

## Has COVID-19 lowered physical activity practice while boosting online searches for professional exercise information?

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### Abstract

COVID-19 is an infectious and contagious disease, caused by the SARS-CoV-2 virus. Due to the rapid spreading of the virus and its lethal consequences, the WHO declared a pandemic. One of the main strategies to treat and prevent the spreading was the stay home safe, a social isolation situation that was accompanied by the closing of fitness gyms, city parks and facilities proper to exercise. This context promoted an increase in home fitness programs and in the search for information online regarding exercise and health. So, the objective of this study was to understand the effects of the pandemic on physical activity behavior and online information search regarding exercise programs. Data collection was through a google forms questionnaire, all procedures were approved by the University ethics committee and we collected data from 1065 participants. Our results showed that the participants main behavior was maintained, 80.7% of our sample were active before the pandemic and only 9.7% of this group stopped being active. On the other hand we registered 7% of participants that started exercise after the pandemic installation. Information about exercise was searched outside social media by 49.6% of the participants with 32.5% using social media. 56.1% would look only for professional advice, interestingly 11.4% of the participants were active without any kind of advice. We concluded that Covid-19 pandemic installation affected negatively the population physical activity behavior and increased awareness about the importance of exercise as a health strategy.

**Key Words:** COVID-19 pandemic; social isolation; physical activity; exercise online information; exercise prescription; exercise immunology.

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COVID-19 is an infectious and contagious disease, caused by the SARS-CoV-2 virus (Syndrome of acute respiratory disease – Corona Virus – 2). The rapid and uncontrolled spread of COVID-19 in the world, its consequences for health, gravity and lethality, led, on March 11, 2020, the Director General of the World Health Organization (WHO) to declare it as a pandemic.<sup>1</sup> Diagnosis, screening, hospitalization, costs of treatment and of providing essential supplies and

health items for medical staff and those in quarantine have put a lot of economic pressure on countries. The effects have resulted in job losses, social consequences of the lockdown and psychological consequences of physical inactivity.<sup>2</sup>

According to the European Health Report,<sup>3</sup> the direct effects of COVID-19 are overwhelming and, understandably, have been the focus of many studies. In addition, insights continue to emerge about how the

pandemic is affecting not only the health of those infected with SARS-CoV-2, but also the health of the population at large. During the stay-at-home period the general population tends to adopt a sedentary lifestyle, which is a well-known factor, together with obesity, cardiovascular disease, depression and anxiety, associated with the increased lethality of COVID-19. The studies, reported by Panayotov K. in the paper "Covid-19 and current issues in EU health policy",<sup>4</sup> underline that the measures imposed to stop the spread of the virus, such as stay-home orders, school closures and physical distancing, can affect health in many ways. The importance of keeping a physically active lifestyle routine during the period of social distance, as a protective measurement to physical and mental health, became of greatest importance because physical activity is a well established non-pharmacological strategy to prevent and treat several diseases, whether they are of physical, metabolic and/or psychological nature (Luan et al., 2019).<sup>5</sup> Bonnar-Kidd et al., 2009,<sup>6</sup> before the boom of the social media, was already worried about the quality of the online information available on physical activity. The authors state a Latin phrase that is still true these days. The sentence "*permissum quaero caveo*" means that the searcher is the one that needs to be aware of the information that he/she is consuming. Perhaps this is more real nowadays where the amount of not specialized gurus multiply as much as the population desire for esthetic. It is important to emphasize the effects of physical exercise in the immunological system. It is also a fact, in the scientific literature, that regular moderate intensity physical exercise improves immune competence, even decreasing the incidence of transmissible diseases such as COVID-19 (Wu et al., 2020).<sup>7</sup> A serious and professional information was published by The ACSM (2020).<sup>8</sup> They published a guide that suggests that moderate or intense physical activity must be maintained during the social distance and quarantine period, evidencing the importance of each and every minute of activity to health. Therefore, the question that prompted this study was if and how the population is keeping physical activity in this critical period and where they are finding the information to do it properly, specifically the source and quality of online information that is searched by those that remained active.

### Materials and Methods

This study was approved by the Committee of ethics in human research of São Judas University under the protocol number 31696620.0.0000.0089.

The sample was composed of 1100 participants that answered an online questionnaire (Google forms) about the amount of physical activity and online information about it. They were all over 18 years old, with 681 women and 384 men. The sample was randomly obtained from the research team personal contacts and statistical power was not calculated.

Subjects were included if they were over 18 years old, had access to an internet connection and to the form with the questions. They also had to mark the yes box, in the "are you willing to participate in the study" question after reading the informed consent form.

Subjects were excluded if they had any problem of understanding the questions proposed, that would be verified if they produced an answer that was not related to the questionnaire. Duplicated answers were excluded. 35 from the 1100 participants were excluded.

We used the SPSS program to organize the descriptive data. After that, samples that were compared using the McNemar repeated measures test. Qui Squared association test was also used with several variables. The significance level was set to 0.05.

### Results and Discussion

We built a questionnaire made up of many different aspects. We begin here by describing the results related to the amount of physical activity (active or inactive and how much time per week they spent exercising). The results in Figure 1 show a significant decrease in the duration of physical activity after the onset of the pandemic. Before the pandemic 80.7% of participants were active, while 19.3% sedentary. After the start of the pandemic, 71.0% were active and 29.0% were sedentary for a reduction of 9.7%. Most participants maintained their pre-pandemic behavior. Those who had exercised remained active (63.9%), those who had not exercised remained sedentary (12.3%). However, some of the sedentary participants started the activity (7%), while others who had been active stopped (16.7%).

Figure 2 shows that the already physically active individuals, activity time followed the distribution: 30% of them did up to 1.5 hours of exercise, 22% did 1.5 to 2 hours and a half and 48% did more than 2 and a half hours a week. For those who started being active after the pandemic: 47% of previously sedentary participants started doing up to 1.5 hours of exercise, 25% started doing 1 hour and a half to 2 and a half hours and 28% started doing more than 2 and a half hours a week. There is a significant association between those individuals who started exercising and shorter exercise intervals, as expected, and there is also a significant association between participants who stayed active and longer intervals.

Another set in the questionnaire concerned which source of information was used for home exercises or who they would ask for advice (Figure 3). All participants who maintained their exercise routines and those who started exercising (n=756) were asked a few questions about where and from whom they sought information about the exercises. Of all these participants, 6.5% were exercise professionals, yet only 0.4% would seek out more information on social media. In any case, social media is the main source of information for online exercise recommendations. 32.5% of the participants stated that they have looked for

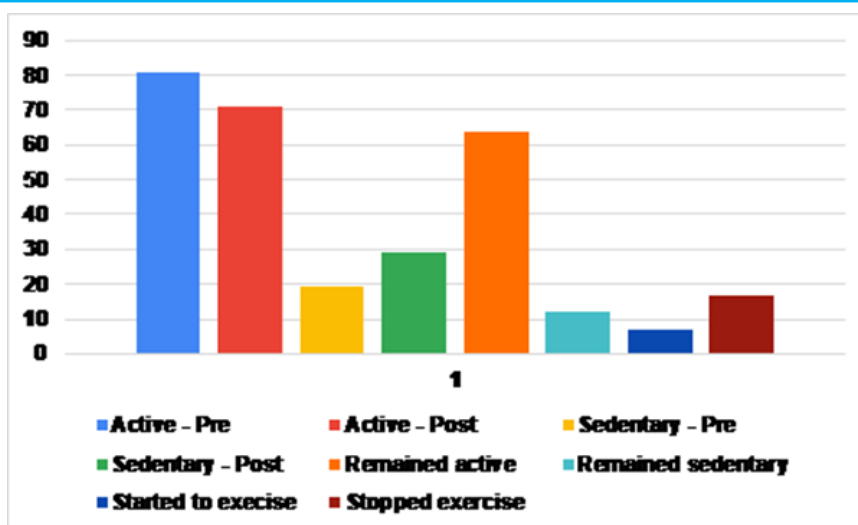


Fig 1. Level of physical activity before and after the onset of the pandemic.

information in this source. Within this group, 17.6% searched social media from fitness professionals, 2.5% used the same source but would also accept advice from amateurs. 12.0% would search for both, professionals or not, and 0.4% would seek information on social media even though they were health experts. Most of the group (49.6%) said they would get information outside of social media, but always online. Of these, 6.3% would seek information without concern even if the subjects who would have provided it were not professionals; 4.8% would inquire with professionals or non-professionals, and fortunately, 38.5% of participants would only seek information with exercise professionals. However, 11.4% of participants reported being physically active without seeking advice. The objective of this study was to investigate the effects

of the pandemic caused by Covid-19 in the physical activity behavior and the source and quality of online information regarding exercise that is searched by those that remained active. COVID-19 pandemic started on March 2020, with some serious consequences and developments from there. Parallel to the understanding and definition of the medical procedures used to contain and treat the disease, other elements that composed the context in that moment had strong influence over the population behavior. COVID-19 pandemic was caused by a virus, but its consequences developed to several different areas of health. This clustering of health related aspects led us to consider the COVID-19 a syndemic instead of a pandemic, as presented by Singer and Clair (2003),<sup>9</sup> due to the complex interaction between the original problems caused by the virus

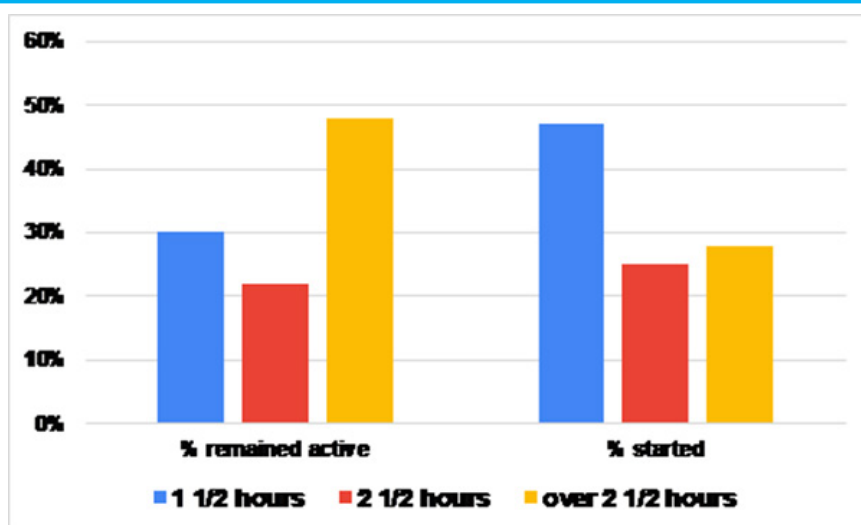


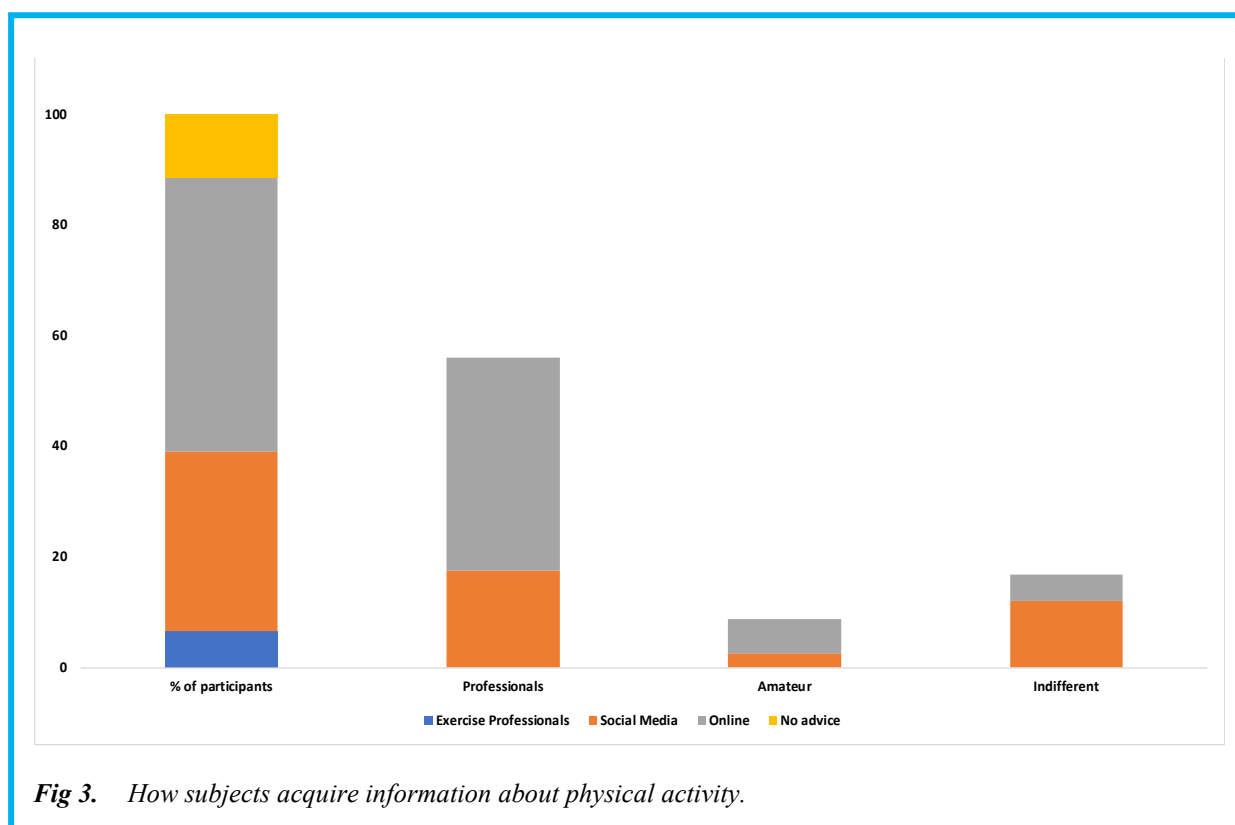
Fig 2. Physical activity: time per week.

## COVID-19, physical activity and online expert search

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infection and the other problems that appeared from there. One of these secondary problems is the reduction in the amount of physical activity that was done by the population. This happened because one of the easiest and most effective strategy to avoid the spread of the virus, that was imposed to the population was the social distance and the stay home safe strategy. In a broad sense, the population was oriented not to live their houses, or to do so only for essential reasons, for at least 4 months. Work was mostly carried out remotely and services and non-essential commercial establishments were closed. Social distance and the stay home safe strategy influenced directly the level of physical activity that was done spontaneously. Even being short and of low intensity, physical activity was done in professional day to day activities or even in leisure time activities. Those spontaneous activities were part of people's metabolic and physical fitness level and we believe that it had a positive impact on the health of those individuals (independent of the health condition they had at that time). Reduction of this specific physical activity level, along the psychological effects of a sudden lifestyle change and moreover with the threat of contamination with a virus with no known treatment and cure, certainly affected people's life in a negative way. Muscle weakness due to physical inactivity can cause severe damage to health. Gonzales et al. (2022)<sup>10</sup> showed that risk factors for weakness muscle can be classified as modifiable and no modifiable. Modifiable risk includes hyperglycemia and other critical diseases.

Dunton et al., 2020 stated that the physical activity pattern decreased in the USA during the first two months of pandemic.<sup>11</sup> A 21% decrease was registered for walking and 46% decrease was registered for moderate intensity exercises. This decrease of moderate intensity exercises is probably related to the fact that gyms and other facilities where these types of exercises were usually done were closed. Another reason why the amount of time of exercise decreased, pointed out by the authors, is the intention of people to prevent the spread of Covid-19. Amini et al., (2020)<sup>12</sup> showed a decrease of 67.5% when considering the METS per minute per week, in a group of 1200 people, with a steeper decrease of men and older people. The main causes listed by the authors were the closing of fitness gyms, other exercise specific structures and lack of safety to walk or ride a bike in the area where the study was carried out, although this last argument, according to the authors, is a problem older than the pandemic installation. Another study that evaluated the effects of COVID-19 pandemic in psychological aspects of the population and connected these effects with regular physical activity was the study published by Alsharji (2020).<sup>2</sup> This study evaluated the prevalence of depression and anxiety in the population during the pandemic. With more than 50% of the participants reporting increased anxiety and more than 60% reporting depression, the incidence of anxiety was bigger among women and younger individuals with low educational level while incidence of depression was bigger among women and older



**Fig 3.** How subjects acquire information about physical activity.

individuals, with lower levels of education and married. Both conditions, anxiety and depression were related to a lower level of physical activity. Furthermore, the complexity of the symptoms and the clinical variability produced by COVID-19 require study of these symptoms' physiopathological repercussions, one of the most relevant of which is damage in respiratory function. A study realized by Lopez-Vinã et al. (2022)<sup>13</sup> generated preliminary findings of neurophysiological and sonography data through diaphragmatic assessment. Conversely, we do not observe relevant differences in the latency because of the variability in the length of the thorax among the patients included in the study. The amplitude of the motor evoked potentials evinces individual variability driven by Body Mass Index and diaphragmatic fat storage, and thus, the main parameters assessed stem from the percentage of variation between both phrenic nerves, compromising breathing. We also registered a reduction in the number of active people after the pandemic onset. However, although we had a large group of participants that responded the questionnaire, we had 80.7% of our participants active before the pandemic, and this number reduced around 10% only after the pandemic. Comparing to the numbers presented, the amount of people, in our research that remained active was high.

So, the next question that we asked was where people got information about exercise to keep active or to know what to do to start a home fitness program. To begin the information debate, 97% of the participants stated they knew that regular exercise practice would be good for their organisms and for their immune system and that would protect them somehow in case they were contaminated by COVID-19.

The idea that regular exercise practice may influence positively the immune system is a very popular fact, known by a lot of people [Nieman DC, Wentz LM, (2019)<sup>14</sup> Fisher et al., (2011)<sup>15</sup>]. However, regular physical activity behavior is not widespread as it should be (Zenko et al., 2019).<sup>16</sup>

The pandemic might have influenced this idea, when health is at stake, information on how to improve or maintain a good health becomes very important. Social media and the pandemic combined, definitely had a role in spreading the information that once was available only for health professionals (Gottlieb and Dyer, 2020),<sup>17</sup> and that might have stimulated people to keep active or start a fitness program or any physical activity, even at home. Another important element in this context is the information that subjects with comorbidities would be more affected by Covid-19 [(Zhengtong and Shubin, (2021)<sup>18</sup>; Jordan et al., (2020)<sup>19</sup> and (2021)<sup>20</sup>], this additional threat might be another source of incentive to begin a physical activity program. This information is corroborated by our data on the Chi squared test that shows a significant association between positive influence on the immune system and keeping active or starting an exercise program. That

meant that people that knew, or learned, about this relationship between a good immune system and regular exercise would either maintain an active routine or start a program, despite the difficulties caused by the pandemic installation and the stay home safe direction.

The need of exercise, as a health strategy and the different context imposed over the society, the social isolation, directed people to social media as a source of information, both, for usual information and for exercise information. We understand that because of the pandemic and the social isolation all participants that reached for information about exercise, used some kind of online strategy. That might include video calls, recorded classes, youtube videos, instagram videos and other different forms. So, we divided social media, the most popular companies such as facebook or instagram or twitter, from other forms of online content. One intriguing information that we found is that around 11% of the participants did exercise without any information. Although it is a small proportion, it meant almost 100 subjects. It is difficult to understand that even with a very large amount of information available in the internet some people still would exercise without any kind of advice. However, because social media is so abundant in content these days, one important concern is about the quality of this information. Social media is a lot more about socializing than it is about publishing good quality information. People publish in social media for visibility and followers, that means that a person with a beautiful body might be an inspiration source, but it doesn't mean that the publisher knows how to teach other people about exercise with safety and effectiveness. Yet, there are some good professionals that use social media as a tool to spread good quality information. Our results showed that most of our participants searched for information outside social media. We still found that almost one third of our participants (32.5%) would go for social media to look for information or prescription about exercise, with 17.6% looking for professional advice. From almost half of our participants that would look for information online, but outside social media, almost 40% of them would look for professionals as a source of information. Those data added gave us a 56% of 80% of the total participants, that would search information only with professionals, either on social media or not. Gottlieb and Dyer (2020)<sup>17</sup> published an article where they discuss the role of social media as a source of information, especially regarding the COVID-19 pandemic. The article is about medical professionals, but surely what they propose is useful in our context. The authors propose some ideas such as a system of certification done by a third party to help inform the public about the quality of the information. They also suggest expanding the reach of experts on social media through lists of experts and sharing their messages. Another interesting suggestion is to work with the social media companies to adapt the algorithms to show reliable information at

the top of the searches and finally, one last suggestion is that the publishers would make their credentials, area of work and conflicts of interests, available, so the user can contextualize the publications. All these suggestions make a lot of sense when we understand the power of social media and the influence that it has on physical activity behavior as we showed with our results. They are even more important when we consider the number of participants that looked for professional information regarding exercise. Our data shows a picture of physical activity behavior and how they would obtain information about exercise when in social isolation. Although these data were obtained during the COVID-19 pandemic and in its context, our results brought interesting insights on the quality of information regarding exercise that is searched online, the importance of social media in connecting people and the behavior of physical activity of people when conditions are not ideal. COVID-19 pandemic was a catastrophic event that required social isolation and shut down several different exercise facilities. That generated negative consequences to both, mental and physical health. At the same time, the need to have a strong immune system, and to keep a healthy mind increased the awareness of regular physical activity as a cheap and effective health strategy. Social isolation changed exercise routines to home exercise programs and that was accompanied by a large wave of online information, not only about COVID19 but also about how to exercise at home. We understand social media as an important player in this context but we gladly observed that most of the participants of this study looked online for professional exercise advice. We understand that online information is a powerful tool that might be used to keep people active, stimulate people to start exercise and to disseminate the well established benefits of regular exercise to the immune system and that was magnified by the COVID-19 pandemic.

### List of acronyms

COVID-19 - Coronavirus disease 2019  
 METS - Metabolic Equivalents  
 SARS-CoV-2 virus - Syndrome of acute respiratory disease – Corona Virus  
 WHO – World Health Organization

### Contributions of Authors

All authors helped to collect the data obtained in the schools mentioned. All authors have read and approved the final edited typescript.

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### Conflict of Interest

The authors declare no financial, personal, or other conflicts of interest.

### Ethical Publication Statement

We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

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