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Associations between physical activity and self-rated wellbeing in European adults: A population-based, cross-sectional study

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ABSTRACT

Although self-rated wellbeing is an indicator of health status, it has been receiving little attention; its relationship with physical activity among adults remains inconclusive. The purpose of this study was to analyse the relationship between physical activity and several dimensions of self-rated wellbeing in European adults. This cross-sectional study was based on data from the European Social Survey round 6, 2012, comprising 40,600 European adults (18,418 men, 22,186 women) from 27 countries, with mean age 42.1 ± 13.3. Meeting physical activity guidelines was assessed using World Health Organization criteria. Six dimensions of the self-rated wellbeing were assessed (evaluative wellbeing, emotional wellbeing, functioning, vitality, community wellbeing, supportive wellbeing). Men and women who attained physical activity recommended levels had better evaluative wellbeing (men, $p = 0.009$; women, $p < 0.001$), emotional wellbeing (men, $p < 0.001$; women, $p < 0.001$), functioning (men, $p < 0.001$; women, $p < 0.001$), vitality (men, $p < 0.001$; women, $p < 0.001$), supportive relationships (men, $p < 0.001$; women, $p < 0.001$), and wellbeing total score (men, $p < 0.001$; women, $p < 0.001$). Physical activity frequency was linearly associated with self-rated wellbeing in the 6 dimensions as well as the wellbeing total score ($p < 0.001$). Attaining recommended physical activity levels is related to better self-rated wellbeing, and more frequent physical activity is linearly associated with better self-rated wellbeing in its 6 dimensions.

1. Introduction

Self-rated wellbeing (SRW) is considered an indicator of health status (Chida and Steptoe, 2008). Studies have shown that SRW is related with a healthier physiological response to stress (Fredrickson et al., 2000), reduced probability of developing diseases, and improved immunity response (Cohen et al., 2003).

Despite the importance of SRW in health status, it has been receiving little attention, and its relationship with physical activity (PA) among adults remains inconclusive (Engberg et al., 2015). Notwithstanding physical activity is associated with lower depressive symptomatology and greater emotional well-being (Galper et al., 2006). Furthermore, many surveys rely upon single-item measures of happiness, or life satisfaction, as the indicator of personal wellbeing (Engberg et al., 2015; Williams and Smith, 2013). Theoretical and empirical studies have suggested that wellbeing is a multidimensional concept; single-item measures might not capture the multifaceted nature of the concept (Huppert et al., 2009; Vitterso et al., 2010). Thus, for the study of wellbeing, what is recommended is the inclusion of a rich range of personal and social wellbeing dimensions (Huppert et al., 2009; OECD, 2013). This is important because recognizing how people relate with each other is a key aspect of their subjective wellbeing (Brown et al., 2003; Dunn et al., 2008).

To our knowledge, no study has analysed the relationship between PA and personal and social dimensions of SRW. Therefore, the purpose of this study was to analyse the relationship between recommended PA levels, according World Health Organization criteria (≥30 min of at least moderate PA on five or more occasions per week) (WHO, 2010), and PA frequency and several dimensions of SRW, in a representative sample of European adults from 27 countries. Given that single-item measures of happiness or life satisfaction (indicator of wellbeing) are positively associated with PA, we hypothesise that personal and social dimensions of SRW are also positively associated with PA.

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2. Methods

2.1. Study design, participants, and procedures

This is a multi-country study based on data from the European Social Survey (ESS) round 6, 2012, including 28 European countries (Albania, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Kosovo, Lithuania, Netherlands, Norway, Poland, Portugal, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom). The ESS is an open database for free access. We obtained access through the following link: http://www.europeansocialsurvey.org/data/download.html?r=6.

Probability sampling from all residents aged 15 years and older was applied in all countries (excluding only the homeless and the institutional population), comprising 54,673 participants. Since the PA recommendation for young people and older adults is different from adults, participants under the age of 18, and over the age of 65, were excluded from the analyses. Because Israel is not a European country, has sociocultural differences, and has much lower levels of PA than European countries (Marques et al., 2015) participants from Israel were also excluded. Furthermore, respondents without information in more than two socio-demographic variables were also excluded. These restrictions resulted in a total sample size of 40,600 participants (18,418 men, 22,186 women) with mean age 42.1 ± 13.3 (41.6 ± 13.3 men, 42.6 ± 13.2 women).

ESS is an academically driven, cross-national survey that has been conducted every two years across Europe and Israel since 2001. The ESS uses a multi-stage probability cluster sampling design to provide national representative samples among several European countries. According to national options, participants were sampled by means of postal code address files, population registers, social security register data, or telephone books. In the sampling procedure, statistical precision was kept the same for all countries. In each country information was collected using a questionnaire filled-in through an hour-long face-to-face interview that included questions on use of medicine, immigration, citizenship, socio-demographic and socioeconomic issues, health perception, and physical activity. The questionnaire was translated, by language experts, into the language of each of the participating countries.

2.2. Measures

2.2.1. Physical activity

Information on PA was assessed using the question: "on how many of the last 7 days did you walk quickly, do sports, or other PA for 30 min or longer?" Although PA was assessed with a single item, there is evidence that in studies where PA is not the primary focus, and more detailed measures are not feasible, a single question is an acceptable alternative and perform as well as other self-report physical activity measures when compared to objective accelerometer (Wanner et al., 2014). Using the World Health Organization criteria (WHO, 2010), participants were classified as having attained the recommended level of PA (≥30 min of at least moderate physical activity on 5 or more time per week), or not having attained the PA recommended levels (<30 min of at least moderate PA on 5 or more time per week).

2.2.2. Wellbeing

SRW was measured using 32 items that comprised 6 dimensions (ESS, 2015; Michaelson et al., 2009). The description, construction, and validity of the ESS well-being module is describe elsewhere (ESS, 2015; Huppert et al., 2009; Michaelson et al., 2009). These items and their response range are presented in Table 1. The aggregations of the items in wellbeing dimension are described in data analysis.

2.2.3. Covariates

Participants reported their sex and age. The ESS data provides two variables of educational attainment: the levels of education achieved and years of full-time education. For the analysis, the level of education achieved was chosen because the population might cluster according to educational level (Carlson et al., 2010; Marques et al., 2014). Then participants were classified into less than high school, high school education, and superior education. Respondents were asked to describe whether they live with or without a husband/wife/partner, and the legal situation (e.g. married, civil union, illegally recognized). Response options were dichotomized into live with or without a partner. Participants answered if they lived with or without children at home and then the number of people living regularly as a member of the household. Household income was determined based on decile. Using this data, 1st to 3rd decil, 4th to 7th decil, and 8th to 10th were grouped to create three groups. To determine the living place, participants were asked to report whether they lived in a big city, suburbs or outskirts of big city, town or small city, country village, or home in countryside. Those who indicated that they lived in a big city or suburbs or outskirts of big city were grouped into a new category named urban areas; those who responded that they lived in country village or home in countryside were grouped into rural areas. Self-rate health was assessed with a single-item question. Participants were asked, "How is your health in general?" The response options were: very bad, bad, fair, good, or very good.

2.3. Data analysis

Since wellbeing is a multidimensional concept, it was assessed using a combination of theoretical models and statistical analyses (ESS, 2015). Six key dimensions of SRW within the personal and social wellbeing module, used in the ESS, were created (Table 1). At first, each item was standardized as proposed by the ESS (ESS, 2015; Michaelson et al., 2009). Using the standardized items, a principal component analysis was performed, with Varimax rotation, to see which sets of items in the survey correlate most with one another statistically, and therefore form clusters of items. The components saturation did not allow the creation of components according the literature (ESS, 2015; Michaelson et al., 2009). Therefore, a reliability analysis was performed on the standardized items of each of the components, and alphas were from $\alpha = 0.7$ to 0.9 (see Table 1). These SRW dimensions were aggregated into a wellbeing total z-score. To facilitate the interpretation of the SRW dimension and total score, because it is not clear what the minimum and maximum z-scores are, a transformation metric has been proposed that maps the z-scores for each indicator onto 0–10 scales, where a '0' is the minimum for that indicator, '10' is the maximum, and '5' is the mean for the sample (Michaelson et al., 2009). The transformation is described in the following formula:

$$t_i = (Z_i \times 5)/(Z_i \times M_i + C_i) + 5$$

$$M_i = (\min_i + \max_i)/(\min_i - \max_i)$$

$$C = (\min_i \times \max_i \times 2)/(\max_i - \min_i)$$

Descriptive statistics were calculated for all variables (means, standard deviation and percentages) for the entire sample. Student *t*-test and Chi-square were performed to assess sex differences in socio-demographic variables, PA, self-rate health and SRW. Once men and women were significantly different in all variables, the subsequent analyses were stratified by sex. Bivariate relationships between PA recommendations (not attaining the PA recommended level vs. attaining the PA recommended level), self-rate health and SRW (for each dimension and for total score) were tested by Student *t*-test. To test associations between PA participation in the last 7 days, self-rate health and SRW multivariate linear regressions were conducted. Analyses were adjusted