



## Increase in Regular Leisure-Time Physical Activity in Spanish Adults Between 1987 and 2017

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1 **INCREASE IN REGULAR LEISURE-TIME PHYSICAL ACTIVITY IN SPANISH**  
2 **ADULTS BETWEEN 1987 AND 2017**

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41 **ABSTRACT**

42 **Introduction:** The prevalence of leisure-time physical activity has been observed to increase  
43 over the last decades, but values importantly differ among countries. Owing to the  
44 improvement of the living standards, a higher frequency of leisure-time physical is expected  
45 in Western countries such as Spain, but there is a lack of research involving large and  
46 representative samples during a prolonged temporal frame to confirm such tendency.

47 **Methods:** Individual representative data from 1987, 1993, 1995, 1997, 2001, 2011, and 2017  
48 rounds of the Spanish National Health Survey was used. Statistical analyses were conducted  
49 from April 9 to May 5, 2020.

50 **Results:** A total of 114,813 participants (43.9 years [SD 16.7], 51.8% women) were included  
51 in the study. Crude linear trends in regular monthly and weekly LTPA were estimated  
52 together using linear regression models across survey years, which also served to estimate  
53 regression coefficients ( $\beta$ ) and 95% CIs for every year change. All age groups significantly  
54 increased the prevalence of regular LTPA, either several times a month or a week, over time  
55 ( $P$  for trend  $<0.001$ ). Participants aged 16 and 17 years had the highest increase for annual  
56 prevalence of regular LTPA ( $\beta = 0.8$  [95% CI 0.7-1.0]). Additional adjusted multivariable  
57 logistic regression confirmed the trends. **Conclusions:** This study shows an increase in  
58 regular LTPA among the adult Spanish population during the period from 1987 to 2017.  
59 Younger participants consistently presented higher prevalence levels compared with older  
60 participants.

61

## 62 INTRODUCTION

63 The impacts of non-communicable chronic diseases on both mortality and disability in Spain  
64 have grown following worldwide trends.<sup>1</sup> A total of 92.8% of all deaths are due to non-  
65 communicable chronic diseases, in which ischemic heart disease, Alzheimer disease and  
66 related dementias, stroke, chronic obstructive pulmonary disease, and lung cancer account for  
67 the major part.<sup>2</sup> On the other hand, physical activity is considered a cornerstone to preserving  
68 good health and well-being throughout life. Prior research has identified physical activity as a  
69 preventive factor for mortality in a dose-response fashion. This preventive effect has been  
70 observed even with a low volume of physical activity or regardless of the intensity-level.<sup>3</sup>  
71 Also, further research has demonstrated that the domain of leisure-time physical activity  
72 (LTPA) reduces risk of all-cause mortality and specific mortality due to cardiovascular  
73 disease and cancer conditions.<sup>4</sup> Furthermore, a recent meta-analysis involving the  
74 aforementioned domain demonstrated a reduction in risk of chronic conditions such as  
75 myocardial infarction, cardiovascular disease, heart failure, stroke, type 2 diabetes, colon  
76 cancer, and breast cancer.<sup>5</sup>

77

78 In addition, whereas prevalence of different volumes and intensity levels have been widely  
79 examined among several different populations worldwide, less is known about the frequency  
80 of physical activity. Performing physical activity every week is recommended by the World  
81 Health Organization (WHO) for adults,<sup>6</sup> thus examining this specific pattern through national  
82 population-based research can provide new insights regarding how physical activity is  
83 performed as well as cross-national comparisons. Observing frequency has relevance since  
84 physical activity has been observed to be mainly comprised of short (i.e., less than 5 minutes)  
85 instead of weekly long-bouts among adults.<sup>7</sup> Changes in frequency of physical activity can

86 also indicate a change in health status; for instance, the reduction in physical activity after a  
87 stroke is not mainly due to a decrease in the time spent being active within each bout but to a  
88 decrease in the frequency of bouts.<sup>8</sup> Also, adults achieving WHO recommended levels of  
89 physical activity (i.e.  $\geq 150$  minutes in moderate-intensity or  $\geq 75$  minutes in vigorous-  
90 intensity) through more frequent sessions of LTPA (i.e.  $\geq 3$  sessions) associated with lower  
91 risk for all-cause, cardiovascular, and cancer mortality than the so-called ‘weekend warriors’,  
92 individuals performing weekly LTPA once or twice during the weekend, who also achieved  
93 the referred WHO physical activity guidelines and importantly reduced such mortality risks in  
94 comparison to inactive adults.<sup>9</sup>

95

96 To date, research regarding physical activity trends from countries such as Spain has been  
97 conducted partially, comprising regional or very specific population analyses during periods  
98 involving a temporal framework between 10 to 20 years up to the year 2008.<sup>10-12</sup>

99 Furthermore, Spain is a case in point among the European Union countries since it ranks on  
100 average in the last Eurobarometer on sport and physical activity.<sup>13</sup> Therefore, the present  
101 study aimed at estimating a broader and actualized trend of regular LTPA among the general  
102 population of Spanish adults utilizing representative data from the Spanish National Health  
103 Survey. We hypothesized relevant variations of regular LTPA over the examined period.

104

## 105 **METHODS**

### 106 **Study population and survey**

107 The Spanish National Health Survey, a survey assessing general health carried out in a  
108 collaboration between the Ministry of Health, Social Services, and Equality and the National  
109 Statistics Institute. Since 1987, it has continuously surveyed a nationally representative three-

110 stage stratified sample (i.e., considering census sections, households, and individuals) of the  
111 civilian noninstitutionalized Spanish population in 2 to 6 years cycles comprising two  
112 different surveys: one for adults (i.e., 15 years of age or over) and other for minors (i.e., under  
113 15 years of age). The samples were distributed throughout all Spanish regions assigning both  
114 a uniform part and other variable parts in proportion to the size of the region and accounting  
115 for the type of respondent, study characteristics, and information from previous surveys.  
116 Within each stratum, sections were selected with proportional size probability. In each  
117 section, households were selected with equal probability by systematic sampling, prior  
118 arrangement by the size of the household. Thereupon, an equal probability of eligibility was  
119 guaranteed to all potential participants in the household through the random Kish method.  
120 Finally, previously arranged computer-assisted personal interviews were conducted by trained  
121 interviewers in the homes of selected participants, who provided written consent to  
122 participate. The complete anonymized data series from all the survey rounds are publicly  
123 available from an institutional web server. For this study, only data of adults from those  
124 surveys including the same question regarding LTPA were retrieved. Thus, data from 1987,  
125 1993, 1995, 1997, 2001, 2011, and 2017 rounds were included. The average response-rate for  
126 these rounds was 70%, and the main reasons for not responding to the survey were absence,  
127 empty dwelling, refusal, or inability to answer. Information regarding the sociodemographic  
128 characteristics, occupational physical activity, and LTPA from each data survey was  
129 combined into a single data set.

130

131 In the present study, age groups were set in accordance with prior research.<sup>14</sup> Participants  
132 were grouped in the following age bands: 16 through 17 years; 18 through 30 years; 31  
133 through 49 years; 50 through 64 years; and 65 through 75 years. Because not all the analyzed  
134 surveys included population aged 15 years, participants of that age were excluded from the

135 study (n = 309). Also, due to the high prevalence of diseases and treatments, the population  
136 over 75 years was excluded (n = 9,770).<sup>15</sup> Trends in LTPA were presented using an estimated  
137 prevalence of regular LTPA. All trends were examined by age, sex, working status, and  
138 occupational physical activity level, which were the only potential confounders consistently  
139 assessed across the included survey rounds. This study was conducted using the  
140 Observational Routinely-collected health Data (RECORD) Statement.<sup>16</sup> The study was  
141 performed in accordance with the ethical standards of the Declaration of Helsinki and its later  
142 amendments and received the approval of the Ethics Committee of Research in Humans of the  
143 University of Valencia (ID 1510464).

144

#### 145 **Regular Leisure-Time Physical Activity**

146 Regular LTPA was assessed through one consistent single-item question included in all  
147 survey rounds: “Which one of the following choices better describe the frequency of your  
148 leisure-time physical activity?”. Possible answers consisted of six possible choices: 1) “I do  
149 not exercise. I spend my leisure-time almost completely in a sedentary way (reading,  
150 watching TV, cinema, etc.)”; 2) “I occasionally perform any physical activity or sport  
151 (walking, cycling, gardening, soft aerobics, recreational activities involving a light effort,  
152 etc.)”; 3) “I perform physical activity several times a month (sports, aerobics, running,  
153 swimming, team games, etc.)”; 4) “I perform sport or physical training several times a  
154 week.”; 5) “Does not know.”; and 6) “Refused to answer”. In the analyses, responses 1 and 2  
155 were categorized as no regular LTPA, and responses 3 and 4 were categorized as regular  
156 LTPA. Responses 5 and 6 were both considered as missing values. Single-item questions  
157 regarding physical activity have shown strong reproducibility when using Spearman’s rank



158 correlation coefficients ( $r = 0.72-0.82$ ), as well as a strong agreement when meeting physical  
159 activity recommendations ( $\kappa = 0.63$ ; 95% CI 0.54-0.72).<sup>17</sup>

160

## 161 **Covariates**

162 Self-reported sociodemographic characteristics used consistently in all the survey rounds  
163 included age, sex, and working status (working, and not working). Data on occupational  
164 physical activity were retrieved from the aforementioned surveys, which consistently used the  
165 same question: “Which one of these choices better describe your primary activity during the  
166 last 12 months (at work, educational institution, household, etc.)?” and possible answers  
167 comprised six options: 1) “Sitting most of the time.”, 2) “Standing up most of the time,  
168 without much movement or efforts.”, 3) “Walking, carrying any weight, frequent  
169 movements.”, 4) “Heavy work, tasks that require a lot of physical effort”, 5) “Does not  
170 know.”; 6) “Refused to answer.”. In the analyses, answers 1 and 2 were categorized as no  
171 occupational physical activity, whereas answers 3 and 4 were categorized as occupational  
172 physical activity. Responses 5 and 6 were considered as missing values. Prior research has  
173 identified significant differences among levels of physical activity regarding age, sex,  
174 working status, and occupational physical activity.<sup>14,18,19</sup>

175

## 176 **Statistical analyses**

177 Statistical analyses of individual data were performed with STATA version 16.1 (Stata Corp,  
178 Texas, USA) from April 9 to May 5, 2020. Survey analysis procedures were conducted to  
179 account for sample weights, stratification, and clustering of the complex sampling design and  
180 to make the sample representative of the Spanish Census civilian noninstitutionalized  
181 population. Estimates on crude weighted prevalence and 95% Confidence Intervals (CIs) of

182 regular LTPA (monthly or weekly) were calculated by age survey and age subgroup.  
183 Although a first visual inspection of age-related prevalence showed a not perfect linear trend  
184 (Figure 1), overall crude linear trends in regular LTPA were evaluated using linear regression  
185 models across survey years, which also served to estimate regression coefficients ( $\beta$ ) and 95%  
186 CIs for every year change. P for trends were calculated using the survey year as a continuous  
187 variable, whereas absolute differences in the estimated prevalence of regular LTPA were  
188 calculated by comparing the 2017 survey with the 1987 baseline survey (i.e., the first round of  
189 the National Health Survey). Additionally, crude trends in regular LTPA (monthly or weekly)  
190 were visually illustrated.

191

192 Multivariable logistic regression adjusted for survey year, sociodemographic features (sex,  
193 age, and working status), and lifestyle (occupational physical activity) were used to model  
194 prevalence of regular LTPA and estimate odds ratios (ORs). Sensitivity analyses for regular  
195 LTPA trends in relation to sex, and estimated ORs only using surveys with additional control  
196 variables such as Body Mass Index and educational attainment were conducted. Individuals  
197 with missing data in any of the examined variables (32.3%) were excluded from the analyses.  
198 All statistical tests were 2-sided and statistical significance was set at  $p < 0.05$ .

199

## 200 **RESULTS**

201 A total of 114,813 participants on average aged 43.9 years (SD 16.7) (51.8% women) were  
202 included in the study. The sample size per survey ranged from 5,991 to 27,252 participants.  
203 Unweighted sample sizes in the 2017 survey overall and for each age group by  
204 sociodemographic and lifestyle characteristics are displayed in Table 1. The weighted sample  
205 size for each survey included in the study is presented in the supplement (eTable 1). The

206 estimated prevalence of regular LTPA in the 2017 survey is displayed in Table 2 for each  
207 specific subgroup; 51.8% (95% CI, 46.9% to 56.8%) for participants aged 16 and 17 years,  
208 39.9% (95% CI, 37.8% to 42.0%) for participants aged 18 to 30 years, 30.4% (95% CI, 29.3%  
209 to 31.5%) for participants aged 31 to 49 years, 19.4% (95% CI, 18.3% to 20.4%) for  
210 participants aged 50 to 64 years, and 13.0% (95% CI, 11.9% to 14.2%) for those aged 65 to  
211 75 years.

212

213 Figure 1 illustrates the trend for prevalence of regular LTPA for all age groups throughout the  
214 survey years; except for the 2001 survey, in which regular LTPA remained stable, the overall  
215 trend is consistent towards higher prevalence. Such prevalence remained higher in an age-  
216 response fashion (i.e., younger participants showed higher prevalence of regular LTPA than  
217 older participants) throughout all the survey years. Compared with the 1987 survey, the 2017  
218 estimated prevalence of regular LTPA was steadily increasing over time in all age groups (p  
219 for trend <0.001) (Table 2). The larger regular LTPA difference between the 1987 and the  
220 2017 survey was found for groups of participants aged 18 to 30 years (24.0%; 95% CI 21.8%  
221 to 26.2%) and 31 to 49 years (24.2%, 95% CI 22.9% to 25.4%). Prevalence and P for trend  
222 regarding sex throughout the survey years showed a similar increasing tendency (p for  
223 trend <0.001). See eTable 2 in the supplement.

224

225 A significantly higher estimated prevalence of regular LTPA was observed for most of the  
226 age groups after multivariable adjustment among males (Table 3). Compared with females,  
227 the OR for males substantially and continuously decreased across age groups from a  
228 significant 3.76 (95% CI, 3.27 to 4.32) in males aged 16 and 17 years to a non-significant OR  
229 = 1.01 (95% CI, 0.88 to 1.17) in males aged 65 to 75 years. Compared with their non-working

230 counterparts, the OR for working participants showed an inverted U-shaped trend with the  
231 group of participants aged 31 to 49 years showing the highest OR values: 1.72 (95% CI, 1.60  
232 to 1.85). In contrast, the OR for occupational physical activity presented a U-shaped trend  
233 when compared with their inactive counterparts across age groups; active participants aged 31  
234 to 49 years showed a significantly lower OR when compared with those inactive (OR = 0.84,  
235 95% CI, 0.78 to 0.91). Additionally, for estimated adjusted ORs regarding education and body  
236 mass index in which obese and higher educational attainment consistently showed  
237 significantly lower and higher ORs respectively for regular LTPA as regards their  
238 correspondent counterparts, see eTable 3 in the supplement. Besides, a reduction of  
239 prevalence for the regular LTPA category correspondent to “sitting most of the time” showed  
240 an overall reduction over the examined period; the reduced tendency was highly consistent  
241 over time for most of age subgroups except for the 16-17 years’ subgroup which increased  
242 these prevalence levels from 2001 (eTable 4).

243

## 244 **DISCUSSION**

245 The prevalence of regular LTPA among Spanish adults steadily and significantly increased  
246 from 1987 to 2017 in all age groups examined. Our study revealed lower prevalence values  
247 consistently linked to older participant groups in a dose-response fashion within each of the  
248 seven surveys examined; sex, working status, or occupational physical activity did not  
249 substantially vary these findings. These results endorse those found by Mielgo-Ayuso et al.<sup>14</sup>  
250 regarding the importance of age when determining physical activity patterns among the  
251 Spanish population. Also, there is mixed evidence from other studies estimating regional  
252 trends for the amount of LTPA of Spanish adults since they showed a decline as well as an  
253 increase during the assessed periods from the nineties to the noughties,<sup>10,20</sup> although other

254 study comprising data about frequency of LTPA (i.e., once a month or more) in the elderly  
255 Spanish population during the period 1987-2006 observed a notable increase.<sup>12</sup> Additional  
256 analyses concerning sex consistently showed women exhibiting lower prevalence of regular  
257 LTPA throughout all surveys used in the present study, which has been observed in prior  
258 research involving Spanish adult and elderly populations.<sup>12-15</sup> Interestingly, the increasing  
259 trend of regular LTPA has probably been accompanied by a reduction of sedentary time for  
260 most of the age subgroups, which strengthens the notion of a more active and less sedentary  
261 Spanish population during leisure in the last decades, although the turning point observed for  
262 the 16-17 years' subgroup from 2001 deserves closer examination and further research.

263

264 A simultaneous general tendency towards increasing less active occupations and reducing  
265 more active occupations might have led to a different use of discretionary time with more  
266 active activities; recent research has suggested higher levels of work-related fatigue from  
267 physically demanding jobs is associated with lower levels of LTPA (i.e. weekly amount of  
268 LTPA).<sup>21</sup> Hence a reduction in physically demanding jobs could have contributed to  
269 increasing the amount and the frequency of LTPA, because workers have less fatigue from  
270 work and therefore more energy in leisure time.<sup>22</sup> Another possible reason for this finding  
271 might be attributable to a higher awareness of the physical activity benefits over health, since  
272 raising awareness about this issue has been observed to increase LTPA among adults.<sup>23</sup>

273

274 As regards to higher increase of prevalence of regular LTPA observed in younger subgroups,  
275 this could be partly attributed to the exposure of younger generations to campaigns promoting  
276 physical activity. Moreover, changes towards lower occupational physical activity levels may

277 have contributed towards both new physical activity behaviors and attitudes among leisure-  
278 time in younger generations.

279

280 Studies comprising adult populations from different European countries have also observed  
281 increasing trends of LTPA over the last decades. For example, Borodulin et al. observed an  
282 increase in the prevalence of LTPA between 1972 and 2002 in Finnish adults, indicating that  
283 the onset of the increasing LTPA trend could stem from earlier than observed in the present  
284 study.<sup>24</sup> Similarly, Petersen et al. identified an increasing trend for Danish adults between  
285 1987 and 2005,<sup>25</sup> which points at a consistent tendency in this geographical area over the  
286 examined period; in contrast with our study, trends of LTPA prevalence have shown the  
287 highest increase for Danish adults aged 65 years or over, which might be explained by  
288 historical, cultural, and socioeconomic differences.<sup>25</sup> Furthermore, a systematic review on the  
289 topic involving most studies with adult populations from the United States, Canada, and  
290 Australia indicates a far-reaching scope of the LTPA increasing trend during the eighties,  
291 nineties and noughties decades. Such observed tendency is possibly linked to changes in the  
292 standard of living associated to this temporal frame, which involves higher levels of leisure-  
293 time, and lower levels of both occupational and commuting physical activity.<sup>24,26</sup> Our study  
294 strengthens and updates the existing evidence regarding an increasing trend of LTPA  
295 identified in specific geographical areas worldwide, supports the notion that this is a  
296 widespread trend over the last decades, and comprises a more extended period in which such  
297 trend can be observed.

298

299 A key limitation of the present study is that LTPA was self-reported by participants, which  
300 can lead to an information bias difficult to estimate.<sup>27</sup> Furthermore, the possibility that a

301 social-desirability bias overestimating levels of regular LTPA in the more recent rounds of the  
302 Spanish National Health Survey is plausible; in fact, factors linked to self-perceived identity  
303 in relation to exercise have been previously identified as causes for physical activity  
304 measurement bias when using questionnaires, a phenomenon that could be more common in  
305 recent times.<sup>28</sup> Furthermore, even though the possibility of a systematic information bias that  
306 might importantly vary prevalence values is plausible,<sup>29</sup> trends would remain similar, thus we  
307 assume a uniform information bias. Future research should delve into type of physical  
308 activities performed to better understand the observed LTPA trend.

309

## 310 **CONCLUSIONS**

311 This study documents a substantial increase in self-reported regular LTPA among the adult  
312 Spanish population during the period from 1987 to 2017. Particularly, younger groups and  
313 men consistently presented higher prevalence levels than their older counterparts. It is  
314 necessary to continue promoting physical activity among the overall adult population and  
315 concentrate efforts to reducing both generational and gender gaps.

316

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323

324 **SUPPLEMENTAL MATERIAL**

325 Supplemental materials associated with this article can be found in the online version.

326

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420 **Figure 1 Temporal trends of regular leisure-time physical activity in Spanish adult**  
421 **during 1987 and 2017 by age groups (Prevalence and 95% Confidence Intervals).**

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**Table 1 Sample Size for Regular Leisure-Time Physical Activity in the Spanish Population by Sociodemographic and Lifestyle Characteristics, Spanish National Health Survey 2017<sup>a</sup>**

<b>No. of Participants by Age Subgroup (Weighted %)</b>					
	<b>16-17 y</b>	<b>18-30 y</b>	<b>31-49 y</b>	<b>50-64 y</b>	<b>65-75 y</b>
<b>Overall</b>	386	2,136	7,170	5,747	3,407
<b>Weighted N</b>	905,225	6,177,606	13,725,829	9,409,068	4,807,228
<b>Sex</b>					
<b>Female</b>	194 (50.3)	1,108 (51.9)	3,717 (51.8)	3,000 (52.2)	1,857 (54.5)
<b>Male</b>	192 (49.7)	1,028 (48.1)	3,453 (48.2)	2,747 (47.8)	1,550 (45.5)
<b>Working status</b>					
<b>Not working</b>	383 (99.2)	1,165 (54.5)	1,691 (23.6)	2,482 (43.2)	3,298 (96.8)
<b>Working</b>	3 (0.8)	971 (45.5)	5,479 (76.4)	3,265 (56.8)	109 (3.2)
<b>Occupational Physical Activity<sup>b</sup></b>					
<b>Active</b>	11 (2.8)	349 (16.3)	1,484 (20.7)	1,081 (18.8)	326 (9.5)
<b>Inactive</b>	375 (97.2)	1,787 (83.7)	5,686 (79.3)	4,666 (81.2)	3,081 (90.5)

436 <sup>a</sup>Participant characteristics were presented by age group: 16-17 years, 18-30 years, 31-49  
 437 year, 50-64 years, and 65-75 years. All estimates were weighted to be nationally  
 438 representative.

439 <sup>b</sup>Occupational Physical Activity level was defined by most of the occupational time sitting or  
 440 standing without frequent movements (inactive) or walking, carrying any weight, frequent  
 441 movements, or hard work that requires high physical effort (active).

**Table 2 Crude weighted trends among the Spanish population, Spanish ational Health Survey 1987-2017<sup>a,b</sup>**

<b>Regular Leisure-Time Physical Activity (Several times a month or a week), Weighted % (95% CI)</b>										
<b>Age, y</b>	<b>1987</b>	<b>1993</b>	<b>1995</b>	<b>1997</b>	<b>2001</b>	<b>2011</b>	<b>2017</b>	<b>β (95% CI)<sup>c</sup></b>	<b>P for Trend<sup>c</sup></b>	<b>2017 vs. 1987 survey, Difference (95 % CI)</b>
<b>Trends in regular Leisure-Time Physical Activity across survey years</b>										
16-17	28.0(25.7-30.3)	39.8(36.5-43.1)	44.2(38.1-50.2)	44.5(38.4-50.7)	42.6(39.0-46.3)	50.2(44.5-55.8)	51.8(46.9-56.8)	0.8(0.7-1.0)	<b>p&lt;.001</b>	23.8(18.3-29.3)
18-30	15.9(15.1-16.7)	24.7(22.9-26.5)	27.0(24.9-29.1)	28.4(26.2-30.6)	27.3(26.0-28.5)	35.8(33.9-37.6)	39.9(37.8-42.0)	0.8(0.7-0.8)	<b>p&lt;.001</b>	24.0(21.8-26.2)
31-49	6.3(5.7-6.8)	10.5(9.3-11.6)	11.4(10.0-12.8)	14.1(12.6-15.6)	14.0(13.1-14.8)	25.1(24.1-26.1)	30.4(29.3-31.5)	0.8(0.8-0.9)	<b>p&lt;.001</b>	24.2(22.9-25.4)
50-64	1.9(1.6-2.2)	4.3(2.9-5.6)	5.8(4.5-7.1)	6.5(5.1-7.8)	6.7(5.9-7.4)	14.0(13.0-14.9)	19.4(18.3-20.4)	0.6(0.5-0.6)	<b>p&lt;.001</b>	17.5(16.4-18.6)

65-	0.7(0.4-	1.9(1.2-	2.2(1.2-	3.3(2.0-	3.7(3.0-	8.8(7.8-	13.0(11.9-	0.4(0.4-	<b>p&lt;.001</b>	12.4(11.2-
75	0.9)	2.6)	3.2)	4.5)	4.3)	9.8)	14.2)	0.5)		13.5)

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Note: Boldface indicates statistical significance (p<0.05)

<sup>a</sup>Sample sizes for individual cells ranged from 256 to 8073 and can be found in eTable 1 in the Supplement.

<sup>b</sup>Weighted estimates and 95% CIs were estimated for each survey year. All estimates were weighted to be nationally representative.

<sup>c</sup>The estimate  $\beta$ , 95% CI, and P for trend were calculated using linear regression that included the year of each National Health Survey as a continuous variable. The estimate  $\beta$  can be interpreted as the average annual percentage point change of prevalence.

**Table 3 Weighted logistic regression models of regular Leisure-Time Physical Activity, adjusted for sociodemographic features and occupational physical activity, Spanish National Health Survey 1987-2017<sup>a</sup>**

<b>Odds Ratio (95%CI)<sup>b</sup></b>					
<b>Regular Leisure-Time Physical Activity (Several times a month or a week)</b>					
<b>Age subgroup</b>	<b>16-17 y</b>	<b>18-30 y</b>	<b>31-49 y</b>	<b>50-64 y</b>	<b>65-75 y</b>
<b>No.</b>	4,292	26,109	39,426	28,328	16,658
<b>Age<sup>c</sup></b>	<b>0.77(0.68-0.88)</b>	<b>0.93(0.93-0.94)</b>	<b>0.97(0.96-0.97)</b>	<b>0.97(0.96-0.98)</b>	<b>0.93(0.91-0.96)</b>
<b>Sex</b>					
<b>Female</b>	1(reference )	1(reference )	1(reference )	1(reference )	1(reference )
<b>Male</b>	<b>3.76(3.27-4.32)</b>	<b>3.76(3.51-4.02)</b>	<b>1.85(1.74-1.97)</b>	<b>1.19(1.09-1.30)</b>	<b>1.01(0.88-1.17)</b>
<b>Work</b>					
<b>Not working</b>	1(reference )	1(reference )	1(reference )	1(reference )	1(reference )
<b>Working</b>	<b>0.37(0.29-0.48)</b>	<b>0.78(0.73-0.83)</b>	<b>1.72(1.60-1.85)</b>	<b>1.55(1.41-1.70)</b>	<b>0.98(0.65-1.47)</b>
<b>Occupationa</b>					
<b>I Physical Activity<sup>d</sup></b>					



<b>No</b>	1(reference )	1(reference )	1(reference )	1(reference )	1(reference)
<b>Yes</b>	1.40(1.10- 1.79)	0.92(0.85- 1.00)	<b>0.84(0.78- 0.91)</b>	0.94(0.83- 1.06)	<b>2.44(2.01- 2.97)</b>
<b>Survey</b>					
<b>1987</b>	1(reference )	1(reference )	1(reference )	1(reference )	1(reference)
<b>1993</b>	<b>1.71(1.41- 2.06)</b>	<b>1.76(1.56- 1.98)</b>	<b>1.75(1.50- 2.03)</b>	<b>2.34(1.60- 3.41)</b>	<b>2.89(1.62- 5.13)</b>
<b>1995</b>	<b>2.12(1.59- 2.82)</b>	<b>1.95(1.72- 2.22)</b>	<b>1.95(1.65- 2.30)</b>	<b>3.27(2.44- 4.37)</b>	<b>3.27(1.71- 6.26)</b>
<b>1997</b>	<b>1.98(1.49- 2.63)</b>	<b>2.11(1.86- 2.40)</b>	<b>2.52(2.15- 2.94)</b>	<b>3.70(2.80- 4.89)</b>	<b>4.93(2.73- 8.92)</b>
<b>2001</b>	<b>1.85(1.52- 2.27)</b>	<b>2.06(1.88- 2.25)</b>	<b>2.37(2.12- 2.66)</b>	<b>3.67(2.96- 4.54)</b>	<b>5.78(3.59- 9.30)</b>
<b>2011</b>	<b>2.35(1.79- 3.07)</b>	<b>3.21(2.89- 3.56)</b>	<b>4.99(4.49- 5.55)</b>	<b>8.20(6.77- 9.94)</b>	<b>14.05(8.95- 22.06)</b>
<b>2017</b>	<b>2.82(2.21- 3.61)</b>	<b>3.93(3.51- 4.40)</b>	<b>6.45(5.81- 7.17)</b>	<b>11.80(9.79- 14.21)</b>	<b>21.92(14.04- 34.29)</b>
<b>P for</b>	<b>&lt;.001</b>	<b>&lt;.001</b>	<b>&lt;0.05</b>	<b>&lt;.001</b>	<b>&lt;.001</b>
<b>Trend<sup>e</sup></b>					

Note: Boldface indicates statistical significance (p<0.05)

<sup>a</sup>Participant characteristics were presented by age subgroup: 16-17 years, 18-30 years, 31-49 year, 50-64 years, and 65-75 years. All estimates were weighted to be nationally representative.

<sup>b</sup>For categorical variables, the odds ratios (ORs) represent the change in odds expected in each category in relation to the reference group.

<sup>c</sup>The ORs in this row represent the change in odds expected from a 1-year increase in age within this age group.

<sup>d</sup>For Occupational Physical Activity definitions, see Table 1 footnotes.

<sup>e</sup>*P* for Trend over survey was calculated using the National Health Survey years as a continuous variable.