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DIET, PHYSICAL ACTIVITY AND TCA WHAT ARE THE CONSEQUENCES OF THE COVID-19 PANDEMIC? A SYSTEMATIC REVIEW

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Summary. The present systematic review aims to pool knowledge about the physical and psychological consequences of the Covid-19 pandemic. We reviewed 54 articles in which we sought to know how the health situation has affected habits such as diet and physical activity, as well as their possible relationship with the development/worsening of symptomatology related to the spectrum of ED.
The results show that there was a significant change in the way of eating and a decrease in the time spent in physical activity in general terms. While it is true that there has been a change in the trend towards gender. Women are the ones who have practiced the most sports and eaten the worst, unlike before the pandemic.
Likewise, although there is an increase in symptomatology in the general population, there is no increase in the number of diagnoses of ACT since they are restricted to quarantine periods and therefore do not meet temporal criteria. However, a significant worsening of the course has been observed in people with a previous diagnosis.
These results have a special relevance in the elaboration and implementation of health policies in order to treat health in a comprehensive manner.

Keywords: pandemic, food, physical activity, eating disorders, eating disorders

ALIMENTACIÓN, ACTIVIDAD FÍSICA Y TCA ¿CUÁLES SON LAS CONSECUENCIAS DE LA PANDEMIA POR COVID-19? UNA REVISIÓN SISTEMÁTICA

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Resumen. La presente revisión sistemática tiene como objetivo aunar el conocimiento acerca de las consecuencias físicas y psicológicas de la pandemia por Covid-19. Se han revisado 54 artículos en los que se buscaba conocer cómo ha afectado la situación sanitaria a hábitos como la alimentación y la actividad física, así como su posible relación con el desarrollo/empeoramiento de sintomatología relacionada con el espectro de TCA.
Los resultados demuestran que se produjo un cambio significativo en el modo de alimentarse y una disminución en el tiempo empleado para la actividad física en términos generales. Si bien es cierto que se ha constatado que se produce un cambio de tendencia entorno al sexo. Las mujeres son las que más deporte ha practicado y peor han comido, al contrario que antes de la pandemia.
Así mismo, a pesar de que existe un aumento de sintomatología en población general no se produce un aumento de diagnósticos de TCA puesto que están restringidos a los períodos de cuarentena y por tanto no cumplen criterios temporales. Sin embargo, se ha constatado un empeoramiento significativo del curso en personas con diagnóstico previo.
Estos resultados tienen una especial relevancia en la elaboración e implementación de políticas sanitarias para poder tratar la salud de forma integral.

Palabras clave: pandemia, alimentación, actividad física, trastornos de conducta alimentaria

Introduction

COVID-19 is a viral disease with respiratory consequences. It started as an epidemic in Hubei (China) at the end of November 2019 but given the high contagiousness it has spread to 124 countries, thus assuming pandemic status (Inchausti et al., 2020).

It has been necessary to resort to public health policies in order to cope with the pandemic such as the use of masks, mandatory quarantines, use of hydroalcoholic gel, mass vaccination ... However, health has not been treated comprehensively, leaving aside mental health (Ramirez et al., 2020).

At the social level the impact has been uneven due to intrinsic characteristics of their culture and way of life and other influencing factors (Venkatesh & Edirappuli, 2020).

Some of the measures such as social distance or social isolation in quarantine cases have disrupted daily routines (Gomez et al., 2020). All this, within a context of uncertainty and the consequent psychological consequences it entails (Tyrrell & Williams 2020). There are studies such as those carried out by Tull et al. (2020) that point to an exponential increase in the levels of anxiety, depression and stress related to financial worry, fear for health and loneliness caused by the obligation of having to do quarantines, especially pronounced in women and young people.

In this scenario, it is understood that habits such as eating or performing physical activity have also been affected by confinement (El Hangouche & Amekran, 2020).

There are external factors that have contributed to dietary change during confinement, such as the difficulty of going to the supermarket, interruptions in food chains or social inequalities (Muscogiuri et al., 2020).

There are also psychological factors specific to each individual that play an important role in the choice of the type of diet. This is something that authors such as Kuijer & Boyce (2012) have also mentioned. They conducted a study that showed how the psychological consequences of a disruptive event, in this case an earthquake, can modify eating habits.

On the other hand, physical activity has also been affected by external factors such as regular activities and the limited possibilities of finding alternatives at home (Castañeda-Babarro et al. 2020).

In addition, psychological factors are also decisive in the motivation to engage in physical activity. This motivation can be intrinsic to promote a healthy lifestyle or extrinsic in order to pursue pre-established canons of beauty set by society. Both have been affected by the pandemic and confinement (Teixeira et al., 2012).

Eating and lifestyle habits are extremely important for health and the prevention of some diseases, especially in a pandemic context (Maraver-Romero, 2020).

In addition, the medium- and long-term consequences create uncertainty (Johnson et al., 2020). These conditions may have consequences in the development of organic diseases (diabetes, hypertension and obesity) or psychological disorders. It may also be the case that pre-existing pathologies worsen (Hudson et al., 2007).

Specifically, habit changes in terms of eating and exercise due to psychosocial stressors that arise due to the pandemic may be triggers or increase symptomatology of eating disorders (ED) due to the difficulty in emotion regulation involved (Brewerton & Dennis, 2016). Something that authors such as Vartanian et al. (2012) already predicted. These authors found that motivations for physical activity that may have occurred during confinement, such as physical appearance, are related to increased symptomatology.

The most prevalent are anorexia nervosa (0.4%), bulimia (1.5%) and binge eating disorder (1.6%), especially among young women (APA, 2014).

During the health crisis there have been external factors to increase certain symptoms of anorexia such as the desire to increase the feeling of control through maladaptive behaviors, dissonance between weight and body shape promoted by increased exposure in RRSS (Schlegl et al., 2020).

Likewise, people with bulimia have been able to increase their polarization by acting in two ways: skipping meals or increasing binge eating due to the increased availability of food because of food insecurity. This phenomenon has also affected binge eating disorder (Touyz et al., 2020).

There is a recurring phenomenon in this type of situation that does not meet the criteria but does share some similarities: emotional eating. (Keller & Siegrist, 2015). Disinhibited eating occurs, as a form of control in the face of intense emotions, such as those produced by the pandemic (Lattimore & Mead, 2015).

As we have seen, extraordinary conditions have arisen and the long-term consequences of this situation are not yet fully known. It is true that the health crisis has highlighted the importance of global health, however, this has not been done in a comprehensive manner (Ramirez et al., 2021).

Difficulty in accessing hospitals or mental health care has also been a factor against being able to know, prevent and treat the consequences in both general and clinical populations (Garriga et al., 2020). It is therefore essential to know the impact on eating and exercise behaviors in order to target interventions appropriately.

Objectives and hypotheses

The main objective is to learn about habit change (diet and physical exercise) and its relationship with behaviors within the spectrum of eating disorders during the Covid-19 pandemic through the current literature.

Secondary objectives: (a) to learn how psychological consequences mediated the changes and (b) to explore in which population strata the greatest changes occurred.

Main hypothesis:

-There has been an increase in diagnoses of ED in the general population.

Secondary hypotheses:

-The course of people with ACT has worsened during the lock-in.

-Lifestyle habits (food and sports) have been less healthy during the confinement.

Method

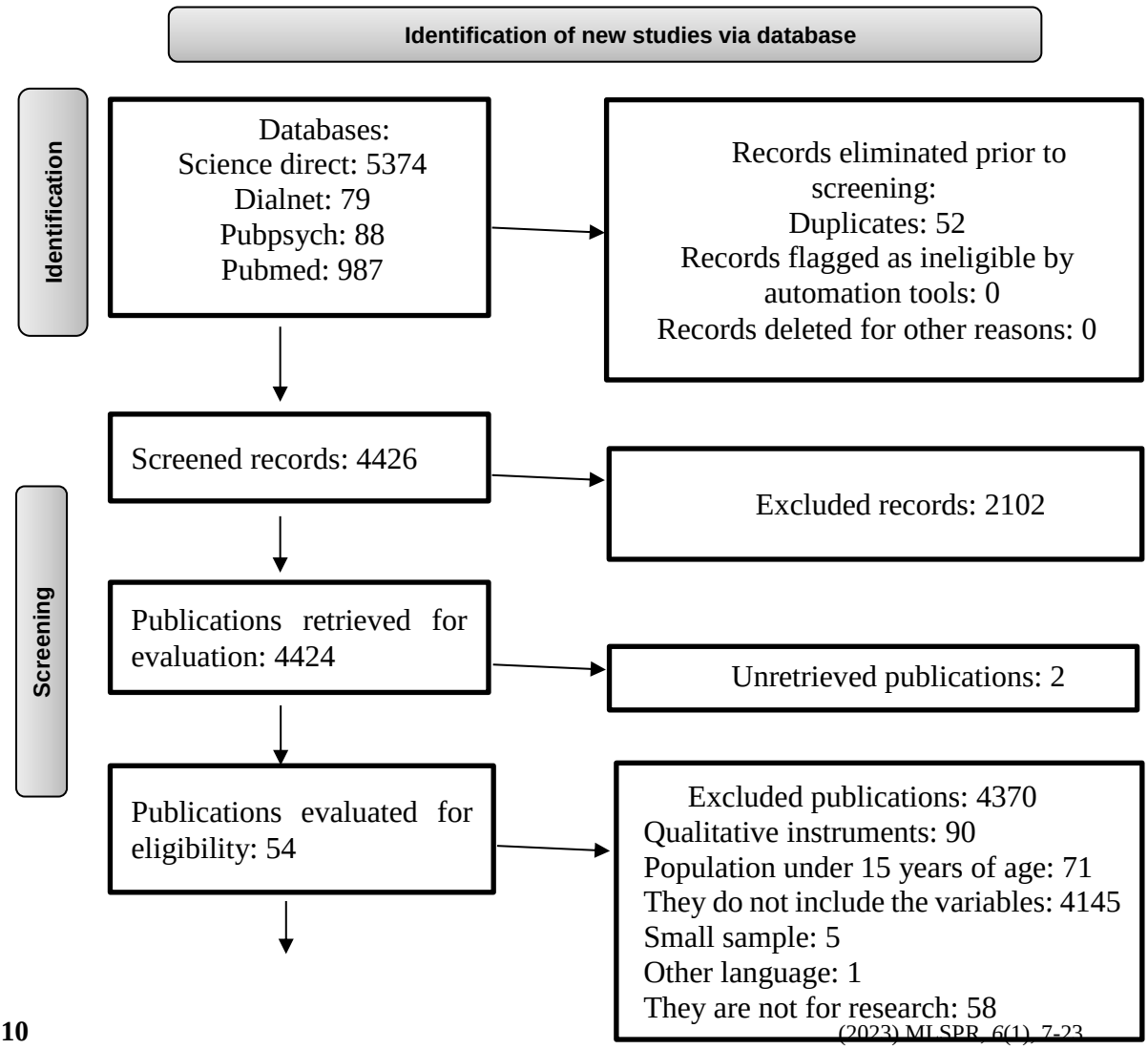
An extensive search for research articles was made among different databases between November and December 2021, given the nature of the problem, only articles from 2020 and 2021 were included. Different databases were chosen: Sciencedirect, Dialnet, Pubmed and Pubpsych. All platforms are Open Acess, one of the reasons why they were chosen.

For the search we used the English terms "eating disorders" "covid" "pandemic" using the Boolean operator "AND" and in Spanish "trastornos de conducta alimentaria", "covid", "pandemia" and the Boolean operator "y" in all the databases.

Along the same lines, the English terms "changes habits", "covid", "pandemic" were used using the Boolean operator "AND" and in Spanish "cambio de hábitos", "covid", "pandemia" and the Boolean operator "y" in all the databases.

The inclusion criteria for the selection of studies were: empirical studies; language: English or Spanish; research related to psychology; that included the variables of the present review; that included at least one validated quantitative measure; and that the target population was between 15 and 65 years of age.

The exclusion criteria for the selection of studies were: reports, clinical commentaries, reviews or conferences; qualitative research; sample of less than 40 participants and suffering from any type of physical and/or mental illness other than an ACT.



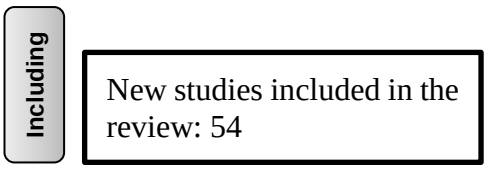


Figure 1. Flowchart according to the PRISMA 2020 statement for systematic reviews.

Results

Participants

Overall, a total of 43,257 subjects participated in the 54 articles.

The gender of the participants was specified in 49 articles, which represents 90.7% of the articles. Likewise, in 45 studies, women participated more than men (92.6%). So much so that 29,063 women (67.2%) and 14,194 men (32.8%) participated.

As for age, 51 studies included the mean (94%). Study participants ranged in age from 15 to 60 years old. In 39 studies (76%) the mean age ranged between 30 and 40, although there were some exceptions.

Given the nature of the present review and its objective, 26 studies (48.8%) studied the impact of the pandemic on the population with ACT. Likewise, it should be taken into account that 14 studies (26%) do not explicitly include the diagnosis among the sociodemographic data but do study the associated behaviors.

In addition, studies from different countries that have been affected by the pandemic have been taken into account. However, it is noteworthy that 49 studies (90.75%) were conducted in Western countries. Only 5 studies (9.25%) report data from an eastern country, which in this case is China (3), Saudi Arabia (1) and Lebanon (1).

Instruments

The *International Physical Activity Questionnaire* [IPAQ] (IPAQ Research Committee, 2005) is the most widely usedtoassess physical activity, included in 11 studies (20.34%). The IPAQ-SF is a 7-item scale that reports the intensity, duration and frequency of physical activity and divides it into vigorous (aerobic) and moderate (cycling) activity and also assesses the time spent sitting during the last 7 days (Lee et al., 2011).

Some studies have measured other variables related to symptomatology, the most widely used being the EDE-Q (6 articles; 11.11%). The *Eating Disorder Examination Questionnaire* [EDE-Q] (Fairburn and Beglin, 1994). It consists of 36 items that assess cognitive and behavioral symptoms of eating behavior in the last 28 days. Items are scored from 0 to 6, with higher scores indicating greater ED-related symptomatology. It has an inter-rater consistency of .95 (Mond et al., 2006)of .95 (Mond et al., 2006).

Other emotional issues are also measured. However, the most widely used are the DASS-21 (6 items; 11.11%) and the PSS (10 items; 18.51%).

The *Depression, Anxiety and Stress Scale* [DASS-21] (Lovibond and Lovibond, 1995). It has 3 self-response scales and consists of 21 items with 4 response options in Likert format. Each scale contains 7 items and the score per subscale reaches 21 points (Román, Santibáñez, & Vinet, 2016). Cronbach's alpha of .9 (Barrera-Herrera et al., 2019).

On the other hand, the *Perceived Stress Scale* [PSS] (Cohen et al., 1983). It is a 10-item scale All items were rated on a 5-point scale with higher scores reflecting higher perceived stress. The internal consistency is de .88 (Lee, 2012).

Procedure

In general, the procedure has been affected by the health emergency situation. This is why in 53 of the studies (98.14%) it was carried out telematically, with the exception of the study conducted by Zhou & Wade (2021), which was completed by having the participants come in person, but once there, they completed it online.

To encourage people's participation, 40 studies (74%) have used the method of nieve method (social networks, Profilit...). On the other hand, 14 studies (26%) used the convenience (26%), used the convenience sampling method by e-mails from official institutions.

As for test administration, it was carried out online in 53 studies (98.2%) and in 1, an interview was conducted by telephone, which is 1.8%. Different platforms such as Survio, Google Forms or Qualtrics were used, but the most widely used was M-turk.

As for administration times, they depend on the research cut-off. In this case, 37 studies (68.5%) were cross-sectional. However, another 17(31.5%) were of longitudinal cut and required more than one time for the application.

Results

Among the studies included in the review, 14 of them include aspects related to food, which represents 26% of the studies.

Mascherini et al. (2021), Dobrowolski & Włodarek (2021) and Cheikh Ismail et al. (2021) reported an increase in food intake. McAtamney et al. (2021) found that the majority of their participants (58.1%) reported no change in the amount of food while 16.2% ate less and 25.7% ate more.

As for the type of diet, depending on the country, the type of food consumed during the pandemic is different from pre-Covid. In all there is some significant tendency for them to be less healthy (Skotnicka et al., 2021; Dobrowolski & Włodarek, 2021). Overall 14% more unhealthy foods were consumed compared to 2019 (Cummings et al., 2021),

In addition, the study conducted by Rogers et al. (2021) shows how 8 months after confinement, high levels of unhealthy diets are maintained by increased out-of-home meals.

In terms of sociodemographic variables there is consensus that women had a greater predisposition to undertake a less healthy diet (Coulthard et al., 2021; Özcan & Yeşİlkaya, 2021; Cummings et al., 2021; Baceviciene & Jankauskien, 2021; d os Santos Quaresma et al., 2021). Especially those with a higher BMI and with an initial tendency to overeat (Coulthard et al., 2021). Also, being a student and being confined for more than 45 days were associated with poor feeding (Intelangelo et al., 2021; Musharaf et al., 2021). In contrast, older men were those who reported a greater tendency to eat a healthy diet (Cummings et al., 2021; Mascherini et al., 2021).

Regarding the effect on diet due to psychological consequences, there is some controversy since the studies carried out by Alon-Tirosh et al. (2021), Coulthard et al. (2021) and Musharaf et al. (2021) show that variables such as distress are determinants of a less healthy diet, while McAtamney et al. (2021) found no relationship between psychological consequences and type of diet.

The present study included 18 articles that included aspects related to physical activity during confinement, which represents 33.33%.

Regarding time spent in physical activity studies report a downward trend (Intelangelo et al., 2021; Savage et al., 2020; Skotnicka et al., 2021; Mascherini et al., 2021; Hargreaves et al., 2021; Bağcı et al., 2021; Maltagliati et al., 2021; Jodczyk et al., 2021; Cheikh Ismail et al., 2021). In contrast, the study conducted by Rogers et al. (2021) report that exercise levels remained similar. While Breiner et al. (2021) reported an increase in time spent exercising.

There is controversy among people who play sports. Intelangelo et al. (2021) reported an increase in time of around 30 minutes, while Savage et al. (2020) reported a decrease of about 28 minutes per week. In this regard, Tornaghi et al. (2020) note that only very active students increased time.

Factors related to the sport were being female, young, a student, separated, or having a house with a garden. On the other hand, factors hindering physical activity were being male, self-employed and widowed (Mascherini et al., 2021; Savage et al., 2020; Baceviciene & Jankauskien, 2021). Women had more negative thoughts about their physical condition which motivated them (León-Zarceño et al., 2021).

Chi et al. (2021) and León-Zarceño et al. (2021) report that exercise acts as a protective factor for depression, anxiety, insomnia... However, the same is not true for stress (Breiner et al., 2021; Savage et al., 2020; Alon-Tirosh et al., 2021)

With regard to behaviors related to ED, 26 articles have been included that provide information on the subject, which represents 48.8% of the studies included.

The risk of eating disorders was not altered in the general population although certain symptoms characteristic of an ED were present. Likewise, individuals who reported a history of ATT showed an increase in symptomatology after confinement. While in those with a previous diagnosis, symptomatology worsened (Meda et al., 2021; Breiner et al, 2021; Martínez-de-Quel et al., 2021; Robertson et al., 2021).

Specifically there are studies that note that 15.5% relapsed into an ATT, 19% recovered and 65.5% reported no change during the pandemic (Branley-Bell & Talbot, 2021).

Participants with anorexia nervosa increased restraint (especially in the second wave), as did purging. People with bulimia nervosa and binge eating disorder had increased binge eating episodes, although they did not differ between waves. It is worth mentioning that the symptomatology of bulimia was more severe than that of anorexia. People with a history noted concerns about relapse (Termorshuizen et al., 2020; Phillipou et al., 2021; Castellini et al., 2020). All increased compensatory exercise (Castellini et al., 2020). In addition to the fact that binge eating did not increase significantly after confinements (Gullo & Walker, 2021).

Decreased feelings of control, increased rumination, and poor sense of social support have been found among people with ACTs (Branley-Bell & Talbot, 2020). Likewise, Giel et al. (2021) state thatpeople with a greater tendency to reappraise as an emotion regulation strategy had less ED symptomatology.

In general population, 56% of the sample reported that it was more difficult to control their eating, and 60% reported being more concerned about food and their appearance during confinement (Robertson et al., 2021; Zhou & Wade, 2021; Trott et al., 2021). Food insecurity and nutritional practices are related to the risk of developing eating disorders (dos Santos Quaresma et al., 2021).

Specifically, there are studies that point out that symptomatology such as fasting (25%), binge eating (29%), overeating (81.0%), loss of control over eating (47.2%), vomiting (10%) and driven exercise (10%) occurred (Ramalho et al., 2021; Zhou & Wade, 2021; Tazeoğlu et al., 2021). However, in physically active people, the possibility of developing symptoms compatible with ACT decreased (Martínez-de-Quel et al., 2021).

Studies agree that being a woman is one of the main risk factors for this type of symptomatology. It is related to increased perceived media pressure and internalization of beauty ideals during confinement (Baceviciene & Jankauskien, 2021; Robertson et al., 2021; Thompson & Bardone-Cone, 2021; Swami et al., 2021; Robinson et al; Fan et al., 2021).

Risk factors for developing weight control behaviors during the pandemic were: having a lower educational level, being white, having a psychiatric diagnosis, obesity, and having had COVIDor COVID. Being younger, having a prior psychiatric diagnosis, having had COVID-19, higher BMI, and experiencing psychological consequences since confinement were associated with overeating (Robinson et al., 2021). Younger people thought more about exercise and had more concerns about their appearance during confinement. In contrast, there were no differences by age group in perceived changes in eating (Robertson et al., 2021).

COVID-19-related stress and anxiety are associated with a more negative body image. In the case of women, they had a desire for thinness. In men, a greater dissatisfaction with muscle development. In both cases, negative thinking regarding their physical appearance was mediated by self-pity (Swami et al., 2021; Flaudias et al., 2020; Gullo & Walker., 2021).

Generically, COVID-19 anxiety, is more strongly related to compulsive exercise and risk of ED for individuals with lower tolerance for uncertainty (Scharmer et al., 2020).

Stress was also associated with the rumination characteristic of TCAs (Branley-Bell & Talbot, 2021).

Li et al. (2021) found that negative emotions and threat of mortality are associated with binge eating episodes. In the same vein, distress, worse living conditions and decreased social life during confinement have been related to emotional eating (Cecchetto et al., 2021; Özcan & YeşİlkAya, 2021; Tazeoğlu et al., 2021; Giel et al., 2021; E lmacıoğlu et al., 2021). The study conducted by Wang et al. (2021) suggests that emotional eating also increased in mothers due to stress and changes in routine. This fact led to a greater use of rewards in terms of food, even with their children.

Discussion and conclusions

The aim of this review is to determine the magnitude of the effect of the health situation on lifestyle habits in terms of diet and physical activity, as well as their relationship with the symptoms of the spectrum of eating disorders.

Regarding the main hypothesis, the risk of developing ACT was not increased in general population although certain characteristic symptoms such as fasting, binge eating, overeating, loss of control over eating, vomiting and impulsive exercise have been present (Ramalho et al., 2021; Zhou & Wade, 2021; Tazeoğlu et al., 2021). The occurrence of increased symptomatology associated with ACTs is to be expected within a disruptive event (Kuijer & Boyce, 2012). However, most of these behaviors appear during the time of confinement and this is less than the minimum time indicated by the reference manuals to be able to carry out the diagnosis.

On the other hand, studies agree that being a woman is one of the main risk factors for suffering from this type of symptomatology, in agreement with many other previous studies such as those carried out by Chao et al. (2016).

Psychological consequences and increased symptomatology are related to perceived lack of control, and compensation through symptomatology serves as a control mechanism for the uncertainty of the situation (Branley-Bell & Talbot, 2021). This phenomenon occurs recurrently and has been reported by Froreich et al. (2016) in other types of disruptive situations.

Along the same lines, the second hypothesis is confirmed, the course worsened in those with previous diagnosis, and was even maintained after confinements (Meda et al., 2021; Breiner et al., 2021; Martinez-de-Quel et al., 2021; Robertson et al., 2021). The

increase in symptomatology in the face of such a disruptive event is amply demonstrated by research such as that carried out by Scharff et al. (2021).

Regarding the third hypothesis, there is a consensus on the change that has occurred in the results found with respect to food. The results show changes in both the quantity and quality of food during the pandemic.

Likewise, the studies suggest that women were more likely to have a less healthy diet during their forties, something that disagrees with previous studies such as the one carried out by Norte Navarro & Ortiz Moncada. (2011) in pre-pandemic situations. This phenomenon may be supported by the fact that women have developed the most psychological consequences of the pandemic and are most likely to develop abnormal eating in the face of a disruptive event (Klatzkin et al., 2019).

There is a downward trend in terms of commitment to physical activity. This result is in line with the general trend of physical inactivity reported by authors such as Pratt et al. (2019).

As has been shown, in those people who were more active during the quarantine period, the psychological consequences were reduced. This phenomenon is in line with many other pre-covid researches collected in the review conducted by Granados & Cuellar (2018).

There is considerable consensus that being a woman is a factor that favors predisposition to exercise during confinement. This fact is in contradiction with previous studies (Marques et al., 2016). León-Zarceño et al. (2021), explain this fact by claiming that women have had more negative thoughts about their condition and health status and this has motivated them more.

Considering the aforementioned, behaviors related to eating and physical activity are not watertight, but are closely related to the possibility of developing some type of symptomatology within the spectrum of ED (dos Santos Quaresma et al., 2021).

These results are of great importance, since they represent an increase in knowledge about the health consequences of the Covid-19 pandemic at all levels. This information is crucial for the implementation of health policies to prevent the main consequences of this situation. Through this knowledge, intervention strategies can be developed to address the consequences and thus treat health in a comprehensive manner.

However, the strength of the present review is that it has addressed health during the pandemic in a comprehensive (physical and psychological) manner. The fact of approaching it as a whole and not only the presence/absence of negative symptoms, implies a more objective approach to the reality of the population and the problem.

As for limitations, one of them is the methodological diversity of the articles, in terms of sample sizes, instruments and their application in a pandemic context. Specifically, the pandemic situation favored an increase in the use of ICTs to meet the challenge posed in the scientific field, expanding the range of possibilities for developing new research processes in which new limitations have been encountered for data collection, data management and interpretation. These difficulties mean that although there are a large number of publications on the subject, very few are based on the scientific method and are limited to describing a subjective reality.

On the other hand, attempts are being made to establish equitable studies between countries. However, neither the health situation, nor the economic situation, nor the measures, nor the time has been similar, which may bias the results.

In the same vein, a major limitation is that the vast majority of the literature reflects the situation in the West. While it is true that ED disorders are closely linked to culture, the lack of research makes it very difficult to know the situation in Eastern countries.

Another limitation is that most of the questionnaires were carried out online, so it has not been accessible to a large number of people, such as elderly people with no technological knowledge, people with low resources, etc.

Along the same lines, one of the criteria is that the sample must be over 15 years of age. This criterion was established due to the complexity of accessing the population under the established age and the few instruments validated for younger ages, so that a large part of the population at risk cannot be analyzed.

Finally, most of them have not taken into account other variables such as economic level, sleep hygiene or consumption of toxic substances that may be determinants in the development of healthy habits and thus better understand the magnitude of the problem.

For its part, one of the great challenges is to improve the methodological designs used in the various investigations, as a line of future research and to include more longitudinal studies in order to accurately understand the evolution of the different stages of the pandemic.

On the other hand, several studies, such as those conducted by Lehberger et al. (2021) suggest that the conditions of the situation led to panic-driven consumption. It would be important to try to know what variables influence food purchases and how these influenced the diet.

Finally, another line of future research could be the integration of coping strategies related to the studied factors such as fostering self-control, stress management, mood and uncertainty in at-risk population in order to combat bad habits or the development of ED-related symptomatology.

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