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RESEARCH ARTICLE

Influence of COVID-19 confinement on physical activity habits, snacking and alcohol consumption in Spanish population

Influencia del confinamiento por COVID-19 en los hábitos de actividad física, consumo de snacks y alcohol en población española

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KEYWORDS

Physical activity
Snack consumption
Alcohol consumption
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ABSTRACT

Introduction: Household confinement imposed globally as a consequence of COVID-19 may influence and lead to complications in the health of the population. Changes in physical activity, sedentary lifestyles and eating habits can occur. Poor dietary and mobility habits can worsen people's health status. The aim of this study was to analyse changes in the frequency of physical activity during confinement and its relationship or not with the consumption of alcohol and snacks.

Methods: The methodology used was to send an online questionnaire to the Spanish population with questions related to life-style, eating habits and physical activity. A sample of 1640 people was obtained.

Results: The results show that the frequency of physical activity decreased in general during confinement in the population studied. On the other hand, there was no relationship between the practice of physical activity and the consumption of alcoholic beverages, but it could be related to the consumption of snacks.

Conclusions: The Spanish adult population decreased daily physical activity overall, and snack consumption in-creased during the COVID-19 confinement period.

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PALABRAS CLAVE

Actividad física

Consumo de snacks

Consumo de alcohol

COVID-19

Confinamiento domiciliario

RESUMEN

Introducción: El confinamiento domiciliario impuesto globalmente como consecuencia de la COVID-19 puede influir y provocar complicaciones en la salud de la población. Pueden producirse cambios en la actividad física, el sedentarismo y los hábitos alimentarios. Los malos hábitos alimentarios y de movilidad pueden empeorar el estado de salud de las personas. El objetivo de este estudio es analizar los cambios en la frecuencia de actividad física durante el internamiento y su relación o no con el consumo de alcohol y aperitivos.

Metodología: La metodología utilizada fue el envío de un cuestionario online a la población española con preguntas relacionadas con el estilo de vida, los hábitos alimentarios y la actividad física. Se obtuvo una muestra de 1640 personas.

Resultados: Los resultados muestran que la frecuencia de actividad física disminuyó en general durante el encierro en la población estudiada. Por otro lado, no se encontró relación entre la práctica de actividad física y el consumo de bebidas alcohólicas, pero podría estar relacionado con el consumo de snacks.

Conclusiones: La población adulta española disminuyó globalmente la actividad física diaria y aumentó el consumo de snacks durante el periodo de confinamiento COVID-19.

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KEY MESSAGES

1. The main finding was that the Spanish population engaged in lower levels of physical activity during the lockdown and increased their consumption of snacks; however, no changes were observed in alcohol consumption.
2. In addition to physical activity, a balanced diet is essential for maintaining optimal health, as well as supporting psychological well-being and proper immune system function, thereby helping to prevent chronic non-communicable diseases.
3. Individuals who were more physically active consumed fewer snacks. In contrast, those who were less physically active and who were overweight or obese showed a greater tendency toward snack consumption, particularly among women.
4. No significant changes were observed in alcohol consumption, unlike in countries such as England and Australia, where alcohol intake increased during this period, especially among women.

CITATION

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INTRODUCTION

In light of the COVID-19 pandemic, public health recommendations and government measures imposed house confinement with mobility restrictions for the entire Spanish population[1]. On account of these limitations, changes occurred in daily life activities as well as indoor and outdoor leisure activities[2]. Such restrictions limit the mobility of the population, making them more sedentary, which, together with changes in eating habits due to confinement, have repercussions on lifestyle changes and influence consumption habits in general[3].

Populations with healthy and more active lifestyles have better health, as these lifestyles help reduce the risk of chronic non-communicable diseases (NCDs) and reduce the risk of COVID-19 infection as well. On the other hand, populations with more sedentary lifestyles have a higher risk of NCDs such as cardiovascular and metabolic diseases[4].

Since the beginning of the COVID-19 pandemic, there has been a lot of research published that shows that staying longer at home causes people to consume larger amounts of food in general. This increased intake is mainly caused by the anxiety and stress generated by confinement[5,6]. The most frequently consumed foods in the period of confinement by the Spanish population were snacks and sweets, being foods with a high caloric value[5]. The consumption of high-calorie foods combined with a more sedentary lifestyle can lead to an increased risk of overweight and obesity[7]. In addition, in times of anxiety, stress and crisis, there is a greater tendency to consume more alcohol, alcohol consumption being a risk factor for cardiovascular disease[8].

In general, people who are more physically active feel more satisfied and happier in their lives. This same result was seen during confinement, when people who were active were able to improve their physical and mental health[9]. Therefore, the decrease in physical activity during confinement may have negatively impacted not only physical health but also psychological well-being, as physical activity has been shown to reduce stress and anxiety in the population[10]. Consequently, alcohol consumption increased during this period, as many individuals experiencing stress and anxiety used alcohol as a means of alleviating psychological symptoms by stimulating serotonin production[11]. This led to the emergence of different initiatives during the confinement, promoting physical activity in Spanish households in order to prevent NCDs such as obesity and to obtain greater psychological satisfaction by the population in confinement[12].

In view of the above and given the importance of physical activity for both physical and mental health, the aim of this study is to analyse physical activity habits and their relationship with the consumption of snacks and alcoholic beverages during COVID-19 confinement in the Spanish population.

METHODOLOGY

The study design was descriptive, cross-sectional observational. The population participating in this study was composed of Spanish adults over 18 years of age residing in Spain during the period of home confinement resulting from COVID-19.

The required sample size is 427 people, assuming a confidence level of 95% with a precision of 5% and an expected proportion of 50%, and a loss rate of 10%. The research population was chosen by means of a non-probabilistic convenience sampling among the Spanish population. Participants were informed about the objective of the study and were sent and informed consent form together with the questionnaire to be filled in before answering the study questions. The study was conducted according to the guidelines of the Declaration of Helsinki, and it was approved by the University of Alicante Research Ethics Committee (permit nº. #UA-2021-00 02). In addition, the study design, as well as the development of the manuscript, followed the STROBE-nut statements according to Lachat et al. 2016[13].

The data were collected in a questionnaire that was created through the Google Forms platform. The questionnaire was distributed online by email and via the WhatsApp APP. It was sent randomly together with a brief description of the reason for the study and informed consent. Data were collected from 1 April to 4 May 2020, with a total of 1640 participants. After two weeks, a reminder was sent through the same platform through the questionnaire the University of Alicante's social media communication channels, so that it could reach as many of the university community as possible, as well as family and friends, and all those to whom the questionnaire was sent. The questionnaire used was composed of 37 variables, divided into three blocks. The first block refers to socio-demographic variables such as age, sex, employment status and province of residence. The second block contains the variables necessary to analyse the frequency of food and drink consumption. And in the third block, questions related to the practice of physical activity are collected.

The data of food consumption was obtained using the National Health Survey (NHS) Food Frequency Questionnaire (FFQ), validated for adults.

The NHS is composed by several modules, of which the socio-economic and health determinants variables have been used for this study. The full FFQ included in the NHS collects data on 15 different food groups whose response intervals are: Once or more times a day; 4 to 6 times a week; Three times a week; Once or twice a week; Less than once a week; Never[14].

The variable snacks is defined as food consumed between meals, mainly salty and usually with a high caloric content[15]. The question on snack consumption was used to determine the amount of snacks

consumed during confinement. Additionally, a new question was asked regarding snacks consumption: During confinement did you consume snacks as often, more often or less often than before?

An alcoholic beverage is defined as any beverage containing more than 1% ethanol by volume. Both fermented and distilled beverages are included[16]. For the collection of information on alcohol consumption, the questionnaire included the following question: Has your consumption of alcoholic beverages increased during this period? with a yes or no response.

Data on physical activity were collected using the validated International Physical Activity Questionnaire (IPAQ) short version[17]. The IPAQ questionnaire was designed and validated for ages 15-69, so the participants over 69 (1.6%) were excluded from this part of the study. According to the IPAQ categories and guidelines, responses were classified into three categories: low, moderate or vigorous physical activity. For the subsequent analysis, the physical activity variable was categorised according to various criteria:

- Intense physical activity is considered if at least three days of intense physical activity of more than 20 minutes per day are performed or if the sum of the days on which moderate and intense physical activity performed is seven days or more.
- Moderate physical activity is defined as three or more days of vigorous physical activity of less than 20 minutes per day. It is also classified as moderate when five or more days of moderate physical activity are performed or if the sum of moderate and vigorous physical activity days is greater than 5 days.
- Low physical activity is defined for people who did not do enough physical activity for another higher category or did not do any activity at all.

In addition, questions were added about each respondent's personal perception of how physically active they were and whether they did more or less physical activity than before confinement.

A descriptive analysis was performed using frequency and percentage for the total and by sex for all variables. In order to determine whether there were statistically significant differences between physical activity and previous to confinement, a contrast of differences of proportions was performed. In the analysis of physical activity according to the IPAQ questionnaire, those who did not answer the time of physical activity were excluded. The analysis was done according to sex by means of a difference of proportions test to explore the relationships between physical activity, snacks and alcohol consumption. To observe alcohol consumption during confinement according to whether or not physical activity was undertaken, as well as the frequency of snack consumption and its association with physical activity, the Chi-square test was used. Finally, logistic regression was performed to study the association between snack consumption and age-adjusted increase or decrease in physical activity. Data were analysed in SPSS 20.0 statistical software.

RESULTS

A total of 1640 people (1142 women and 498 men) answers to the questionnaire were obtained. The average age of the sample was 37.7, with a minimum age of 18 and a maximum of 81, almost 70% were women. Most of the participants, more than 60%, lived in the Valencian Community.

In relation to the frequency of physical activity during confinement, more than 75% of the population reported doing less physical exercise than before the pandemic, with no significant differences by sex in the different categories (see table 1).

In relation to physical activity habits according to the IPAQ questionnaire, the frequency of physical activity is classified as low, moderate and vigorous. As shown in Table 2, most of the population is in the low and intense categories. No significant differences were found by sex according to category. However, in the category of intense physical activity, it is the men in relation to the women who performed a higher intensity activity. In the low intensity category there is a higher percentage of women than men.

Table 3 shows the frequency of snack consumption and its association with physical activity during home confinement. It should be noted that there are significant differences in the frequency of snack consumption according to whether or not physical activity is undertaken in the total sample and in women. A more in-depth analysis of snack consumption in the less active population reveals that the increase was primarily observed in women, with 37% reporting a higher intake of snacks during confinement. Conversely, men who were more physically active predominantly reduced their snack consumption. Nevertheless, it appears that individuals who did not engage in physical activity reported consuming more snacks during confinement compared to those who were more active.

Analysis of the association between snack consumption and physical exercise during age-adjusted house confinement shows that the population that increased snack consumption during this period was 36% less likely to exercise than those who consumed snacks less frequently, reaching 40% in the case of women (see table 4).

The results obtained by observing the relationship between physical activity habits and the consumption of alcoholic beverages show in Table 5 that, regardless of the practice of physical activity, around 80% of the sample did not increase alcohol consumption during confinement, with no significant differences found when analysed by sex. Although the results do not show statistical significance a trend can be observed in which the least active men exhibited the highest increase in alcohol consumption during confinement. In contrast, physically active women reported the lowest alcohol consumption.

Table 1. Frequency of physical activity performed during home confinement compared to before confinement.

Frequency of physical activity compared to before confinement	Total n (%)	Men n (%)	Women n (%)	P-value*
The same frequency	183 (11.2)	55 (11.0)	128 (11.2)	0.913
Less frequent	1255 (76.6)	392 (78.7)	863 (75.7)	0.185
More frequent	200 (12.2)	51 (10.2)	149 (13.1)	0.108

*p < 0.05

Table 2. Classification of physical activity according to intensity as defined by the criteria set out in the IPAQ.

Category of physical activity (IPAQ)	Total n (%)	Men n (%)	Women n (%)	P-value*
Low PA	734 (47.2)	206 (43.6)	528 (48.8)	0.064
Moderate PA	91 (5.9)	33 (7)	58 (5.4)	0.206
Intense PA	730 (46.9)	233 (49.4)	497 (45.8)	0.207
Total n (%)	1555 (100)	472 (100)	1083 (100)	

PA: physical activity *p < 0.05

Table 3. Frequency of snack consumption and its association with physical activity during home confinement.

		Being physically active Total n (%)		Being physically active Men n (%)		Being physically active Women n (%)	
		Yes	No	Yes	No	Yes	No
Frequency of snack consumption	Less frequent than before confinement	221 (18.0)	69 (16.8)	74 (20.3)	23 (17.2)	147 (17.0)	46 (16.6)
	Same as before confinement	676 (55.0)	202 (49.1)	204 (56.0)	74 (55.2)	472 (54.6)	128 (46.2)
	More frequent than before confinement	332 (27.0)	140 (34.1)	86 (23.6)	37 (27.6)	246 (28.4)	203 (37.2)
	Total	1229 (100)	411 (100)	364 (100)	134 (100)	865 (100)	277 (100)
P-value*		0.023		0.564		0.018	

*p < 0.05

Table 4. Association between snack consumption and physical activity during age-adjusted home confinement.

	Total			Men			Women		
Frequency of snack consumption	**OR**	**IC95%**	**p**	**OR**	**IC95%**	**P**	**OR**	**IC95%**	**P**
Same as before	1			1			1		
Less frequently	0.97	(0.67-1.26)	0.591	1.14	(0.66-1.98)	0.640	0.83	(0.56-1.22)	0.342
More frequently	0.64	(0.49-0.83)	**0.001**	0.71	(0.44-1.16)	0.714	0.60	(0.44-0.82)	**0.001**

*p < 0.05

Table 5. Variation in the consumption of alcoholic beverages and its relationship to physical activity during confinement.

		Being physically active Total n (%)		Being physically active Men n (%)		Being physically active Women n (%)	
		Yes	**No**	**Yes**	**No**	**Yes**	**No**
Alcohol consumption increases	Yes	230 (18.7)	86 (20.9)	76 (20.9)	29 (21.6)	154 (17.8)	57 (20.6)
	No	999 (81.3)	325 (79.1)	288 (79.1)	105 (78.4)	711 (82.2)	220 (79.4)
	Total	1029 (100)	411 (100)	364 (100)	134 (100)	865 (100)	277 (100)
OR (IC95%)		0.87 (0.69-1.15)		0.955 (0.59-1.55)		0.836 (0.59-1.17)	
P-value*		0.325		0.853		0.300	

*p < 0.05

DISCUSSION

The main result of this study was that the Spanish population did less physical activity during confinement and consumed more snacks, and no changes were found in the consumption of alcohol. It should be noted that although the distribution of the sample is not homogeneous and therefore this could limit the generalisation to the whole of Spain, the results of this study are in coincidence with similar studies carried out in several European countries and throughout the world[18–20]; in which an increase in the consumption of alcohol and snacks was observed. In this way, it can be intuited that the results obtained in our study affect the whole Spanish population in the same way.

The most up-to-date healthy eating guidelines recommend that the consumption of these foods should be moderate or occasional as they have detrimental effects on health[21]. There are different studies concerning how certain crises have influenced populations throughout history[22], as was the case with the crisis caused by the COVID-19 pandemic. This has resulted in lifestyle changes in the population, including changes in dietary habits and physical activity. Despite the fact that most of the population claims to maintain an active lifestyle, evidence has shown that during confinement the population tends to lead sedentary lifestyles[3].

The limitations of mobility and social distancing increase the risk of suffering from psychological illnesses such as stress, depression and anxiety, which leads to a change in the habits of the population and makes them more inactive during this period[2]. The results of the present study show that almost 80% of the sample performed less physical activity during confinement. However, a study conducted in a university population obtained the opposite result, concluding that students increased their physical activity during confinement[23]. This result could be due to the fact that this population group spent more time sitting down because of the hours spent studying and online classes. This led to an increase in motivation to engage in more physical activity. It should be noted that women were less motivated than men. Although the results were contrary to those obtained in the present study, in both studies it is the women who are less frequently physically active.

As the study by Kilpatrick et al. shows, motivation for physical activity is different in men and women. Men are more motivated by internal drives of satisfaction, enjoyment and challenge; and women by external and aesthetic motives such as wanting to control their body weight and improving their physical appearance, which is evidence of the bias that still exists between the sexes.

When analysing physical activity according to the degree of intensity, the results observed in this study were that the male group performs physical activity with higher intensity. The scientific literature has shown that men are more likely to be obsessed with sport and fitness[24]. Although exercise addiction varies according to the type of sport, as it is more likely to develop this type of disorder in team sports and as the level of professionalism of the sport increases. In addition, addiction to physical activity can trigger eating disorders and loss of control leading to serious health consequences for the population[25].

A study reviewing several international guidelines recommends at least 2.5 hours of moderate and vigorous physical activity per week in order to keep people active. This frequency of activity is the minimum necessary to derive benefits from physical activity, thereby reducing the risk of NCDs[26].

In addition to physical activity, a healthy and balanced diet is important for the population to maintain optimal health, as well as good mood and a well-functioning immune system to prevent NCDs. During the study period, part of the Spanish population had a greater adherence to the Mediterranean diet, and ate a healthier diet than before confinement, due to the attitude of wanting to improve their physical and mental health despite the restrictions[18]. This was beneficial as it led the population to consuming more fruit, vegetables and pulses. But it also had a negative side as it increased the consumption of sweets and snacks as a consequence of stress and the monotony of daily life. It is clear that the pandemic led to changes in the eating habits of the population. A study conducted in a Spanish adult population concluded that there was an increase in the total amount of food eaten and in the frequency of consumption of more palatable and ultra-processed foods such as sweets and snacks, together with a decrease in the consumption of fruit, pulses and fish[5]. This translates into an increase in daily calorie intake, which together with the decrease in

calorie expenditure caused by the decrease in physical activity, leads to an increase in the risk of becoming overweight or obese. It is also important to note that people with obesity have a worse prognosis for overcoming COVID-19 disease[27]. These changes in the eating styles of the population occurred due to the psychological state, as suffering from stress or anxiety leads to an increase in the consumption of more palatable and less healthy foods[28]. When analysing the relationship between physical activity and snack consumption during the period of confinement, the results of this study are similar to those of other studies[29]. More physically active people consumed fewer snacks but the population that is less physically active and overweight or obese had a higher tendency to snack consumption, and this was more relevant in the female group. This association may be due to physical activity, as people who are more physically active tend to suffer less from stress and anxiety disorders[10], which are key factors driving the consumption of palatable foods such as snacks[30]. Thus, the results of the present study are consistent with the scientific evidence, since the people who increased their consumption of snacks during the confinement period[31] a time characterized by heightened stress and anxiety—were predominantly individuals who did not engage in daily physical activity[32].

Changes in alcohol consumption were observed. Although in general most of the population did not increase their consumption of alcoholic beverages during confinement, when analysed by sex it was found that men did increase their alcohol consumption during this period. However, a study of the Australian population found that during the pandemic, the Australian population did increase their drinking overall, regardless of gender[19], women were more likely than men to report greater anxiety, stress or depression; and therefore had higher alcohol consumption in this population.

When examining the relationship between physical activity and alcohol consumption, no significant differences were found. In general, individuals who engage in higher levels of physical activity tend to do so to maintain fitness and overall health, which often leads to a reduction in snack consumption as part of a healthier diet. However, in Spain, alcohol consumption is not always perceived as an unhealthy habit, which may explain the lack of association between physical activity and alcohol intake. Previous studies[33] suggest that, for example, in Spain, wine has traditionally been considered part of the diet and culture due to Mediterranean dietary customs, with some even attributing health benefits to its moderate consumption.

It has been shown[34] that alcohol consumption varies across cultures and historical periods. In Spain, alcohol consumption is closely linked to social factors and is perceived as an acceptable social behaviour[35]. Another possible explanation for the lack of association with physical activity is that, during confinement, alcohol consumption may have served as a coping mechanism to manage the crisis[36].

In a study carried out in England during confinement[20], similar results were also found. Their main conclusion was that increased consumption of alcoholic beverages during the isolation period leads to an increased risk of mental disorders and other addictions to alcohol or substances such as cannabis which could be sustained over time in the aftermath of the pandemic[20]. Perhaps, one of the reasons why a change in alcohol consumption may not have been observed in our study could be the predominance of female participants in the sample. According to a previous research, women tend to consume less alcohol than men[19]. Another reason for this difference in results could be that, culturally, the Spanish population already had a higher alcohol consumption habit than in other countries[37]. Especially from fermented beverages: wine, beer and cider; as these beverages are included in the consumption recommendations of the Mediterranean diet[37].

When we compare with other studies conducted during the COVID-19 pandemic, similar results are found. Several studies have observed changes in the frequency of physical activity[38,39] similar to this work. Additionally, they have noted an increase in weight due to stress during this period and changes in diet, which led to higher consumption of more caloric foods. These findings are consistent with our observations of an increase in snack consumption. However, other studies have also observed that weight gain occurred mainly in individuals over 30 years old, while those under 30 maintained regular physical activity during lockdown and therefore did not experience weight gain[40,41].

For future research, it is essential to consider the numerous studies[38,42,43] conducted worldwide regarding the COVID-19 pandemic and its impact on health. The results of our study align with those obtained in similar studies across different countries[39,41] and their conclusions should be taken into account when developing new strategies for the prevention of non-communicable diseases (NCDs). Although preventive measures against COVID-19 have been relaxed in many countries, new strains of the virus appear during the respiratory virus season and the prevalence of the disease increases. In addition, it is worth mentioning the consequences of the pandemic not only at the physical level, such as post-pandemic fatigue[44]; but also on mental health, as the pandemic has led to an increase in anxiety and depression, as well as other eating disorders[45]. It would be of great interest to the scientific community to carry out a study in the population to observe whether the increase in the consumption of snacks or unhealthy foods that occurred during confinement due to the need for satisfaction or enjoyment through food has been maintained over time.

One of the main limitations of this work is the study design. The sample selection system as it was done by convenience and telematically. Although this tool does not require trained interviewers, and has a low administration cost, it collects self-reported information in a retrospective manner based on the memory of the people, which might induced some bias because the results could not be verified by any other method. However, the sample size is significant according to the statistical principles applied. Despite the limitations of the sampling method, the fact that similar results have been observed in other studies suggests that the findings of this study may be generalizable

to a wider population. One more limitation is the fact that more than 65% of the sample belonged to the Valencian Community. The consumption of some products could vary in other areas of Spain, depending on their availability and local customs. Another limitation could be an overestimation in the reporting of the frequency of physical activity performed by the participants. Similarly, the amount of snacks and alcoholic beverages consumed could not be quantified as it was a closed question. On the other hand, there is the limitation that only computer literate people can be surveyed, as the questionnaire and the informed consent form were sent electronically. Finally, a current limitation inherent to the type of study is that cross-sectional observational studies do not allow us to observe changes over time and it is difficult to establish causality between the variables studied.

CONCLUSION

The main conclusion of this work is based on the fact that at times of social change caused by various factors there is always an impact on the lifestyles of populations. During the pandemic, the Spanish population became more sedentary and their eating habits worsened. This favours an increase in the prevalence of overweight and obesity, which indirectly causes people with COVID-19 infection to have a worse prognosis for recovery from the disease.

Therefore, it is essential to highlight the importance for the population of acquiring good eating habits and maintaining an adequate physical condition with daily physical activity in order to lead an active lifestyle, and thus prevent infections and reduce the risk of complications in the case of COVID-19.

Consequently, the findings of this study, along with those of similar research, should be considered when designing public policies, interventions, and action guidelines aimed at improving population health, particularly during periods of socioeconomic or public health crisis.

AUTHORS' CONTRIBUTIONS

Conceptualization, A.N., A.M. and I.S.; methodology, J.F.-S., J.M.M.-S., A.G.-H. and A.N.; formal analysis, J.F.-S. and A.M.; investigation, I.S., J.M.M.-S. and A.G.-H.; data curation, A.N. and A.M.; writing—original draft preparation, A.M., I.S., A.N. and A.G.-H.; writing—review and editing, A.M., and J.M.M.-S.; supervision, A.N., A.G.-H. and I.S. All authors have read and agreed to the published version of the manuscript.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

AVAILABILITY OF DATA

Data available on request to the author of the correspondence.

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