The Medium-Term Changes in Health-Related Behaviours among Spanish Older People Lifestyles during Covid-19 Lockdown

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Abstract

OBJECTIVES: The aim was to evaluate general changes and investigate the association between diet quality, physical activity (PA), and sedentary time (ST) during COVID-19 lockdown and the subsequent 7-month changes in health-related behaviours and lifestyles in older people.

PARTICIPANTS: 1092 participants (67-97y) from two Spanish cohorts were included.

DESIGN: Telephone-based questionnaires were used to evaluate health-related behaviours and lifestyle. Multinomial logistic regression analyses with diet quality, PA, and ST during lockdown as predictors for health-related behaviours changes post-lockdown were applied.

RESULTS: Diet quality, PA, and ST significantly improved post-lockdown, while physical component score of the SF-12 worsened. Participants with a low diet quality during lockdown had higher worsening of post-lockdown ST and anxiety; whereas those with high diet quality showed less likelihood of remaining abstainers, worsening weight, and improving PA. Lower ST was associated with a higher likelihood of remaining abstainers, and worsening weight and improving social contact; nevertheless, higher ST was linked to improvement in sleep quality. Lower PA was more likely to decrease alcohol consumption, while higher PA showed the opposite. However, PA was more likely to be associated to remain abstainers.

CONCLUSIONS: Despite improvements in lifestyle after lockdown, it had health consequences for older people. Particularly, lower ST during lockdown seemed to provide the most medium-term remarkable lifestyle improvements.

Key words: Health-related behaviours, diet quality, physical activity, sedentary time, ageing.

Introduction

The coronavirus disease 2019 pandemic (COVID-19) has had profound health, social and economic consequences and has also resulted in a period of home lockdown requiring the sudden disruption of daily activities (1). In Spain, the Government approved this lockdown on March 15th of 2020 (2), being highly restrictive until May 2nd, when the return to the so-called “new normality” began, with a reduction of movement restrictions and the possibility to go outside for exercising or walking among other basic activities (3). This lockdown was essential due to the need for social isolation and distancing to slow the progression of the disease (4); and, while these regulations have contributed to reduce the infection rate, they might also have potentially adverse health effects such as mental health problems (stress, anger, and post-traumatic stress symptoms, depression, etc.) (5, 6), and worsening chronic diseases prevalence (7). The main reason potentially underlying this discouraging scenario has been the increased prevalence of health-related behaviours, i.e., low physical activity (PA), increased sedentary time (ST), poor diet quality, sleep disorders or changes in alcohol consumption, which may have led to higher levels of anxiety, stress, and depression (8, 9). In addition to these direct effects of lockdown, the fear of becoming infected with COVID-19 through personal contact must also be taken into account (10), as it could also have increased the disruption of daily activities.

Although the COVID-19 pandemic and its consequences have affected all population age groups, age is a risk factor in terms of complications and associated mortality (11). Therefore, older people are an especially vulnerable group to lockdown measures (12). Recent population-based longitudinal studies in the older Spanish population have shown an increase in health-related behaviours during the lockdown period, leading to an overall worsening of health (10, 13). In addition, limited access to health services has further aggravated the situation and intensified these potential risks (14). Consequently, these studies can offer important insights into how the pandemic has affected older people, mainly because they presented pre-pandemic data on individuals’ health and provides an accurate picture of the effect of lockdown (4). Nevertheless, no studies have examined the effects of this lockdown on health-related
behaviours and lifestyle throughout the return to the “new normality” in older people. Thus, the present study aimed to 1) evaluate the changes in the lifestyle and health-related behaviours in Spanish older people after emerging from a strict 2-month lockdown and, 2) investigate how the diet quality, PA, and ST during the lockdown was associated with the subsequent changes in health behaviours and lifestyle adaptations during the return to the “new normality”.

**Material and methods**

**Study design and cohorts**

This study included two Spanish prospective cohorts to create a new sub-cohort related to COVID-19: The Toledo Study for Healthy Ageing (TSHA) and the Elderly-Exernet Multi-Center Study (EXERNET). TSHA is a prospective study of older people aged ≥65 years from the province of Toledo. This study includes three waves established between 2006-2009, 2011-2013 and 2015-2017. Likewise, EXERNET is a multi-centre study of non-institutionalized individuals aged ≥65 years recruited in Aragón, Castilla-La Mancha, Madrid, and Cádiz. This study also includes three waves implemented in similar moments: 2008-2009, 2011-2012 and 2016-2017. This new sub-cohort included participants who had been assessed twice, during the COVID-19 lockdown in Spain and 7-months later. Thus, the baseline data were collected between April 28th and June 30rd, always asking regarding the lockdown period, while the follow-up data were collected during December 2020.

At baseline, a total of 2982 participants were recruited from the TSHA and EXERNET, although only 1788 participants agreed to participate (938 from TSHA and 850 from EXERNET, 63% response rate in total). Thus, 589 participants could not be contacted, and 605 refused to participate. 1247 of them agreed to participate in the follow-up (688 from TSHA and 559 from EXERNET, 70% response rate in total), 217 participants could not be contacted and 324 refused to participate. Finally, 11 participants infected with COVID-19 were excluded and 1092 participants with both evaluations complete (33.5% of women) were finally included in the analyses. Participants gave informed consent, and the study was approved by the Clinical Research Ethics Committee of Toledo Hospital Complex (Protocol #2203/30/2005) for the TSHA and the Clinical Research Ethics Committee of Aragón (#18/2008) for EXERNET.

**Procedure**

A telephone-based structured interview (45 min) performed by qualified technicians following a standardised protocol was used to obtain data on health behaviours, mental and physical health, and their potential determinants including demographic and social variables at baseline and follow-up.

**Predictors**

Diet quality, PA and ST were used at baseline (during COVID-19 lockdown) as predictors of changes in health risk factors and lifestyle. Diet quality was assessed using the 14-point Mediterranean Diet Adherence Screener Questionnaire (MEDAS), a questionnaire widely used and validated in older Spanish people (15). The MEDAS comprises 14 questions, where 12 questions are related to food consumption frequency and two questions to food intake habits considered characteristic of the Mediterranean diet. The final score ranges from 0 to 14, allowing to classify participants according to their adherence to the Mediterranean diet into low (MEDAS <5), medium (MEDAS: 5–9) and high (MEDAS >9) (16). PA was assessed using the Physical Activity Scale for the Elderly (PASE), a specific and validated scale for older people (17). PASE included light activities, such as walking, and moderate or strenuous sports or exercise, which provide a total score calculated by multiplying the amount of time spent on each activity by the respective weights and adding all activities together; a higher score means a higher PA (17). Thus, according to their PA levels, older people were classified into tertiles, with those with the lowest PA being at T1 and those with the highest PA being at T3 (18). ST was determined by total daily ST minutes, which included minutes spent watching TV, using electronic devices, reading, listening to music, napping, and sunbathing. In relation to this, participants were classified into tertiles, with those with lower ST being at T1 and those with higher ST at T3 (18).

**Follow-up variables**

In this study, we used variables related to health risk factors and lifestyle that might have been affected by the COVID19 lockdown. In particular, we included the changes in alcohol consumption, diet quality (MEDAS), weight, ST, PA (PASE), hours of night-time sleep, sleep quality (classified as “excellent”, “good”, “fair”, “poor” and “very poor”), anxiety (the 12-item General Health Questionary [GHQ-12]) , social contact (daily social contact with family or friends and living alone) and quality of life (the 12-item Short Form [SF-12], distinguishing between the physical component summary [PCS] and the mental component summary [MCS]) (19). Nevertheless, as these data were used to categorize the sample depending on their post-lockdown evolution, different variables were created from the rate of longitudinal changes according to the cut-off points indicated in Table 1, calculating the change as follow-up minus lockdown values.

**Covariates**

Further information regarding sociodemographic data was also recorded as potential confounders. Age, sex, educational level (illiterate, primary school completed, secondary school completed, university completed), income (≤600€/month, >600 and <900€/month, and ≥900€/month), and marital status (single, married/living together, divorced/separated, widowed) were collected.
Statistical analysis

Statistical analyses were performed using the IBM SPSS Statistics package version 24 (SPSS, Inc., Chicago, IL). The Kolmogorov-Smirnov test and graphical methods (normal probability plots) were used to determine the normal distribution of the variables. Standard descriptive statistics [mean ± standard deviation or prevalence (%)] were performed to summarize the sample characteristics and the differences between baseline and follow-up data. To examine the associations between diet quality, PA, and ST, the subsequent changes in the health-related behaviours and lifestyle after emerging from the lockdown, multinomial logistic regressions to assess the odds ratios (OR) and their respective 95% confidence intervals (95% CI) were calculated adjusted for several confounders. In these analyses, the groups of participants whose lifestyle behaviours did not change between the lockdown and post-lockdown period were used as reference. Statistical significance was set at p<0.05.

Results

The main characteristics of the participants, both during lockdown and at follow-up, and changes in the lifestyle and health-related behaviours induced by the return to the “new normality” are shown in Table 2. The diet quality, PA, ST,
### Table 2. Socio-demographic, lifestyle, and health-related characteristics of the study population during and post COVID-19 lockdown

|                              | During-lockdown (n=1092) | Post-lockdown (n=1092) | % change |
|------------------------------|--------------------------|------------------------|----------|
| **Socio-demographic variables** |                          |                        |          |
| Age, years; $\bar{x}$ (SD)   | 80.3 (5.6)               |                        |          |
| Female; %                    | 66.5                     |                        |          |
| **Education; %**             |                          |                        |          |
| Illiterate                   | 14.7                     |                        |          |
| Primary                      | 55.9                     |                        |          |
| Secondary                    | 13.3                     |                        |          |
| University                   | 8.2                      |                        |          |
| **Marital status; %**        |                          |                        |          |
| Single                       | 4.0                      |                        |          |
| Married                      | 57.9                     |                        |          |
| Divorced                     | 2.3                      |                        |          |
| Widowed                      | 35.7                     |                        |          |
| **Income; %**                |                          |                        |          |
| $\leq$ 600€ per month        | 22.6                     |                        |          |
| >600€ to $\leq$ 900€ per month| 29.2                     |                        |          |
| >900€ per month              | 31.7                     |                        |          |
| Living alone; %              | 27.7                     | 29.1                   | 1.4      |
| Daily socialization; %       | 90.8                     | 74.6                   | -16.2    |
| **Lifestyle-behaviours**     |                          |                        |          |
| Smokers; %                   | 2.7                      | 3.2                    | 0.5      |
| Alcohol intake; %            |                          |                        |          |
| Daily                        | 19.5                     | 21.9                   | 2.4      |
| 3-5 days per week            | 3.9                      | 3.8                    | -0.1     |
| 1-2 days per week            | 3.2                      | 5.2                    | 2.0      |
| Less than 1 day per week     | 8.8                      | 5.7                    | -3.1     |
| Non-drinker                  | 59.0                     | 61.7                   | 2.7      |
| Stopped recently             | 5.6                      | 1.6                    | -4.0     |
| MEDAS index; $\bar{x}$ (SD)  | 7.0 (1.8)                | 7.2 (1.7)              | 0.2*     |
| PASE score; $\bar{x}$ (SD)   | 72.2 (45.2)              | 82.8 (52.6)            | 10.6*    |
| Weight, kg; $\bar{x}$ (SD)   | 70.6 (12.1)              | 70.5 (12.2)            | -0.1*    |
| Height, m; $\bar{x}$ (SD)    | 1.6 (0.2)                |                        |          |
| Total ST, min/d; $\bar{x}$ (SD) | 423.3 (182.7)         | 399.9 (202.1)          | -23.4*   |
| **Sleep characteristics**    |                          |                        |          |
| Hours of night-time sleep; % |                          |                        |          |
| Short sleep ($\leq$ 6 h)     | 31.5                     | 33.7                   | 2.2      |
| Normal sleep                 | 50.6                     | 42.5                   | -8.1     |
| Long sleep ($\geq$ 9 h)      | 17.1                     | 18.0                   | 0.9      |
| **Overall sleep quality; %** |                          |                        |          |
| Very good                    | 6.3                      | 5.5                    | -0.8     |
| Good                         | 54.0                     | 50.1                   | -3.9     |
| Fair                         | 20.1                     | 21.6                   | 1.5      |
| Poor                         | 4.0                      | 4.9                    | 0.9      |
| Very poor                    | 1.3                      | 0.7                    | -0.6     |
| **Health-related variables** |                          |                        |          |
| SF-12, PCS                   | 47.1 (10.4)              | 44.0 (12.2)            | -3.1*    |
| SF-12, MCS                   | 53.5 (9.3)               | 52.9 (9.9)             | -0.6     |
| GHQ score                    | 9.2 (3.8)                | 9.3 (4.0)              | 0.1      |

Variables are presented as mean (standard deviation) or as prevalence (%) of participants in that category. *Statistical significance (p-value <0.05) in the paired sample t-test for change values during-post lockdown. Abbreviations: $\bar{x}$, mean; SD, standard deviation; MEDAS, Mediterranean Diet Assessment Score; PASE, Physical Activity Scale for the Elderly; ST, sedentary time; SF-12, 12-Item Short-Form Health Survey; PCS, Physical Component Score of the SF-12; MCS, Mental Component Score of the SF-12; GHQ, General Health Questionnaire. Higher scores in the MCS and PCS of the SF-12, PASE, as well as on the MEDAS, and lower scores in the GHD are indicative of better health. § Data was collected at the end of the lockdown period and 7 months later.
### Table 3. Prospective associations between baseline diet-quality, sedentarism and physical activity, and changes in health-related characteristics after COVID-19 lockdown

| Changes in alcohol | n | Avg | Low | High | n | Avg | Low | High | n | Avg | Low | High | n | Avg | Low | High |
|-------------------|---|-----|-----|-----|---|-----|-----|-----|---|-----|-----|-----|---|-----|-----|-----|
| n | 180 | 147 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 |
| Changes in diet quality | 640 | 81 | 190 | 253 | 289 | 314 | 299 | 300 | 312 | 158 | 158 | 158 | 158 | 158 | 158 |
| Changes in diet quality | 158 | 158 | 158 | 158 | 158 | 158 | 158 | 158 | 158 | 158 | 158 | 158 | 158 | 158 | 158 |
| Changes in weight | 208 | 19 | 101 | 88 | 124 | 109 | 109 | 81 | 138 | 82 | 82 | 82 | 82 | 82 | 82 |
| Changes in sedentary time | 529 | 62 | 168 | - | - | - | - | - | - | 212 | 212 | 212 | 212 | 212 | 212 |
| Changes in physical activity | 586 | 70 | 182 | 234 | 234 | 293 | 234 | 293 | 293 | 199 | 199 | 199 | 199 | 199 | 199 |
| Changes in night-time sleep | 600 | 77 | 184 | 238 | 238 | 276 | 238 | 276 | 276 | 174 | 174 | 174 | 174 | 174 | 174 |
Table 3 (continued). Prospective associations between baseline diet-quality, sedentarism and physical activity, and changes in health-related characteristics after COVID-19 lockdown

|                      | Diet quality | Sedentary time | Physical activity |
|----------------------|--------------|----------------|-------------------|
|                      | n Avg Low High | n Avg Low High | n Avg Low High |
| Changes in overall sleep quality |                      |                      |                      |
| n                    | 507 59 163 208 263 251 204 274 | 421 Ref. Ref. Ref. 1.45 (0.90;2.31) 1.36 (0.86;2.16) 169 Ref. 1.12 (0.70;1.78) 1.10 (0.72;1.69) |                     |
| No changes           | 507 Ref. Ref. Ref. 0.98 (0.50;1.94) 0.84 (0.53;1.32) 163 Ref. 1.45 (0.90;2.31) 1.36 (0.86;2.16) 169 Ref. 1.12 (0.70;1.78) 1.10 (0.72;1.69) |
| Worsening            | 169 Ref. Ref. 0.98 (0.50;1.94) 0.84 (0.53;1.32) 163 Ref. 1.45 (0.90;2.31) 1.36 (0.86;2.16) 169 Ref. 1.12 (0.70;1.78) 1.10 (0.72;1.69) |
| Improvement          | 139 Ref. Ref. 1.25 (0.63;2.50) 0.89 (0.54;1.47) 131 Ref. 1.26 (0.74;2.16) 1.81 (1.10;2.98)* 139 Ref. 1.20 (0.74;1.95) 0.81 (0.50;1.29) |
| Changes in anxiety   |                      |                      |                      |
| n                    | 518 62 165 213 222 267 263 205 277 | 127 Ref. Ref. Ref. 0.97 (0.57;1.64) 1.55 (0.92;2.62) 316 Ref. 1.05 (0.62;1.80) 0.95 (0.58;1.55) |                     |
| No changes           | 518 Ref. Ref. Ref. 0.41 (0.20;0.83)* 0.90 (0.54;1.49) 288 Ref. 0.97 (0.57;1.64) 1.55 (0.92;2.62) 316 Ref. 1.05 (0.62;1.80) 0.95 (0.58;1.55) |
| Worsening            | 316 Ref. Ref. 0.41 (0.20;0.83)* 0.90 (0.54;1.49) 288 Ref. 0.97 (0.57;1.64) 1.55 (0.92;2.62) 316 Ref. 1.05 (0.62;1.80) 0.95 (0.58;1.55) |
| Improvement          | 302 Ref. Ref. 0.52 (0.26;1.02) 0.69 (0.41;1.17) 292 Ref. 1.08 (0.64;1.83) 1.65 (0.97;2.80) 302 Ref. 1.06 (0.62;1.83) 1.14 (0.69;1.86) |
| Changes in social contact |                      |                      |                      |
| n                    | 625 78 184 243 281 309 287 292 308 | 661 Ref. Ref. Ref. 0.97 (0.57;1.64) 1.55 (0.92;2.62) 175 Ref. 1.17 (0.77;1.79) 1.04 (0.68;1.58) |                     |
| No changes           | 625 Ref. Ref. Ref. 1.13 (0.63;2.03) 1.13 (0.74;1.75) 169 Ref. 1.36 (0.88;2.09) 0.86 (0.55;1.34) 175 Ref. 1.17 (0.77;1.79) 1.04 (0.68;1.58) |
| Worsening            | 175 Ref. Ref. 1.13 (0.63;2.03) 1.13 (0.74;1.75) 169 Ref. 1.36 (0.88;2.09) 0.86 (0.55;1.34) 175 Ref. 1.17 (0.77;1.79) 1.04 (0.68;1.58) |
| Improvement          | 51 Ref. Ref. 1.09 (0.40;3.96) 1.29 (0.63;2.66) 47 Ref. 2.53 (1.07;5.99)* 1.80 (0.76;4.24) 51 Ref. 1.97 (0.93;4.15) 1.23 (0.56;2.69) |
| Changes in PCS       |                      |                      |                      |
| n                    | 400 49 138 157 180 214 207 150 230 | 266 Ref. Ref. Ref. 0.77 (0.49;1.21) 0.74 (0.46;1.20) 0.66 (0.42;1.05) 215 Ref. 0.94 (0.58;1.55) 0.70 (0.46;1.07) |                     |
| No changes           | 400 Ref. Ref. Ref. 1.16 (0.59;2.28) 0.77 (0.49;1.21) 0.74 (0.46;1.20) 0.66 (0.42;1.05) 215 Ref. 0.94 (0.58;1.55) 0.70 (0.46;1.07) |
| Worsening            | 215 Ref. Ref. 1.16 (0.59;2.28) 0.77 (0.49;1.21) 0.74 (0.46;1.20) 0.66 (0.42;1.05) 215 Ref. 0.94 (0.58;1.55) 0.70 (0.46;1.07) |
| Improvement          | 106 Ref. Ref. 1.21 (0.53;2.76) 0.29 (0.41;1.30) 101 Ref. 1.11 (0.59;2.09) 1.30 (0.71;2.36) 106 Ref. 1.36 (0.77;2.41) 0.59 (0.34;1.04) |
| Changes in MCS       |                      |                      |                      |
| n                    | 400 49 138 157 180 214 207 150 230 | 234 Ref. Ref. Ref. 1.37 (0.82;2.30) 1.26 (0.74;2.17) 178 Ref. 1.36 (0.83;2.26) 0.98 (0.62;1.56) |                     |
| No changes           | 400 Ref. Ref. Ref. 1.37 (0.82;2.30) 1.26 (0.74;2.17) 178 Ref. 1.36 (0.83;2.26) 0.98 (0.62;1.56) |
| Worsening            | 178 Ref. Ref. 1.37 (0.82;2.30) 1.26 (0.74;2.17) 178 Ref. 1.36 (0.83;2.26) 0.98 (0.62;1.56) |
| Improvement          | 159 Ref. Ref. 1.31 (0.63;2.74) 1.13 (0.70;1.84) 147 Ref. 1.40 (0.85;2.31) 1.32 (0.79;2.21) 159 Ref. 1.12 (0.65;1.91) 1.10 (0.69;1.75) |

Variables are presented as Odds Ratio (95% Confidence interval). *Statistical significance (p-value <0.05). Abbreviations: Avg, Average; Ref., reference; PCS, Physical Component Score of the 12-Item Short-Form Health Survey; MCS, Mental Component Score of the 12-Item Short-Form Health Survey. All models were adjusted for baseline age, sex (men or women), educational level (illiterate, primary, secondary, or university), marital status (single, married, divorced, widowed), income (≤600€, >600€≤900€, >900€ per month), overall health and time elapsed between data collection.
and weight significantly improved through the return to the “new normality”, while PCS significantly worsened during this period (p<0.05). No changes were found in sleep time and quality, MCS and anxiety level. The relationship between diet quality, PA, and ST and the subsequent changes in the health-related behaviours and lifestyle after emerging from the lockdown is reported in Table 3 and Figure 1. Those with a low diet quality during lock-down were more likely to show a worsening of their ST (OR: 2.03 [95% CI: 1.14; 3.62]) and worsen their anxiety level (OR: 0.41 [95% CI: 0.20; 0.83]) at follow-up; while those with a high quality of diet were less likely to remain abstainers (OR: 0.53 [95% CI: 0.33; 0.84]), worsen their weight (OR: 0.45 [95% CI: 0.22; 0.91]) and improve their PA (OR: 0.63 [95% CI: 0.41; 0.98]). Concerning ST, participants with lower levels of sedentarism during the lockdown were more likely to remain abstainers (OR: 1.95 [95% CI: 1.15; 3.30]), gain weight (OR: 2.34 [95% CI: 1.07; 5.12]) and improve their social contact (OR: 2.53 [95% CI: 1.07; 5.99]); however, those with higher ST were more likely to improve their sleep quality (OR: 1.81 [95% CI: 1.10; 2.98]). Finally, participants with lower PA were more likely to both decrease their alcohol intake frequency and remain abstainers (OR: 3.01 [95% CI: 1.62; 5.59] and 3.30 [95% CI: 1.97; 5.51], respectively); while those with higher PA were more likely to increase their alcohol frequency and remain abstainers (OR: 1.82 [95% CI: 1.08; 3.06] and 2.16 [95% CI: 1.36; 3.44], respectively).

**Discussion**

This study examined the changes in lifestyle and health-related behaviours through the return to the “new normality”, as well as, how the diet quality, PA, and ST during the Spanish strict COVID-19 lockdown period has been associated with the main changes in health behaviours and lifestyle adaptations 7-months later in older people. Our main novel finding is that older people significantly improved during the return to the “new normality” the diet quality, PA, and ST, although the PCS component worsened. In particular, diet quality during lockdown was associated with changes in alcohol consumption,
weight, ST, PA, and anxiety, while ST showed an association with changes in alcohol consumption, weight, sleep quality and social contact. However, PA during lockdown was only associated with changes in alcohol consumption. Furthermore, changes in diet quality, night-time sleep, PCS and MCS did not seem to be associated with these lifestyles during the lockdown.

The abrupt change of lifestyle during the two months of strict lockdown has been studied previously in Spain (10, 13), although this is the first study to observe the return to the “new normality” in these population. Therefore, in this study, we examined the consequences of lockdown in the medium term to determine the current situation and to identify strategies to prevent further effects in the future. In general, participants significantly improved the three main lifestyle components related to health (diet quality, PA, and ST) after the strict lockdown. Nevertheless, the PCS worsened, even showing lower values than the average both during the lockdown and after it. Thus, it seems that although lifestyle is enhanced by the reduction of mobility restrictions, lockdown has had health consequences for this population, who perceive their own physical health as deteriorated.

In a more concrete way, we found that diet quality was the lifestyle component that was associated with the most health-related behaviours. Poor diet quality during lockdown was associated with a worsening of ST upon return to the “new normality”, which is particularly relevant in older people given that ST is one of the main modifiable risk factors worldwide for cardiovascular disease and all-cause mortality (20), frailty and physically dependence (21). Moreover, considering that ageing is characterised by worsening levels of ST (22), and that older people are among the most sedentary and physically inactive segment of society (23), for our study population, it would be essential to break the sedentary lifestyle mainly in those with poorer diet quality. Likewise, poor diet quality during lockdown has also been associated with a lower likelihood of worsening anxiety level. This could seem strange because it is a health benefit found in those participants with a faulty lifestyle component during the lockdown; nonetheless, it could be explained by the enormous alleviation that the return to the “new normality” has brought to these people. Older people have been shown to develop higher anxiety levels during lockdown due to fear of death and worry during or after their isolation/self-lockdown (24). Moreover, most people from this age group spent the lockdown alone, which is often associated with anxiety (25). Conversely, a high diet quality during lockdown was associated with a lower likelihood of worsening the weight and improving PA and decreasing abstaining; thus, a positive relationship was found between diet and weight, but not between diet and PA. It is widely known that eating habits can be protective factors for health and body weight gain (26). However, we can also find eating habits that generate negative health behaviours like in this study. Behavioural compensations have been observed in response to dietary interventions or habits, reducing the PA by unconsciously thinking that a good diet is enough to improve health (27). Moreover, it seems that diet-only interventions are more prone to lead to reductions in PA compared to the opposite approach (27).

PA during lockdown has also been related to the alcohol consumption in the following months. Both low and high levels of PA were associated with continued abstinence, although older people with low PA were more likely to decrease their alcohol consumption, and those with high PA to increase this consumption. These results concur with previous studies, including those conducted during the COVID-19 pandemic, which inform of the strong evidence of a positive association between alcohol consumption and PA (26, 28). Furthermore, Piazza et al. (2012) reported that alcohol consumers were more physically active than their non-drinking peers (29), findings that remain evident also among the general population. Consequently, these results could again indicate a compensatory mechanism depending on the PA performed.

Concerning low ST, we found healthy lifestyle and behavioural changes, given that it has been associated with an increased likelihood of remaining abstainers, weight gain and the improved social contact. Although active people seem to drink more alcohol, being abstainers would be the healthiest option due to the adverse effects of alcohol on metabolism. Particularly during the COVID-19 pandemic, this health risk factor should be highlighted, as it is more likely to cause depression, anxiety, and stress (30). Similarly, weight gain related to spending little time in sedentary behaviours could potentially be due to an increase in muscle mass, which is essential for older people as the clinical relevance of muscle mass together with muscle power has been shown (31). Even though the results of the present study do not show an increase in muscle mass, it could be more likely when the weight gain is related to a low ST than to a good diet. Similarly, improved social contact also provides a beneficial effect on health, decreasing loneliness and helping to improve mental health and anxiety (25), which were particularly impaired during lockdown in this population (5, 6). Finally, higher ST during lockdown was associated with better sleep quality. Perhaps this relation could be explained by the improved epidemiological situation of the pandemic after the lockdown, which would have led to a release and improvement of sleep parameters. However, previous studies also found an association between sleep time and quality with inactivity and lower levels of PA (32, 33). Furthermore, these results do not necessarily indicate improved health, as sleep duration has been strongly associated with and elevated risk of all-cause mortality, which in turn was associated with sleep quality (33, 34). Therefore, understanding the determinants of health-related behaviours and lifestyle during the COVID-19 pandemic is crucial for developing public health interventions (4) that can prevent further long-term consequences, as can already be found in older people in the medium-term. In particular, given these results, it seems that a low ST may provide more relevant health benefits in older people. Furthermore, a low ST also leads to other advantages such as reduced frailty status, a positive bone ageing and better physical function (21, 35).

Even though these consequences were found in a particular older Spanish population, other studies conducted in different populations also determined some improvements in lifestyle with the relief of restrictions. Regarding the Italian student population, it was found that although depressive
symptomatology may be aggravated during lockdown after lifting it, any change quickly vanished (36). Similarly, in England’s general population, the probability of exercising for a long duration (≥3 h) increased in the first 13 weeks of lockdown, which was followed by a decrease when confinement measures were substantially eased in June 2020 (37). However, the characteristics and factors specific to each subject should be studied to better understand more specific consequences (18). Therefore, for all the above, we must bear in mind that the effects on lifestyle after COVID19 lockdown may depend on the type of population we are targeting.

Our study is not without limitations. Variables were collected using a telephone-based structured interview, although most of the questions were obtained from validated questionnaires (15, 17, 19). Moreover, all participants had already completed this interview at home for their respective cohorts before the COVID-19 pandemic, thus being familiar with the procedure and reducing the risk of reporting bias. Additionally, our results should be interpreted with caution and not generalized for other populations, because of the particularly strict lockdown implemented in Spain. To our knowledge, this is the first study to look at the effects of the lockdown in older people during the return to the “new normality”. Likewise, the sample was relatively large and homogeneous, not including institutionalized people with different lifestyle conditions and those infected during the period covered by the study.

Conclusion

This study shows the medium-term effects of the lockdown, and more particularly depending on the diet quality, PA, and ST conducted during this lockdown period in the health-related behaviours and lifestyle of Spanish older people. Despite the expected improvement in lifestyle during the return to the “new normality”, older people perceived their physical health to be impaired. Furthermore, diet quality during lockdown was associated with ST, anxiety, weight, PA, and alcohol consumption, whereas ST was associated with weight, social contact, alcohol consumption and sleep quality. Surprisingly, PA was only related to alcohol consumption. In this regard, it appears that lower ST during lockdown seemed to provide the most remarkable lifestyle improvement in the medium term. Therefore, public health interventions in this direction should be designed to prevent further long-term consequences of the COVID-19 pandemic in older people.

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