

## LIFESTYLE OF BASIC EDUCATION TEACHERS BEFORE AND DURING THE COVID-19 PANDEMIC

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### Highlights:

1. The COVID-19 pandemic has been a strong driver of changes in risky behaviors in teachers' lifestyles.
2. During the pandemic period, the chance of greater exposure to risky behaviors more than doubled compared to the pre-pandemic period.
3. Teachers' perceptions, attitudes, and behaviors influence students' motivation to adopt a healthy lifestyle.

PRE-PROOF

(as accepted)

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## ABSTRACT

The COVID-19 pandemic has led to substantial changes in population behavior and health outcomes. The objective of this study was to analyze the temporal trends of a set of risky lifestyle behaviors self-reported by basic education teachers at public schools in the city of Curitiba, Paraná, before and during the self-confinement imposed by the COVID-19 pandemic. This is an observational study in which two samples of basic education teachers answered a standardized self-report questionnaire, with items on physical activity, screen time, sleep duration, fruit/vegetable consumption, and tobacco and alcohol use. One sample answered the questions in the non-pandemic period ( $n = 376$ ) and the other sample answered the questions one year after the start of the pandemic ( $n = 294$ ). The findings suggest that the COVID-19 pandemic has strongly driven changes in risky lifestyle behaviors, including physical inactivity, excessive screen time, insufficient sleep duration, inadequate fruit/vegetable intake, and excessive alcohol consumption. During the pandemic period, the chance of greater exposure to physical inactivity (OR = 2.07 [1.40 – 3.01]) and insufficient sleep duration (OR = 2.19 [1.39 – 3.46]) more than doubled and, in the case of excessive screen time (OR = 2.99 [2.02 – 4.36]), tripled compared to the pre-pandemic period. In conclusion, intervention actions should be oriented to a broad and comprehensive perspective of health education, which meet the conditions of isolation/social distancing of teachers and the general population.

**Keywords:** Quarantine; coronavirus; home confinement; social distancing; health behaviors.

## INTRODUCTION

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) was initially identified in December 2019 in the city of Wuhan, China, and subsequently spread rapidly across all regions of the world, strongly impacting global public health. In March 2020, the World Health Organization declared SARS-CoV-2 a global pandemic<sup>1</sup>.

This pandemic has caused countless victims, with millions of confirmed cases around the world, and hundreds of thousands of deaths. Latin America has been heavily impacted with a high mortality rate and spread of the disease, especially during the first wave. Specifically in Brazil, by November 2022, when this text was being prepared, approximately

35 million cases and 690 thousand deaths were confirmed, and these numbers continue to increase dramatically<sup>2</sup>. Furthermore, hospitalization associated with COVID-19 is an alarming problem, with high costs for the healthcare system<sup>3</sup>.

As it is a highly infectious virus, the World Health Organization recommended extensive non-pharmacological actions to national health authorities, especially regarding mobility restrictions, to try to mitigate and neutralize the spread and community transmission of SARS-CoV-2. The actions included social distancing, home isolation, restricted travel, and, in some cases, even lockdown, as preventive measures to contain the rate of community transmission of the virus, forcing people to self-confine for long periods<sup>4</sup>.

The world's population was advised to remain at home and contact between people was allowed only with great restrictions and exclusively to carry out essential activities. All other activities and services with the possibility of close proximity or crowding of people, including teaching activities in elementary schools, were interrupted to try to slow the spread of the disease, leading, for example, to teachers giving classes through an online resource.

The inevitable consequence of self-confinement measures is the drastic and sudden disruption to a wide spectrum of people's daily life routines, resulting in limited physical and social mobility and reduced opportunities to live in a community<sup>5</sup>. Furthermore, the emotional toll of the pandemic has likely resulted in additional barriers to staying focused and motivated to adhere to healthy lifestyle behaviors<sup>6</sup>. In this case, given the extent and intensity of self-confinement measures imposed around the world, there is a need for studies on the possible adverse consequences of restrictions related to the pandemic on health behaviors.

To our knowledge, the studies available in the literature on the effects of the SARS-CoV-2 pandemic on the Brazilian population have focused mainly on mental health<sup>7,8</sup>. Lifestyle issues, including changes in diet, physical activity, screen time, nighttime sleep, and the use of addictive substances are topics that are still little researched. Therefore, the objective of the current study was to analyze temporal trends in a set of risky lifestyle behaviors, self-reported by basic education teachers from public schools in the city of Curitiba, Paraná, before and during the self-confinement imposed by the COVID-19 pandemic.

## METHODS

This article is a secondary analysis of data from the Healthy Paraná Project, a study with a school-based epidemiological characteristic, with a cross-sectional analytical design, involving a representative sample of public schools in the state of Paraná, Brazil, focusing on the lifestyle and health of teachers. The procedures used in the study were approved by the Research Ethics Committee of the Northern Parana University (Platform Brazil No. 95.056/2012).

### *Sample selection*

The study consisted of the selection of two samples of basic education teachers who worked in public schools in the city of Curitiba, capital of the state of Paraná. One sample was selected in the non-pandemic period and the other sample close to one year after the start of the pandemic. When recruiting for the composition of both samples, the rights of all participants were safeguarded through a Free and Informed Consent Form signed by the teachers.

The sample equivalent to the non-pandemic period was selected through a random draw involving a cluster of four stages: administrative structure (municipal and state), schools, shift (morning, afternoon, and evening), and cycle of activity (Basic Education Phase I, Basic Education Phase II, and High School). The sample size was established assuming an unknown prevalence of success ( $p = 50\%$ ), a confidence level of 95%, and a sampling error of three percentage points. However, considering that the sampling planning involved clustering, a design effect equivalent to three was defined and, to cover possible cases of losses in data collection, 10% was added, with an initial sample size of 380 teachers. However, after excluding unqualified questionnaires, 376 were included for data analysis.

Participants in the sample equivalent to the pandemic period were selected using a non-probabilistic procedure, through an invitation distributed on digital media (*Facebook, Instagram, Twitter, and Telegram*) and through contact groups of school teachers via *WhatsApp*. As a criterion for inclusion in the sample, the volunteers who expressed interest in participating in the study attested that they were in self-confinement due to the SARS-CoV-2 pandemic. In this case, self-confinement was defined as remaining at home and only leaving

to carry out essential activities, such as purchasing food and medicine, and to be attended to by health professionals. Participants who self-reported the presence of symptoms of the disease, identified through a list of symptoms (fever, cough, dry mouth, runny nose, sore throat), were excluded from the sample. In this way, 312 volunteers were initially recruited, however, the definitive sample used in data processing was composed of 294 teachers.

### *Measurement instrument*

To collect data at both times (non-pandemic period and pandemic period), a questionnaire consisting of three sessions was applied: demographic, occupational data, and lifestyle behaviors. Regarding demographic data, in addition to sex and age, the marital status of the participants was identified. Regarding occupational data, information was collected regarding professional qualifications, teaching experience, sector of activity, and working hours. Data equivalent to lifestyle behaviors were obtained through structured questions specifically designed for use in the study, with the purpose of identifying physical activity, use of screen devices in free time, duration of nighttime sleep, fruit/vegetable consumption, tobacco use, and alcohol consumption.

The practice of physical activity was identified through four questions: (a) *“In the last seven days, how often did you perform physical activity of moderate intensity (causing a noticeable increase in heart and respiratory rate, such as brisk walking)?”*; (b) *“On the days you performed moderate-intensity physical activity, how long did you remain physically active?”*; (c) *“In the last seven days, how often did you perform vigorous-intensity physical activity (causing a large increase in heart and respiratory rate, such as running)?”*; and (d) *“On the days you performed vigorous physical activity, how long did you remain physically active?”*. The answer options for the two questions related to the frequency of physical activity were from “none” to “seven days”, while for the two questions linked to duration, a predefined time scale was available from “none” to “ $\geq 60$  minutes”. To identify the amount of physical activity, the product between frequency (days/week) and duration (minutes/day) was calculated. According to international public health guidelines for recommended levels of physical activity, physical inactivity was considered  $<150$  minutes/week of moderate-intensity physical activity, or  $<75$  minutes/week of vigorous-intensity physical activity, or less than an equivalent combination<sup>9</sup>.

The use of screen devices in free time was addressed through the question: *In a typical or usual week, how many hours do you watch TV and/or use a computer, tablet, or smartphone for any activity that is not related to work?* A predefined time scale was provided for the response, on which respondents marked their option among six categories, ranging from “none” to “ $\geq 5$  hours/day”. The question separately considered the use of screen devices equivalent to weekdays and weekends (Saturday and Sunday). The weighted average including data from weekdays and weekends was used to identify the time spent on screen devices during free time per day. Although there is no consensus recommendation on the time used for screen devices for adults, according to previous studies, a cut-off point of  $\geq 3$  hours/day was used to identify excessive screen time<sup>10</sup>.

Data equivalent to nighttime sleep duration were also gathered considering weekdays and weekends by asking the question: *In a typical or usual week, how many hours do you sleep per night?* A predefined time scale was available for the response, on which respondents marked their option between six categories, ranging from “ $\leq 6$  hours/night” to “ $\geq 10$  hours/night”. The weighted average including data from weekdays and weekends was used to identify sleep duration per night. According to the most recent scientific evidence, insufficient sleep duration was considered as  $\leq 6$  hours/night<sup>11</sup>.

Regarding the consumption of fruits/vegetables, the study participants answered the following question: *“How many portions of fruits and/or vegetables do you usually eat per day (1 portion = 1 medium fruit; 1/2 cup of fruits/vegetables chopped, cooked, or preserved; 3/4 cup of fruit/vegetable juice; 1 cup of green salad; or 1/4 cup of dried fruit)?”* Response options ranged from “no servings/day” to “ $\geq 5$  servings/day”. Based on the frequency of intake reported, in accordance with the recommendations presented by the World Health Organization, inadequate consumption was considered  $\leq 4$  servings/day<sup>12</sup>.

The two other lifestyle behaviors of interest in the study were related to the use of addictive substances. In this case, initially, participants were asked about the use of tobacco and tobacco products, through the question: *“In the last 30 days, on how many days did you use tobacco or tobacco products (for example, cigarette, e-cigarette, hookah, cigarillo, cigar, pipe or rope tobacco, etc.)?”* The answer options ranged from non-smoker to smoked at least once/day (regular smoker). Next, we identified the consumption of alcoholic beverages through the question: *“In a typical or usual week, how many doses of alcoholic beverages do*

*you drink (1 dose = 1/2 bottle or a can of beer; 1 glass of wine; 1 dose of distilled beverage - whiskey/cognac/cachaça/vodka, etc.)?”* Response options ranged from abstainer to  $\geq 14$  doses/week, with  $\geq 7$  doses/week for women and  $\geq 14$  doses/week for men being considered abusive consumption<sup>13</sup>.

#### *Data collection*

Data equivalent to the non-pandemic period were collected in May/2014 by researchers knowledgeable about the instrument and trained in its procedures, who worked simultaneously in the schools selected for the study. At this time, the questionnaire was applied in printed format and at the teachers' own place of work, during working hours, with the same criteria and application conditions being maintained in all cases.

The teachers participating in the study received the questionnaire with instructions and recommendations for self-completion, with no time limit being established for completion. The questionnaire was answered individually, without any contact with other people. Any doubts expressed by the respondents were promptly clarified by the researcher who monitored the data collection. After completion, the questionnaire was stored by the respondent in an urn together with the other completed questionnaires, thus guaranteeing anonymity. The average time taken to complete the questionnaire was 30 minutes.

Data equivalent to the pandemic period were collected after the first year of the outbreak of the virus responsible for the COVID-19 disease, in May/2021. Due to the self-confinement imposed by the pandemic, the questionnaire was completed by teachers via the web through the Google Forms platform, accessed from desktop computers, notebooks, tablets, or smartphones, at any time of convenience and preference. The platform access link was sent to study participants via email and WhatsApp message.

The online format of the questionnaire was adjusted to be as comparable as possible to the printed format, differing only in the interface mode for recording responses. Therefore, the design of both questionnaire formats was identical, using the same type and size of font, spacing, ordering, arrangement of questions/items, and layout in general.

#### *Statistical treatment*

Data analyses were carried out using the computerized *Statistical Package for the Social Science* (SPSS), version 26. Initially, descriptive statistics resources were used to characterize the sample, by calculating the distribution proportion of teachers selected in the two samples in each stratum considered. Prevalence rates equivalent to risky lifestyle behaviors were estimated using point proportions (%), accompanied by respective 95% confidence intervals (CI<sub>95%</sub>). Subsequently, the chance of teachers being exposed to risky lifestyle behaviors during the pandemic compared to the pre-pandemic period was identified using odds ratio (OR) values, calculated using binary logistic regression with adjustments for sex, age, and marital status. The statistical significance threshold was equivalent to  $p < 0.05$ .

## RESULTS

The distribution of the teachers according to demographic and occupational data is shown in table 1. Both samples were predominantly made up of women (77.9% and 81%, respectively) and the highest concentration of participants was aged between 31 and 50 years ( $\approx 62\%$ ). Regarding marital status, close to  $\frac{2}{3}$  of the teachers (68.6% and 66.3%, respectively) declared that they live with a partner (married or in a stable union). Considering occupational data, the proportions found are comparable between the pre-pandemic and pandemic periods.



**Table 1** – Demographic and occupational data of the teacher samples analyzed in the study.

		Pre-Pandemic (n = 376)	During the Pandemic (n = 294)
Demographic data n (%)			
Sex	Women	293 (77.9)	238 (81.0)
	Men	83 (22.1)	56 (19.0)
Age	≤ 30 years	57 (15.2)	30 (10.2)
	31 – 40 years	107 (28.4)	75 (25.5)
	41 – 50 years	127 (33.8)	107 (36.4)
	≥ 51 years	85 (22.6)	82 (27.9)
Marital Status	Single	58 (15.4)	49 (16.7)
	Married/stable union	258 (68.6)	195 (66.3)
	Separated/widowed	60 (16.0)	50 (17.0)
Occupational data n (%)			
Professional qualification	Graduation	68 (18.1)	45 (15.3)
	Postgraduate (lato sensu)	267 (71.0)	211 (71.8)
	Postgraduate (stricto sensu)	41 (10.9)	38 (12.9)
Teaching experience	≤ 10 years	121 (32.2)	87 (29.6)
	11 – 20 years	139 (37.0)	112 (38.1)
	≥ 21 years	116 (30.8)	95 (32.3)
Activity sector	Basic education I (1st to 5th year)	146 (38.8)	115 (39.1)
	Basic education II (6th to 9th year)	156 (41.5)	118 (40.1)
	High school	74 (19.7)	61 (20.8)
Working hours	≤ 20 hours/week	73 (19.4)	59 (20.1)
	21 – 40 hours/week	189 (50.3)	143 (48.6)
	≥ 41 hours/week	114 (30.3)	92 (31.3)

Table 2 presents the teachers' exposure to risky lifestyle behaviors identified in the pre-pandemic and pandemic periods. Similarly, in both samples, the most prevalent risk behaviors were physical inactivity (74.7% CI<sub>95%</sub> [69.2 – 79.8] and 88.6% CI<sub>95%</sub> [83.5 – 94.8], respectively) and inadequate consumption of fruits/vegetables (74.4% CI<sub>95%</sub> [69.7 – 79.6] and 83.8 CI<sub>95%</sub> [78.9 – 89.4], respectively), followed by excessive screen time (58.3% CI<sub>95%</sub> [54.1 – 63.0] and 81.5% CI<sub>95%</sub> [76.6 – 87.4], respectively), and insufficient duration of nighttime sleep (43.6% CI<sub>95%</sub> [40.1 – 47.4] and 65.6% CI<sub>95%</sub> [61.3 – 70.5], respectively). However, due

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to the degree of severity, the prevalence rates of use of addictive substances, especially alcohol abuse (24.8% CI<sub>95%</sub> [22.6 – 27.7] and 39.6% CI<sub>95%</sub> [36.1 – 43.8], respectively), is also worrying. Close to one in every group of ten teachers reported smoking (10.1% CI<sub>95%</sub> [8.6 – 12.0] and 13.2% CI<sub>95%</sub> [11.3 – 15.7], respectively).

**Table 2** – Risky lifestyle behaviors self-reported by basic education teachers in the pre-pandemic period and during the COVID-19 pandemic<sup>a</sup>.

	Pre-Pandemic Period	Pandemic Period	OR (CI <sub>95%</sub> )	p
Physical inactivity	74.7 (69.2 – 79.8)	88.6 (83.5 – 94.8)	2.07 (1.40 – 3.01)	0.012
Excessive screen time	58.3 (54.1 – 63.0)	81.5 (76.6 – 87.4)	2.99 (2.02 – 4.36)	< 0.001
Insufficient duration of nighttime sleep	43.6 (40.1 – 47.7)	65.6 (61.3 – 70.5)	2.19 (1.39 – 3.46)	0.001
Inadequate consumption of fruits/vegetables	74.4 (69.7 – 79.6)	83.8 (78.9 – 89.4)	1.60 (1.08 – 2.68)	0.038
Smoking	10.1 (8.6 – 12.0)	13.2 (11.3 – 15.7)	1.16 (0.65 – 1.99)	0.149
Abusive consumption of alcoholic beverages	24.8 (22.6 – 27.7)	39.6 (36.1 – 43.8)	1.68 (1.12 – 2.46)	0.023

<sup>a</sup> Values expressed in point proportions (%) accompanied by respective 95% confidence intervals.

When compared with data from their pre-pandemic peers, teachers surveyed during the pandemic indicated a significantly greater chance of exposure to five of the six lifestyle risk behaviors covered in the study. The odds ratio values suggest that during the pandemic, teachers were twice as likely to remain physically inactive (OR = 2.07; CI<sub>95%</sub> [1.40 – 3.01]; p = 0.012) and to have a nighttime sleep deficit (OR = 2.19; CI<sub>95%</sub> [1.39 – 3.46]; p = 0.001) than in the pre-pandemic period. Furthermore, it was pointed out that during the pandemic teachers were three times more likely (OR = 2.99; CI<sub>95%</sub> [2.02 – 4.36]; p < 0.001) to report excessive use of screen devices during leisure time. Risky lifestyle behaviors equivalent to smoking did not show significant changes between the pre-pandemic and pandemic periods. However, during the pandemic, teachers were between 60% and 68% more likely to consume inadequate fruits/vegetables (OR = 1.60; CI<sub>95%</sub> [1.08 – 2.68]; p = 0.038) and excessive amounts of alcoholic beverages (OR = 1.68; CI<sub>95%</sub> [1.12 – 2.46]; p = 0.023) than in the pre-pandemic period.

## DISCUSSION

The findings of this cross-sectional study suggest that the COVID-19 pandemic has been a strong driver of changes in a set of risky lifestyle behaviors, including physical inactivity, excessive screen time, insufficient sleep duration, inadequate fruit/vegetable consumption, and alcohol abuse, self-reported by basic education teachers in public schools in Curitiba, Paraná.

Although previous studies in Brazil<sup>14</sup> and in other countries<sup>15</sup> have already investigated risk behaviors specific to the lifestyle of elementary school teachers, to our knowledge, this is the first study to examine the possible effects of the COVID-19 pandemic on these variables in the teacher population. Furthermore, the selected risk behaviors represent the most relevant behavioral contributors to adult physical and mental health<sup>16</sup>. Therefore, our findings add new knowledge to the literature and provides important support for designing more effective interventions aimed at promoting health at school.

According to international physical activity guidelines, around  $\frac{3}{4}$  of teachers in the pre-pandemic period were identified as insufficiently active (74.7%). In consultation with the literature, prior to the start of the COVID-19 pandemic, it was estimated that 72.5% of the world population did not meet the guidelines for physical activity<sup>17</sup>, while a survey of the Brazilian population found that 69.9% of adults aged 18 or over were insufficiently active<sup>18</sup>. Therefore, the prevalence of physical inactivity found in the pre-pandemic period of the study was similar to data available in the national and international literature. However, during the pandemic period, the prevalence rate of physical inactivity rose to 88.6%, which confirms suspicions from previous studies about the negative effects of the COVID-19 pandemic on maintaining physically active habits<sup>19</sup>. In this regard, in addition to reduced opportunities for physical mobility and limited involvement in outdoor activities, the perception of social isolation induced by self-confinement measures may have contributed to less physical activity, which is consistent with a pre-pandemic study that suggests social isolation as an important predictor of reduced physical activity, mediated by regulation of emotions<sup>20</sup>.

Despite the high prevalence of physical inactivity and it being referred to as a relevant risk behavior for health problems, these findings reinforce the need for actions that can encourage the adoption of a more active and healthy lifestyle among teachers, even in the face

of a health crisis such as the COVID-19 pandemic. Furthermore, adequate and sufficient practice of physical activity presents an important cluster with the adoption of other healthy behaviors, such as reducing smoking, adequate eating habits, and stress control<sup>21</sup>.

Recent studies have shown that, regardless of physical activity, increased exposure to screen time is associated with a set of harmful health effects, including obesity, diabetes, cardiovascular disease, some types of cancer, and dementia<sup>22</sup>. The impact of the use of screen devices on health is a complex phenomenon that can go beyond sedentary behavior resulting from spending more time sitting. TV watching is associated with poor dietary choices, in part due to commercial advertising; frequent handling of smartphones is associated with greater exposure to radiofrequency electromagnetic fields that affect brain physiology; using e-readers at night has also been shown to affect sleep through suppression of melatonin secretion and changes in circadian rhythm. Additionally, long periods of screen time have been linked to mental health problems, including anxiety and depression, which in turn can disrupt the hypothalamic-adrenal axis, adversely affecting immune function and metabolism<sup>23</sup>.

In the pre-pandemic period, the study identified that six in each group of ten teachers reported using screen devices for  $\geq 3$  hours/day in their free time (58.3%), while in the pandemic period the proportion rose to eight in each group of ten teachers (81.5%). Excessive screen time was the risky lifestyle behavior that worsened most with the advent of the pandemic, with the chance of excessive use of screen devices by teachers during the pandemic being tripled compared to their peers in the pre-pandemic period.

Another finding resulting from the study was the high prevalence of insufficient nighttime sleep duration. Issues linked to sleep have been intensely investigated in recent decades, demonstrating associations with multiple morbidities, such as obesity, hypertension, diabetes, heart disease, mental disorders, and other health risk behaviors, including smoking, alcohol consumption, inadequate diet, and physical inactivity<sup>24</sup>. Furthermore, sleep is considered particularly important for cognitive functions and memory, in addition to having implications for emotional regulation and behavior. More specifically, insufficient nighttime sleep duration is related to deficiencies in the processing of incoming stimuli and in the ability to concentrate, which, in turn, translates into compromised occupational performance<sup>25</sup>.

When a comparable definition of insufficient nighttime sleep duration was used ( $\leq 6$  hours/night), the prevalence rates identified in basic education teachers in Curitiba, Paraná, in the pre-pandemic (43.6%) and pandemic (65.6%) periods were three to four times higher than the rate found in the general Brazilian population (15.8%)<sup>26</sup>; however, the pre-pandemic data coincides with what was observed in a national study in the United States (40%)<sup>27</sup>.

Similar to what was observed in previous surveys carried out in Brazil<sup>18</sup> and in other countries<sup>28</sup>, the results showed that inadequate fruit/vegetable consumption was one of the most prevalent lifestyle risk behaviors in both the pre-pandemic and pandemic periods (74.4% and 83.8%, respectively). The dietary pattern consisting of low consumption of fruits/vegetables is associated with an increased risk of cardiometabolic diseases and some types of cancer<sup>29</sup>, indicating, therefore, that teachers' eating habits deserve special attention.

In our sample, the data showed that smoking was the least prevalent risky lifestyle behavior and the proportion of smokers did not change significantly after the first year of the COVID-19 pandemic health crisis (10.1% versus 13.2%). In a recent national survey, although relevant regional differences were identified, 13% of the Brazilian adult population reported regular tobacco use<sup>18</sup>, constituting one of the lowest prevalences in the world. A review study with data from different countries showed variations in smoking prevalence of between 7% and 41%<sup>30</sup>. Possible understanding of the lower prevalence observed in the Brazilian population and in the pre-pandemic and pandemic periods of the study may be related to the success of campaigns to combat smoking in recent decades in Brazil. However, even so, actions are recommended to stop the smoking habit in the group of teachers who have undertaken this risky behavior for their health, considering that smoking is the main risk factor for some types of cancer<sup>31</sup>.

On the other hand, around  $\frac{1}{4}$  of teachers in the pre-pandemic period (24.8%) and more than  $\frac{1}{3}$  of teachers in the pandemic period (39.6%) reported abusive alcohol consumption, a higher proportion than that found in a national survey carried out in Brazil (17%)<sup>18</sup>; however, this result coincides with findings from some European countries identified in a non-pandemic period<sup>32</sup>. These data confirm that alcohol is the most commonly consumed addictive substance worldwide; furthermore, it may be associated with other health risk behaviors, such as impaired sleep quality, smoking, use of illicit drugs, physical inactivity, and an unbalanced diet<sup>21</sup>. The significant increase in alcohol abuse during the pandemic

period may possibly be associated with psychological stressors, such as sadness, anxiety, depression, and fears regarding the future and risk of infection, which corroborates results found in a survey carried out in Belgium<sup>33</sup>.

Data available in the literature make clear the negative impact of the COVID-19 pandemic on the mental health and well-being of the population around the world<sup>34</sup>. Additionally, the findings of the present study also suggest a marked epidemiological trend, in which selected risk behaviors in the lifestyle of teachers, which can possibly be generalized to other segments of the population, have changed as a result of the self-confinement imposed by the health crisis. Although at the moment this trend is preliminary, international organizations have warned of the long-term systemic effects on health, far beyond the direct effects of COVID-19<sup>35</sup>.

Adherence to health risk behaviors tends to contribute to subsequent worsening of consequences for physical and mental health, thus having broader and more significant social and economic implications. Therefore, effective measures should be proposed immediately in an attempt to mitigate the impact of COVID-19 restrictions on lifestyle behaviors, responding proactively to reduce the potential health risks associated with public health emergencies. Better understanding of the current status of lifestyle behaviors among basic education school teachers during this pandemic could be a useful and valuable resource for establishing targeted policies and designing effective interventions to control potential harms in future pandemics.

In this regard, a wide variety of techniques are available aimed at behavior change interventions and adherence to healthy behaviors, including physical activity, nutrition, non-smoking, and less harmful consumption of alcoholic beverages<sup>36</sup>. In this way, similar principles can be considered and integrated with the emergency condition caused by the COVID-19 pandemic, in order to design and modulate behavioral changes adapted to the specific context. Interventions can also be used to assist with potential long COVID-19 actions.

The main strengths of the current study are related to the conception, design, and conduct of the Healthy Paraná Project. The project provides robust and updated data on the lifestyle behaviors of teachers in public elementary schools in a state capital representative of

the southern region of Brazil, which allows generalization of the results to a larger population universe. Considering the methodological aspect, possible seasonal interferences in the results found were minimized considering that in both samples data collection was carried out in a short period of time (four weeks) and in the same season of the year (autumn), which together with the minimal refusal rate to participate helps to guarantee greater reliability of the findings.

However, the limitations of the study must be recognized. In this case, it is important to note that the risky lifestyle behaviors were self-reported, therefore, they are subject to bias in estimates and measurements by respondents. Furthermore, the cross-sectional data approach offers limited capacity to elucidate the causal effects of the pandemic on health behaviors. Furthermore, due to the online nature of the sample selected during the pandemic period, it is possible to identify the inevitable self-selection bias, which may have led to under- or overestimation of prevalence rates.

In conclusion, the results of the study revealed evidence that the self-confinement imposed by the COVID-19 pandemic contributed significantly to increasing the prevalence rates of a set of risky lifestyle behaviors among primary school teachers, including physical inactivity, excessive screen time, insufficient duration of nighttime sleep, inadequate consumption of fruits/vegetables, and excessive consumption of alcoholic beverages. During the pandemic period, the chances of teachers being more exposed to physical inactivity and insufficient duration of nighttime sleep more than doubled and, in the case of excessive screen time, tripled, compared to the pre-pandemic period. Therefore, intervention actions should be guided by a broad and comprehensive perspective of health education, which meets the conditions of isolation/social distancing of teachers and the general population. The expectation is that teachers, in addition to having the option to adopt health protective behaviors, can act as models, considering that their perceptions, attitudes, and behaviors can influence the students' motivation to adopt a healthy lifestyle.

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