 2020). During this isolation scenario, unhealthy eating patterns are identified, such as losing control over the food intake throughout the day, overeating, and skipping meals (Ramalho et al., 2021). The literature highlights that the pandemic context can lead to a greater propensity for the development of eating disorders, and binge eating episodes at times of increased anxiety, stress, and depression, with food used as a coping strategy to deal with adverse outcomes of the new reality (Ramalho et al., 2021; Rodgers et al., 2020).

Women are currently most concerned about nutrition and body image (Martínez-de-Quel et al., 2021; Rodgers et al., 2020); consequently, women had a greater diet pandemic impact (Ramalho et al., 2021; Rodgers et al., 2020). However, in physical activity, the opposite gender showed better exercise habits and motivation to exercise (Martínez-de-Quel et al., 2021; Maugeri et al., 2020).

Risk behaviors associated with substance use such as tobacco, alcohol, and drugs also increased, emerging as a resource to cope with stress (Satre et al., 2020; Weerakoon et al., 2020). A higher risk of consumption is usually associated with males (Cai, 2020; Jordan et al., 2020; Sharma et al., 2020; Weerakoon et al., 2020). At the technological level, the imposed requirements of social distancing, following the news or the suspension of numerous face-to-face activities have led to an increase in screen use and dependence (Rodgers et al., 2020; Weissman et al., 2020).

With strong and recognized psychological and physical consequences (Holmes et al., 2020; Mansfield et al., 2021; Tee et al., 2021; Wang et al., 2021), increased levels of anxiety and depression, the coronavirus disease 2019 (COVID-19) pandemic has proven detrimental for sleep regulation (Kutana & Lau, 2020; Rajkumar, 2020). Reduced or increased fatigue

and physical tiredness in cases where daily activity has undergone very significant changes, reduced sun exposure, and/or increased time using electronic devices are factors directly influencing sleep problems, namely insomnia, and insufficient or excessive duration (Kutana & Lau, 2020; Voitsidis et al., 2020). Studies show that women are more susceptible and vulnerable to sleep difficulties during this period (Liu et al., 2020; Paiva et al., 2021; Pinto et al., 2020; Sinha et al., 2020; Voitsidis et al., 2020).

This study aims to compare health risk behaviors in both genders before and during the pandemic, allowing to obtain evidence and considerations for public health policies and health promotion.

2 | METHODS

2.1 | Design and participants

A total of 5746 responses were collected through the application of an online questionnaire developed in the Survey Legend platform and directed to people over 18 years old. Predominantly female ($N = 3710$; 67.7%) and married ($N = 2892$; 52.8%), participants had a mean age of 48.5 years ($SD = 14.3$)—young ($N = 483$; 8.8%), adult ($N = 4060$; 74.1%), and senior ($N = 914$; 16.7%), distributed among the groups: (1) general population ($N = 972$; 17.7%); (2) patients with sleep disorders ($N = 1261$; 23%); (3) professionals combating the pandemic: doctors and nurses ($N = 2794$; 51%); and (4) professionals affected by the pandemic: teachers, psychologists, and dentists ($N = 452$; 8.2%).

The study was disseminated throughout mainland Portugal, including islands (Azores and Madeira), in the period corresponding to the first wave of the COVID-19 pandemic in the country (April–August 2020).

2.2 | Instrument

With an average completion time of 20–30 min, the data collection instrument included the following themes: Demographics and Health Status; Confinement Characteristics, Mood, Attitudes and Behaviors; Disability Scales; Sleep; Physical Activity; Media Use; Nutrition; Substances and Addictions.

For this study, the following variables of health and risk behaviors were analyzed: Sleep—quality of sleep; Physical Activity—number of hours of daily physical activity; Media Use—number of hours per day of TV, cell phone use, online games, and social networks; Nutrition—number of meals per day; Substances and Addictions—number of cigarettes smoked per day, drug use (Likert scale in which 1 = No and 4 = Yes, regularly) and number of glasses of beer and wine per day.

2.3 | Data analysis

Using the quantitative analysis software SPSS v. 26, the following data analyses were carried out: descriptive statistics; a *t*-test for paired samples to study the differences in means before and during the pandemic; and the analysis of variance test to analyze differences between groups. A significance value of 0.05 was set.

3 | RESULTS

A *t*-test for paired samples was used to compare health and risk behaviors before and during the pandemic. In the study (see Table 1), a significant difference in nutrition is seen between the number of meals per day before and during the pandemic, observing a pandemic decrease in the daily number of meals.

TABLE 1 Paired sample t-test in the study of differences of means

	nBC	M (SD) BC	nDC	M (SD) DC	M difference	SE mean	t Value	df	Sig (two-tailed)
Meals/day	4097	3.87 (0.893)	4097	3.84 (0.905)	0.032	0.012	2.723	4096	<0.001
Cigarettes/day	535	10.83 (7.249)	535	12.57 (8.698)	-1.738	0.224	-7.746	534	<0.0001
Drugs use	3953	1.02 (0.102)	3953	1.02 (0.181)	0.003	0.002	1.414	3952	n.s.
Beer glasses/day	2621	0.311 (0.967)	2621	0.507 (1.129)	-0.196	0.023	-8.678	2620	<0.0001
Wine glasses/day	2621	0.225 (0.919)	2621	0.224 (0.839)	0.001	0.011	.090	2620	n.s.
h TV/day	3565	2.088 (1.539)	3565	3.113 (2.43)	-1.025	0.035	-29.212	3564	<0.0001
h Mobile phone/day	3540	1.751 (1.963)	3540	2.589 (2.597)	-0.839	0.035	-24.278	3539	<0.0001
h Social networks/day	3151	1.675 (1.76)	3151	2.479 (2.384)	-0.804	0.034	-23.716	3150	<0.0001
Online games/day	707	1.466 (1.627)	707	2.015 (1.818)	-0.549	0.046	-11.957	706	<0.0001
h Physical activity/day	2107	4.57 (7.727)	2107	4.14 (7.246)	0.424	0.160	2.656	2106	<0.001
Sleep quality	4223	6.604 (1.979)	4223	5.689 (2.171)	0.915	0.028	32.456	4222	<0.0001

Note: Only the values and highest significant mean are highlighted in bold.

Abbreviations: BC, before COVID-19; DC, during COVID-19; n.s., nonsignificant.

TABLE 2 ANOVA comparisons based on gender

	Gender	n	M _{Before}	SD	F	p	η^2	n	M _{During}	SD	F	p	η^2
Meals/day	M	1350	3.57	0.85	246.924	<0.001	0.057	1351	3.61	0.89	132.081	<0.001	0.031
	F	2753	4.02	0.88				2753	3.95	0.89			
Cigarettes/day	M	172	12.51	8.56	15.55	<0.001	0.028	170	13.39	9.6	3.185	n.s.	0.006
	F	378	9.91	6.45				378	11.96	8.24			
Drugs use	M	1318	1.03	0.232	3.528	n.s.	0.001	1319	1.02	0.23	1.657	n.s.	0.0
	F	2643	1.02	0.169				2626	1.01	0.16			
Beer glasses/day	M	1001	0.47	0.99	41.833	<0.001	0.016	1001	0.71	1.25	50.832	<0.001	0.019
	F	1620	0.22	0.94				1620	0.38	1.03			
Wine glasses/day	M	1001	0.41	0.91	67.243	<0.001	0.025	1001	0.44	1	108.081	<0.001	0.04
	F	1620	0.11	0.9				1620	0.09	0.68			
h TV/day	M	1243	2.33	1.68	47.079	<0.001	0.013	1263	3.26	2.24	9.553	<0.01	0.003
	F	2479	1.96	1.49				2393	3	2.53			
h Mobile phone/day	M	1164	1.84	2.35	2.492	n.s.	0.001	1164	2.36	2.64	11.131	≤0.001	0.003
	F	2420	1.73	1.85				2420	2.66	2.57			
h Social networks/day	M	968	1.73	1.91	1.68	n.s.	0.001	991	2.36	2.22	1.556	n.s.	0
	F	2229	1.65	1.69				2283	2.47	2.37			
Online games/day	M	340	1.66	2.06	4.510	<0.05	0.006	380	2.08	1.89	6.705	≤0.01	0.007
	F	413	1.38	1.46				519	1.77	1.72			
h Physical activity/day	M	1045	4.92	8.09	20.199	<0.001	0.007	875	4.44	7.67	6.138	<0.05	0.003
	F	1903	3.76	5.84				1479	3.71	6.38			
Sleep quality	M	1394	6.75	1.83	11.781	≤0.001	0.003	1395	6.22	2.07	125.377	<0.001	0.029
	F	2836	6.53	2.04				2837	5.43	2.17			

Note: Only the values and highest significant mean are highlighted in bold.

Abbreviations: ANOVA, analysis of variance; F, female; M, male; n.s., nonsignificant.

Differences are also observed in substance use, in the number of *cigarettes* smoked per day before and during and in *beer* consumption per day prior and over the course. In both behaviors, a pandemic increase is observed. In drug use and consumption of glasses of wine per day no statistically significant differences were observed.

Concerning media use there are differences between TV per day in the prepandemic and its course; *mobile phone* hours per day before and during; *social networking* hours per day before and during; and also in *online gaming* hours per day prior and during the pandemic. In all four behaviors, an increase was seen at the second time point.

The number of daily hours' *physical activity* was statistically different in the comparison prior and during. A decline in practice was observed.

Sleep quality, differences were again observed between the first and second, denoting a pandemic decline.

In the analysis of gender differences in health and risk behaviors before and during the COVID-19 pandemic (see Table 2), statistically significant differences are observed in nutrition: Number of *meals* per day before and during pandemic, with the female gender presenting a higher number of meals per day in both. A decrease in the average number of meals from the period before to during the pandemic is visible in females and an inverse result in males.

In substance use, the number of *cigarettes per day* before the outbreak, males stand out with a higher average; smoking increased in both genders during the pandemic, with no gender differences *beer* glasses per day increased with males standing out in the two periods. Idem for *wine* glasses per day. Males increased while females reduced it.

No. of hours per day of previous TV viewing and pandemic, statistically significant differences are also observed, with more screen time (TV) in males in relation to female, and greater screen time during the outbreak. Although no significant gender differences are revealed in the number of hours per day of previous *mobile phone* use, they are evident in the during, with greater use of mobile phones by females in the course of the pandemic, as well as their increase in both genders. In the number of hours/*online games* before and during the pandemic COVID-19, statistically significant differences are also observed, with men standing out with a higher average in playing online, translated into a greater number of hours of play. In women and men, an increase in screen time (playing online) was observed in the course of the outbreak.

Also in the number of hours/*previous physical activity* and during COVID-19, with men showing a greater number of hours of sporting practice. When comparing hours of physical activity per week between pre- and during the pandemic, women show a decrease in the practice, alongside the men.

Finally, in *sleep quality*, statistically significant differences are also shown in the previous period and during the outbreak. Even though the male gender look at their quality of sleep better than that of women, both decrease their quality of sleep during the pandemic.

In the study of drug use, number of hours per day of social media use, no statistically significant differences were revealed.

4 | CONCLUSIONS AND DISCUSSION

The present study was developed to compare gender differences in health risk behaviors before and during the pandemic scenario.

In general, health behaviors such as the number of meals per day, physical activity practice, declined during the pandemic, as did the perception of sleep quality; while tobacco, beer consumption, and media use (TV, mobile phone, social networks, and online games) increased. In the same sample, shorter sleep duration, poorer nutrition, decline in physical activity, greater media use, and more negative attitudes and behaviors during the pandemic were found to be positively associated with poor sleep and awakening quality (Paiva et al., 2021). Also in a literature review conducted by Stockwell et al. (2021), a decrease in physical activity and increase in sedentary behaviors is highlighted.

Gender differences are clear: Women have, both prior and during the pandemic, a higher number of meals per day when compared with men, but this number decreased in women and increased in men during COVID-19. Although negative impacts on diet are highlighted (Martínez-de-Quel et al., 2021; Ramalho et al., 2021; Rodgers

et al., 2020), Janssen et al. (2021) reveal different changes in lifestyles and diet during the pandemic. The authors report that the number of meals per day can increase or decrease depending on the person, and be related to restrictions, frequency of shopping, perceived risk of disease, decreased financial capacity, and sociodemographic factors.

Smoking behavior (number of cigarettes per day), intensified during the pandemic, being higher in men in the prepandemic. The consumption of beer per day also showed an increase during the pandemic in both genders, as well as the number of glasses of wine per day in men (decreasing in women). Satre et al. (2020) and Weerakoon et al. (2021) reveal similar results.

Media use increased from prepandemic to pandemic in both genders, especially in males in the prepandemic (hours TV per day, social networks and online games) and postpandemic (hours TV per day and games/online). Women use more the mobile phone per day during the pandemic. A study also developed in Europe and during the current scenario, presents that males are more prone to gambling, while women tend to spend more time on social networks (Lemenager et al., 2020).

The number of hours of daily physical activity decreased during the pandemic scenario (Park et al., 2021) as did the quality of sleep. In both a higher mean in males stands out. Despite the worse perception of prepandemic sleep quality, the literature has reported that the worries and uncertainties of this period have a greater impact on female sleep (Liu et al., 2020; Pinto et al., 2020; Sinha et al., 2020; Voitsidis et al., 2020). As women often report their sleep quality as less positive, and it is not known whether this is a reality or a perception, it is also true that they report and live with a lower perception of well-being (de Matos, 2019).

4.1 | Strengths and limitations

As regards limitations, and due to the constraints associated with the pandemic scenario, the present study was conducted exclusively online to reach a larger number of participants and decrease the exposure of the team and participants to the SARS-CoV-2 virus. Although efforts have been made to have an equitable gender distribution, this was not achieved, but other studies developed in the country show this common reality.

In contrast to the identified limitations, the present study reveals several strengths. The first, the total number of responses obtained, which allows us to increase the validity of its conclusions. The second, the diversity of the sample. Lastly, to our knowledge, this is the first study conducted in the country that includes such a complete diversity of themes in studying the impacts of the COVID-19 pandemic, as well as the involvement of a multi-disciplinary team in its design and analysis.

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