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Integrated analysis of the health and social inequalities of Spanish adolescents[1]

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ABSTRACT. This survey descriptive study presents the process leading up to the creation of a global health score for adolescents. In recent years, the concept of health, which is the bases for this study, has undergone changes to include both dysfunctional elements as well as the individual resources that protect health. The sample was made up of 18,955 adolescents between 11 to 18 years of age, in Spain and with participants in each of the regions making up the kingdom of Spain. Using exploratory and confirmatory factorial analysis techniques, the results showed a global dimension of the health, starting from self-report indicators of life satisfaction, health-related quality of life, perception of the general state of health and psychosomatic complaints. This health score decreased as age increased and more notably among girls, as well as in adolescents from low-income families. The comparative analyses between regions showed differences which were, in principle, not attributable to the economic well-being of the geographic area. Finally, these results and their implications were discussed, as well as the importance of the calculation used in the analysis of the social inequalities in health.

KEYWORDS. Health. Adolescence. Social inequalities. Survey descriptive study.

RESUMEN. Este estudio descriptivo presenta el proceso hasta la creación de una puntuación global de la salud en los adolescentes. En los últimos años, el concepto de

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salud, en el que se basa este estudio, ha sufrido cambios para incluir tanto los elementos disfuncionales como las fortalezas que protegen la salud. La muestra estuvo formada por 18.955 adolescentes, representativos de la población de 11 a 18 años en España y en cada una de las Comunidades Autónomas que conforman el Estado español. Utilizando técnicas de análisis factorial exploratorio y confirmatorio, los resultados mostraron una dimensión global de la salud, a partir de indicadores autoinformados de satisfacción vital, calidad de vida relacionada con la salud, percepción del estado general de salud y malestar psicosomático. Esta puntuación de salud disminuía a medida que aumentaba la edad y de manera más marcada en mujeres, así como en adolescentes de familias con capacidad adquisitiva baja. Los análisis comparativos entre Comunidades Autónomas mostraron diferencias entre ellas, no atribuibles en principio al bienestar económico de la región. Finalmente, se discutieron estos resultados y sus implicaciones, así como la importancia de la medida utilizada en el análisis de las desigualdades sociales en salud.

PALABRAS CLAVE. Salud. Adolescencia. Desigualdades sociales. Estudio descriptivo mediante encuestas.

Currently, the most important causes of death are due to neoplasic and cardiovascular diseases as well as the loss of faculties due to accident; all of these are linked to environmental factors and individual lifestyle (Matarazzo, 1994; World Health Organization, 1986). Thus, when faced with the problems raised by the biomedical model to explain the incidence of these external, health-related factors, the need arises to formalize a new biopsychosocial conceptualization that allows us to understand the combined influence of these biological, psychological and social factors on health and disease (Engel, 1977). In recent decades, as we have moved to gradually include these external, health-related factors in the notion of health, the concept of health itself has experienced major change, which has gone from a negative and reductionist conception, based on the absence of disease or disability, to a new more positive and holistic dimension, in which a variety of dimensions, including well-being, psychosocial adjustment, quality of life, daily function, protection against possible risks of disease and personal development, have been included (Godoy, 1999; Singer and Ryff, 2001).

The positive focus of the health has indeed been ignored by biomedical science for a long time and in such a way that it has been the intervention against pathological aspects that has traditionally monopolized the attention of both professionals and experts. However, today, it is ever more evident that the consensus about the idea that promoting health from this broader focus is not only a desirable right, but also a hindrance for physical and mental disease (Seligman, 2008).

Despite the fact that this viewpoint is very recent within research, it would be go to remember certain historical aspects. Thus, with a historical declaration of intentions, the preamble of the first World Health Organization statutes already proposed a definition of health that seeks to embrace a broader and more positive focus. Health is defined as a complete state of physical, mental and social well-being, and not merely as the absence of infirmity or disease (World Health Organization, 1948). The literal interpretation of this definition suggests that healthy individuals and communities should have certain desirable characteristics and not merely be free of disease or handicap.

Other new tendencies, inspired by the general systems theory, consider two aspects within the concept of health. One of these aspects is subjective and consistent with the feeling of well-being, while the other is objective and linked to the functional capacity, which may appear in different degrees along a continuum between health and disease (Terris, 1980). Even more recently, Antonovsky (1987, 1998) has developed the theory known as the «human salutogenesis theory». This theory underlines the need to recognize that disease is not the contrary to normality or the absence of disease, but rather positive health. Therefore, according to this author, to research the pathogenic factors that cause disease must go hand in hand with research into the various factors of salutogenesis causing or maintaining positive health.

Today, a state of conceptual multiplicity has been reached in which it is difficult to identify a common and broadly accepted definition of health. However, it can be said that the new positive focus bears in mind a broader perspective that takes into consideration subjective, historically forgotten variables, which are greatly related to the emotional well-being (Singer and Ryff, 2001), that has typically been defined by most authors according to three components: life satisfaction, presence of positive emotions and absence of negative emotions. Moreover, researching and assessing health and well-being during adolescence is particularly important, as this is a key growth stage for the development of a series of mental disorders and the configuration of mental health models. Specifically, according to the World Health Organization, the risk rates for unipolar depression peak at 15 years of age (World Health Organization, 2000). At the time when the biomedical focus of health prevailed, the subjective measuring tools were extremely questionable; it was argued that they worthless. However, if a broader definition of health is adopted, accompanied by the corresponding methodological accurateness, the subjective measures appear to be the most sensitive, not only in detecting the individual's strengths, but also the presence of physical discomfort (Schlaepfer and Infante, 1990).

Within this context of vitality and accuracy for the subjective experience of health, many experts agree in pointing out the need to establish the underlying attributes of the broad concept of health to develop quality measures that allow its assessment. This would be the first step to design and assess complex explanatory models that are able to include both positive and dysfunctional elements and that would allow a situation or lifetime to be simultaneously analyzed from both points of view (Diener, Kesebir, and Lucas, 2008; Locker and Gibson, 2006; Patrick and Bergner, 1990; Seeman, 1989; Seligman, 2008; Vázquez and Hervás, 2008).

Some of the most commonly used measures to evaluate those attributes of health in adolescence, which are classified by the literature as basic in a positive and integrated concept of health, are provided below:

– Life satisfaction. This has been defined as the cognitive assessment that the person makes of his/her life in general (Shin and Johnson, 1978). Although the state of a person's emotions could influence their evaluation, the assessment of life satisfaction should not be confused with a transitory feeling or reaction to a specific event. Rather, the self-assessment of life satisfaction refers to more general aspects, to a basic or permanent bottom line that embraces a global

assessment of his/her life or its main aspects (Lazarus, 1991). Although adult life satisfaction has been studied extensively, that is not the case in earlier developmental stages. Only recently has attention been paid to life satisfaction during childhood and adolescence (Bender, 1997). With regards to the differences between adolescent boys and girls, while some authors find that there are significant differences (Ash and Huebner, 2001; Huebner, Drane, and Valois, 2000), however, other authors have found that the level of life satisfaction shown in girls is lower when compared to that of boys (Goldbeck, Schmitz, Besier, Herschbach, and Herich, 2007; Shmotkin, 1990). According to Goldbeck *et al.* (2007), during adolescents, there is a progressive decrease in life satisfaction between the ages of 11 and 16. Nevertheless, other researchers failed to find major differences at this stage (Ash and Huebner, 2001; Huebner *et al.*, 2000). One aspect that has not been sufficiently studied, yet it has been highlighted at the international level, is the different levels of development in boys and girls in terms of life satisfaction throughout adolescence. To conclude, there is little research that strictly analyzes the socioeconomic inequalities of adolescent life satisfaction. Of those authors who have done so, they found higher levels of life satisfaction amongst adolescents coming from families with a higher socioeconomic level (Ash and Huebner, 2001). While differences were found in life satisfaction with regards to the Gross Domestic Product (GDP) in an international comparison carried out by Oishi, Diener, Lucas, and Suh (1999), the same did not hold true in terms of the results found by Takayoshi (2007) who demonstrates that there was no relationship between both variables with an adult Japanese population.

– Health-related quality of life. Despite major increases in longevity throughout the 20th century, this increase in life expectancy is not necessarily associated with a better quality of life (Schwartzmann, 2003). The use of the term quality of life has been used extensively in recent years; unfortunately, there is no universally accepted definition for this term (Harding, 2001; Spieth and Harris, 1996). In fact, in the literature, it is commonplace to find references to the same instruments using terms such as health-related quality of life, emotional well-being or even mental health. One of the most useful definitions was proposed by Shumaker and Naughton (1995) who, upon reviewing the existent definitions, concluded that health-related quality of life is the subjective assessment of the influence of the state of health, health care and the promotion of health on the individual's capacity to maintain a functioning level that allows them to carry out the activities that are important to them and that affect their general well-being. Learning more about the health-related quality of life in childhood and adolescence is especially relevant for public health, because the quality of life at this age is the basis for the quality of life and health in adulthood (Bisegger *et al.*, 2005). The differences, based on age and sex in the specific measurement of the health-related quality of life, are not completely clarified in the literature. In general, this health indicator presents higher values during childhood than during adolescence; however, in connection with sex, the inequalities are not at all clear, although

several studies tend to indicate that male adolescents have higher values than adolescent girls (Bisegger *et al.*, 2005; Gkoltsiou *et al.*, 2008). More specifically, Bisegger *et al.* (2005) and Palacio-Vieira *et al.* (2008) evidenced an increase in sex differences when it comes to the health-related quality of life throughout adolescence, with the greatest decrease being found in the case of girls. There is a great deal of evidence about the relationship between the socioeconomic level and health in adulthood; thus people from low socioeconomic levels experience higher indexes of illness and mortality than people from higher socioeconomic levels. However, the effects on health have rarely been evaluated and, as Von Rueden *et al.* (2006) point out, even less with regards to the health-related quality of life during childhood and adolescence. These researchers demonstrate that the scores of this indicator are lower in adolescents from a low socioeconomic level; these results are supported by those obtained by Gkoltsiou *et al.* (2008), who use the Family Affluence Scale (FAS) as the measure of socioeconomic status. In fact, within the study of socioeconomic inequalities, research seems to demonstrate that wealth indicators are better predictors of results in health, such as the health-related quality of life, than the Standard International Classification of Occupations (ISCO) indicators (Von Rueden *et al.*, 2006).

– Perception of the general state of health. In many studies, the global perception of health has proven to be a predictor of the mortality rate. Specifically, Idler and Benyamini (1997) refer to twenty-seven studies that have shown coherent results in the relationship between the perception of health and future mortality, as well as results persistent with numerous health indicators and other co-variables included in the analysis, such as sex. With regards to adolescence, Breidablik, Meland, and Lydersen (2008) show that the constructs that adolescents use to evaluate their self-reported health are associated with a broad composition of background factors (medical, psychological, social and the health behaviours). However, the number of studies that include self-reported health in adolescents is still extremely limited. With regards to the sociodemographic variables associated with this measure, it has been found that in all age groups, girls have a poorer perception of their health than boys and these sex differences increase with the age (Cavallo *et al.*, 2006; Siahpush and Singh, 2000; Silventoinen, Posthuma, Lahelma, Rose, and Kaprio, 2007; Wade and Vingilis, 1999). Specifically, Bisegger *et al.* (2005) indicate that boys perceive themselves to have a poorer health than girls in childhood, while in adolescence it is just the opposite. The development of perception of the general state of health in connection with age during adolescence has been studied very little, and the few studies that explore this field show data lacking in coherency. Specifically, while there are a few studies that do include this data, they agree on a decrease in the good perception of health as age increases from 11 to 15 years (Cavallo *et al.*, 2006) and from 12 to 17 years (Wade and Vingilis, 1999), the same does not hold true as of that age. As such, Silventoinen *et al.* (2007) found a decrease of the good perception of health from 16 to 25 years, while Wade and Vingilis (1999) showed that from

17 to 19 years old, this decrease disappears and the level of self-reported health remains constant. Once again, discrepancies arise in the relationship between socioeconomic level and self-reported health. However, for the most part, these differences appear to be due to the measure of socioeconomic level used. Specifically, the research that uses measures linked more to the occupational level of the parents find that there is no relationship to the adolescents' perception of health (Glendinning, Love, Hendry, and Shucksmith, 1992; Rahkonen, Arber, and Lahelma, 1995). Even so, other studies that use measures more related to the family economic situation do demonstrate inequalities (Sleskova *et al.*, 2006; Wade and Vingilis, 1999); thus, the adolescents from lower income families report a worse state of health. In the same way, the studies that combine the two types of measures (on the one hand, the ISCO codes and, on other, the FAS scale) find that indicators related more to the strictly economic aspect are most related to the inequalities in health (Goodman, 1999; Goodman, Huang, Schafer-Kalkhoff, and Adler, 2007). The few studies that analyze the relationship between the perception of health and the GDP as a macro-systemic indicator of socioeconomic level, unanimously demonstrate this relationship, both in studies carried out exclusively in former iron-curtain countries (Bobak, Murphy, Rose, and Marmot, 2007) and in those that have been carried out by means of a more heterogeneous selection of countries (Torsheim *et al.*, 2004; Von dem Knesebeck, Dragario, and Siegrist, 2005).

– Psychosomatic complaint. Subjective complaint refers to the symptoms experienced by the individual with or without a definite diagnosis. These symptoms refer both to daily experiences and health problems. They are commonly the cause of illness and certified disability in adulthood. In the case of adolescents, the use of a self-reported list of psychosomatic symptoms by the adolescents themselves is based on three underlying assumptions: first, the adolescents have a level of cognitive development to be able to differentiate the concepts of health and illness; second, during said developmental phase, it is possible to understand the list of symptom concept and; third, the adolescents can reliably evaluate and report on emotions and complaint (Haugland and Wold, 2001). The relationship between the frequency of psychosomatic symptoms and variables such as the sex and age of the adolescent has been clearly demonstrated; thus, girls suffer this complaint more frequently than boys (Haugland, Wold, Stevenson, Aaroe, and Woynarowska, 2001; Hetland, Torsheim, and Aaro, 2002; Huurre, Rahkonen, Komulainen, and Aro, 2005; King, Wold, Tudor-Smith, and Harel, 1996). The frequency in both cases increases with age (Haugland *et al.*, 2001; King *et al.*, 1996), especially in the case of girls (Haugland *et al.*, 2001; Hetland *et al.*, 2002; King *et al.*, 1996). The socioeconomic inequalities in the frequency of psychosomatic complaint have not been studied to any extent as has been the case with the aforementioned variables. However, Huurre *et al.* (2005) show the existence and even the direction of the relationship between the ISCO codes obtained with the occupational level of the parents and a number of psychosomatic symptoms in adolescents.

– Integrated health focus. Despite the fact that these measures have proven to be appropriate instruments in conceptualizing the health in adolescence from a broader (not only strictly medical) and more positive point of view, many experts agree that there is a need to create integrated health models. These models must bear in mind the relationship between the various variables, relevant in their conceptualization. Among the variables generally mentioned are well-being, quality of life, emotional stress, global perception of health, physical complaint, etc. (Diener *et al.*, 2008; Greenspoon and Saklofske, 2001; Locker and Gibson, 2006; Patrick and Bergner, 1990; Seeman, 1989; Seligman, 2008; Vázquez and Hervás, 2008; Zullig, Valois, and Drane, 2005). For example, Huebner (2004) defends life satisfaction as a useful psychological construct in the conceptualization of health, which is related with a variety of well-being constructs, but which must be supplemented with other measures that refer to negative indicators of well-being, such as psycho-pathological symptoms. Another example has been suggested by Hetland *et al.* (2002) who explain that to better understand psychosomatic complaint in adolescence, it would be necessary to know how it is related to well-being and the quality of life. Taking the position presented up to now as a reference, this present work seeks to contribute to the study of health in adolescents, presenting a rich and integrated measure and, using the Spanish sample of the Health Behaviour in School-aged Children (HBSC) study as participants. The paper analyzes the properties of this measure and their distribution depending on the age and sex of the adolescent and the combinations of sex based on age, the FAS scale, ISCO codes and the region of Spain where they live. Specifically, the first objective of this paper is to propose a wide-range and integrated health measure, which bears in mind the variables stated as basic to the new conception of health: life satisfaction, health-related quality of life, self-reported state of health and psychosomatic complaint. The second objective focuses on analyzing how the proposed measure influences in sex and age, as well as in the socioeconomic conditions in which the adolescents have been raised. This latter includes the micro-systemic environment (FAS and ISCO) and macro-systemic environment, by means of the GDP *per capita* of their Region.

Method

This work falls within the 2006 edition of the international HBSC study, which is a World Health Organization collaborating study. The methodological details of the HBSC study in Spain are minutely detailed in Moreno *et al.* (2008). According to the classification raised by Montero and León (2007), this investigation is an empirical quantitative study, concretely, a survey descriptive study.

Participants

The selection of the participating adolescent sample was carried out using a randomized, multi-staged sampling, stratified by conglomerates, bearing in mind: the age

of the adolescents (11 to 18), geographical area (Region of Spain), residence habitat (rural and urban) and type of educational center (public and private).

Despite the fact that the HBSC study sample was made up of 21,811 adolescents, for this work only those boys and girls who had responded to all the items were included, but after verifying that there were no systematic errors in the non-response. The rejection rate for lost values was 13% of the original sample; therefore the sample for this paper was made up of a total of 18,955 adolescents from Spain in 375 educational centers. Of the total sample analyzed in this work, 46% were boys and 54% girls. The distribution by age was 24.1% in the 11-12 year-old group, 24.4% were 13-14 years of age, 27.8% were 15-16 and 23.8% were 17-18 years old. Distribution according to the Family Affluence Scale was as follows: 15.2% low level, 46.7% medium level and 38.1% high level; while the distribution according to the occupational level of the parents (ISCO codes) was 59.8% low level, 16.6% medium level and 23.6% high level.

To conclude, the sample percentage for each Region of Spain was distributed as follows: 7.8% in Andalusia, 6.2% in Aragon, 5.9% in the Principality of Asturias, 48% in the Balearic Islands, 6% in the Canary Islands, 5% in Cantabria, 5,7% in Castilla and León, 6.1% in Castilla-la-Mancha, 4.2% in Catalonia, 4.6% in the Region of Valencia, 5.6% in Extremadura, 7.2% in Galicia, 4.9% in the province of Madrid, 5.2% in Region of Murcia, 6% in the Chartered Community of Navarre, 5.2% in the Basque country, 5.1% in La Rioja and 4.5% in Ceuta and Melilla.

Instruments

The HBSC questionnaire collects information about the adolescents based upon various topics related to their lifestyles, their positive health and the contexts in which they grow up (family, peers and school). This study has demonstrated along its almost 30 years of history to have a large bank of instruments that meet the criteria of reliability and validity marked by the experts (Ramos-Álvarez, Moreno-Fernández, Valdés-Conroy, and Catena, 2008). Since this information is quite detailed, in the following paragraphs are cited the references to papers that validate the instruments that have been used in this work.

For this paper the following variables related to the demographic and socioeconomic contents have been selected:

– Sex: boy and girl.
– Age group: 11-12, 13-14, 15-16 and 17-18 years.
– Combination of sex and age.
– Family Affluence Scale, variable estimated according to the Family Affluence Scale (FAS): low, medium and high income (Boyce, Torsheim, Currie, and Zambon, 2006). The FAS is a score of four items: does your family own a car, van or truck?; do you have your own bedroom for yourself?; during the past twelve months, how many times did you travel away on holiday (vacation) with your family?; and how many computers does your family own?.
– International Standard Classification of Occupations (ISCO codes) of the parents, with values from 1 to 5 according to the degree of specialization required to perform the professional tasks of the post they hold (International Labour

Organization, 2004). The questions are: does your father have a job?; If YES, please say in what place he works and please write down exactly what job he does there; If NO, please say why your father does not have a job? He is sick, or retired, or a student / he is looking for a job / he takes care of others, or is full-time in the home / I don't know. The same questions were asked in relation to the mother.

– Region of Spain: Andalusia, Aragon, Principality of Asturias, Balearic Islands, Canary Islands, Cantabria, Castilla, and Leon, Castilla-la-Mancha, Catalonia, Region of Valencia, Extremadura, Galicia, Province of Madrid, Region of Murcia, Chartered Community of Navarre, the Basque Country, La Rioja, Ceuta, and Melilla.

– Gross Domestic Product (GDP) per capita for each Region of Spain, corresponding to the same year as the collection of data, that is to say, 2006 (Instituto Nacional de Estadística, 2009).

The journal supplement published by the *International Journal of Public Health* in September 2009 was dedicated to the analysis of the HBSC study throughout its 25 years of history (Ravens-Sieberer *et al.*, 2009). In keeping with this summary of works, a section of this supplement endorsed the measures related to adolescents' state of health (Erhart *et al.*, 2009; Ravens-Sieberer *et al.*, 2009). Thus, this up-dated review of instruments demonstrates the guarantees and accuracy of the variables that have been used in this paper, which are detailed in depth below:

– Life satisfaction, measured by the Cantril Ladder Cantril (1965), with values from 0 to 10 to represent the global perception adolescents have of their lives, in which 0 is the lowest perception of life satisfaction and 10 the highest.

– Health-related quality of life, measured with the Kidscreen instrument designed for a population between the ages of 8 to 18. Specifically the Kidscreen-10 version was used, which provides a global, health-related quality of life index with 10 items covering physical, psychological and social aspects (Ravens-Sieberer *et al.*, 2001). These items, which show an alpha Combrach of .82, refer to feeling well and fit, full of energy, sad, lonely, having enough time for themselves, doing things they want in their free time, receiving fair treatment from their parents, having a good time with friends, getting on well at school and being able to pay attention/concentrate.

– Self-reported health, a single item asked the adolescent to consider their health at that moment, with their response fitting to one of the following four options: excellent, good, passable or poor (Idler and Benyamini, 1997). This measure has recently been validated for quantitative use (Silventoinen *et al.*, 2007).

– Psychosomatic complaint, using the so-called HBSC-symptom checklist, it measures two aspects (Ravens-Sieberer *et al.*, 2008): psychological complaint (nervousness, feeling low, irritability and sleeping problems) and somatic manifestations (headache, stomach-ache, back ache and feeling dizzy), with an alpha Combrach of .80.

Procedure

The information collection procedure was faithful to the conditions demanded by the international coordination of the HBSC study, which established that firstly, it must

be the students themselves who respond to the questionnaire. Secondly, the anonymity of the respondent must be guaranteed, as well as the understanding of the text (therefore in bilingual areas, the adolescents could select the language preference of the questionnaire). Lastly, the administration of the questionnaires must be carried out within the school context and by specifically trained staff[3]. For the data analysis, an exploratory factorial analysis was carried out, and, subsequently, a confirmatory factorial Analysis of a global health score, as latent variable of the measures of life satisfaction, health-related quality of life, self-reported health and psychosomatic complaint. To verify the factorial structure of the model, the SPSS 16.0 statistical program was used (for the exploratory factorial analysis) and the 6.1 version of EQS (for the confirmatory factorial analysis). The parameters were obtained by means of the Maximum Verisimilitude method and the scores were provided using the regression system.

The FIT coefficients taken into consideration to evaluate the accuracy of the measuring model were: χ^2 (chi-square) and χ^2/gl (chi-square divided by the degrees of freedom). Being that to evaluate the adjustment between the theoretical and the observed models, the chi-square test alone should not be used because it is affected by the sample size, the following relative adjustment indicators were calculated: RMSEA (Root Mean Square Error of Approximation), non-standardized Bentler-Bonett Index and incremental indexes (IFC, NFI and TLI). These accuracy adjustment indexes are considered acceptable when the χ^2/gl is less than 5, the incremental indexes (IFC, IFI and MFI) are greater than .85 (ideally above .90), the non-normalized Bentler-Bonett index (BBNNFI) is between .90 and .95 (ideally above .95) and the error indexes (RMSEA) are less than .08 (ideally below .05).

For the second step, statistical significance tests were drawn up (ANOVA and Student *t* test, whose significance was considered suitable starting from $p < .001$) as well as size of effect tests (Cohen *d* for each crossing of two response values) to learn the relationship between the global health score and several identifying characteristics of the adolescents in addition to the socioeconomic variables of their family. To discover the relationship between health and the GDP per capita of each Region of Spain, a Pearson correlation test was carried out.

Results

Creation of a global and integrated health measure in adolescents

The construct of a health measure for Spanish adolescents was elaborated to response to a wide range and integrated focus presented in the introduction of this work. With this objective, and using the four best and most referred to variables in research (life satisfaction, health-related quality of life, self-reported state of health and psychosomatic complaint) an initial exploratory factorial analysis was carried out, followed by a confirmatory factorial analysis.

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[3] One month before the start of the data collection, the HBSC-Spain research team held a training session titled «Training in Questionnaire Field Work Methodology Course», in Seville for the 32 research assistants who were to collect the data. From here, we would like to thank these people for their efforts and interest, as well as for the quality of work performed.

The exploratory factorial analysis showed a sample adaptation Kaiser-Meyer-Olkin index (KMO) of .73 and the spherical Bartlett test of ($p < .001$) indicated that the score matrix fulfilled the identity supposition. The exploratory factorial analysis provided a single factor that explained 51.76% of the variance while the factorial structures obtained suggested the possibility of considering a single dimensional configuration as provisionally feasible. The factorial load matrices for the global health score showed the following weights over the factor studied: .68 for the life satisfaction variable, .65 for the health-related quality of life, .52 for self-reported health and -.52 for psychosomatic complaint. Next, in the correlation matrix represented in Table 1, all the interactions between each of the elements included in the exploratory factorial analysis prove to be significant, which indicates an elevated cohesion between the variables.

TABLE 1. Pearson correlation matrix of the constituent variables of the exploratory factorial analysis.

	Life satisfaction	Health-related quality of life	Self-reported health	Psychosomatic complaint
Life satisfaction	-	.45**	.34**	-.36**
Health-related quality of life		-	.34**	-.32**
Self-reported health			-	-.30**

Note. Determinant = .539; Sig. (unilateral) < .001 **

As for the confirmatory factorial analysis, the FIT coefficients are presented next in their robust version (since the data fails to adapt to the normal law) to test the adjustment of the unidimensional factorial model. Despite the fact that the value obtained with the chi-square ($\chi^2_{(6, N = 18,955)}$ = 8,319.65; $p < .001$) divided by degrees of freedom does not provide a suitable index (χ^2/gl = 1,386.60) due to the large size of the sample ($N = 18,955$), it was therefore necessary to bear in mind the relative adjustment indicators. These indicators showed, in the first place, a non-normalized Bentler-Bonett index (BBNNFI) of .985 which, being above the ideal limit of .95, is considered valid; secondly, all incremental indexes exceeding the strictest option .90 (*IFC* = .995; *IFI* = .995; *MFI* = .999) and, finally, an error index that is much lower than the ideal value (.05), specifically the RMSEA value is .033. Therefore, the FIT coefficients obtained for the global health score are appropriate and confirm that the measuring model is adjusted to the unidimensional character.

Once the scores for the global health variable were obtained with both factorial analyses (exploratory and confirmatory), both scores were verified to have a Pearson Correlation equal to 1. For this, we used the global health score obtained with the confirmatory factorial analysis, which shows a minimum value of 1.27 points, a maximum of 14.60, a mean value of 8.47 and a typical deviation of 1.41, all of these calculated for a total valid sample of 18,955 adolescents.

Relationship between the global health score and the sex and age of the adolescents

As can be seen in Table 2, boys have better global health scores than girls, 8.71 as opposed to 8.27 respectively. The differences are statistically significant ($F_{(1, 18952)} = 453.075$; $p < .001$) and with a medium effect size ($d = .32$).

TABLE 2. Average values of global health depending on sociodemographic and socioeconomic variables.

		Global health score			
		Mean	Typical deviation	Valid N	Signification
Total		8.47	1.41	18,955	
Sex	Boys	8.71	1.34	8,722	p < .001
	Girls	8.27	1.44	10,233	
Age	11 - 12 years-old	9.31	1.23	4,566	p < .001
	13 - 14 years-old	8.49	1.47	4,621	
	15 - 16 years-old	8.17	1.28	5,265	
	17 - 18 years-old	7.94	1.28	4,503	
Combination of sex and age	Boys 11 - 12 years-old	9.33	1.22	2,138	p < .001
	Boys 13 - 14 years-old	8.74	1.41	2,290	
	Boys 15 - 16 years-old	8.46	1.21	2,470	
	Boys 17 - 18 years-old	8.25	1.28	1,824	
	Girls 11 - 12 years-old	9.29	1.24	2,428	
	Girls 13 - 14 years-old	8.25	1.49	2,330	
	Girls 15 - 16 years-old	7.92	1.29	2,795	
	Girls 17 - 18 years-old	7.74	1.24	2,680	
FAS	Low	8.10	1.54	2,917	p < .001
	Medium	8.44	1.40	8,739	
	High	8.66	1.34	7,155	
ISCO	Low	8.46	1.43	10,779	p = .003
	Medium	8.43	1.45	2,864	
	High	8.54	1.35	3,926	
Region	Andalusia	8.55	1.40	1,484	p = .329
	Aragon	8.44	1.34	1,176	
	Asturias (Principality of)	8.53	1.40	1,128	
	Balearic (Islands)	8.35	1.40	916	
	Canarias (Islands)	8.34	1.60	1,136	
	Cantabria	8.55	1.41	944	
	Castilla and Leon	8.54	1.31	1,089	
	Castilla-la-Mancha	8.53	1.35	1,148	
	Catalonia	8.33	1.36	800	
	Valencia (Region of)	8.49	1.46	879	
	Extremadura	8.54	1.48	1,056	
	Galicia	8.37	1.53	1,360	
	Madrid (Province of)	8.32	1.42	924	
	Murcia (Region of)	8.41	1.43	995	
	Navarra (Chartered Community	8.60	1.36	1,139	
	Basque Country	8.56	1.33	982	
	Rioja (La)	8.61	1.37	959	
	Ceuta and Melilla	8.61	1.41	847	

Notes. FAS = Family Affluence Scale; ISCO = International Standard Classification of Occupations.

In the case of age, the differences are also significant ($F_{(3, 18950)}$ = 947.10; $p < .001$) and with suitable effect sizes, as can be seen in Table 3. In the Cohen d values of this table, a leap is observed between the 11-12 year-old adolescents (9.31 average score) and the adolescents of the other age groups (whose average score are 8.49, 8.17, and 7.94 respectively). All the Cohen d values arising from all the crossings between the youngest age group and the other groups exceeds .6. This reveals that the age of 13 is a key developmental moment in the deterioration of health during adolescence.

TABLE 3. Cohen d values for all the crosses of the follow variables: age, combination of sex by age and Family Affluence Scale*.

Age

	11 -	13 -	15 -	17 -
11 - 12	-	.61	.91	1.09
13 - 14		-	.23	.40
15 - 16			-	.18
17 - 18				-

Combination of sex and age

		Boys				Girls			
		11 -	13 -	15 -	17 -	11 - 12	13 -	15 -	17 -
Boys	11 - 12	-	.45	.71	.87	.03	.80	1.12	1.30
	13 - 14		-	.21	.36	-.42	.34	.61	.76
	15 - 16			-	.17	-.68	.16	.44	.60
	17 - 18				-	-.83	.00	.26	.41
Girls	11 - 12					-	.77	1.09	1.26
	13 - 14						-	.24	.38
	15 - 16							-	.14
	17 - 18								-

FAS

	Low	Medi	High
Low	-	.24	.40
Mediu		-	.16
High			-

Notes. This table does not include the Cohen d for the cross of sex, because from the two response options (boy and girl) only one result was obtained, specifically .32. FAS = Family Affluence Scale.

With regards to the combination of sex and age, a decrease in health is observed with age. Despite the fact that it takes place in both sexes, this decrease is more marked in girls when compared to boys ($F_{(7, 18946)}$ = 499.68; $p < .001$). However, the effect sizes for all the crossings show that the differences between boys and girls in the same age groups present significant differences, with a medium effect size in the 13-14 year-old age group and upwards (see Table 3). In the lower age group (11-12 year-olds), these differences present an insignificant effect size. Therefore, the differences between sexes

in the global health score appear as of 13-14 years old, remaining constant from that age upwards.

Relationship between the global health score of adolescents and the socioeconomic variables of their families

The relationship between the socioeconomic level that characterizes the adolescents' family micro-system and the health score created in this work differs depending on the measure used. Thus, when the socioeconomic level is measured using FAS, its relationship with the health score is shown to be significant ($F_{(2, 18807)}$ = 171.76; $p < .001$) and, as can be seen in Table 2, there is an appropriate effect size, especially when comparing low and high income ($d = .4$). The specific results reveal that the health of the adolescents with low FAS scores is poorer (average score of 8.10) than the level of health that characterizes adolescents with high affluence (average 8.66). However, when the family socioeconomic level is measured with an indicator based upon the occupational level of the parents, the ISCO codes (a measure with fewer economic components and based more on the necessary training requirements for each professional category), this relationship with the global health score is lost ($F_{(2, 17565)}$ = 5.77; $p = .003$).

Relationship between the global health score of adolescents and the socioeconomic indicators for the Region of Spain where they live

The relationship between adolescent health and the GDP *per capita* of each Region of Spain does not show a significant Pearson correlation ($r = -.007$; $p = .32$). The relationship between both measures is represented in Figure 1 showing their differential scores, achieved by subtracting the population average from the direct score -represented as value 0 for the population average - (average for health = 8.47/average for the GDP = 20,729.98). This representation shows how certain Regions do not follow the hypothesis of the higher GDP, the higher the health score; therefore the results indicate major differences in the positions of several Regions. Specifically, there are four major groups: those with a lower GDP and lower health scores (Canaries, Galicia, and Murcia); those with higher scores in both indicators (Navarre, Basque Country, and La Rioja); those that, despite having a lower GDP, have higher health scores (Extremadura, Ceuta and Melilla, Andalusia, and Castilla-la-Mancha) and those with very low health scores despite being among the Regions with a higher GDP (Madrid, Catalonia, and Balearic Islands).

FIGURE 1. Dispersion diagram between the global health score for each Region of Spain and its value in Gross Domestic Product *per capita*.
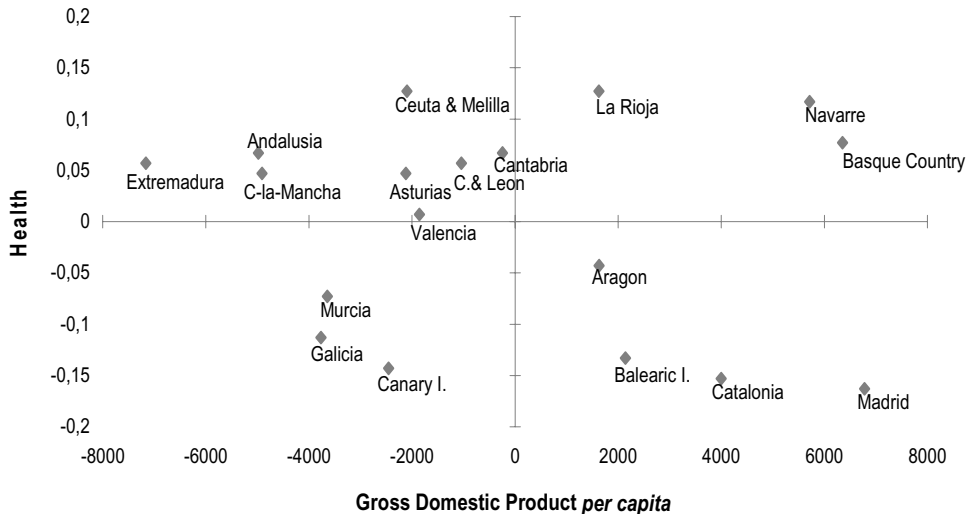
Discussion

Despite the fact that over 60 years ago the World Health Organization defined health as the state of complete physical, mental and social well-being, and not only the absence of diseases or infirmity (World Health Organization, 1948), neither research nor the daily practice nor the institutions responsible for health management fail to be consistent with this conceptual reference. Undoubtedly, the increase of diseases directly associated with environmental factors and individual lifestyles in today's society (Matarazzo, 1994; World Health Organization, 1986) have demonstrated the need for a resolved orientation towards a biopsychosocial model of health. As a consequence of the interdisciplinary nature promoting this new focus, Psychology has become a key discipline, both for the contributions it can offer in the field of research, as well as in interventions aimed at improving citizens' quality of life and the well-being.

From this discipline, and being aware of the need to create complex and integrated health models that are able to include both positive and dysfunctional elements, this research has worked on the design of a global health score that facilitates the analysis of adolescents' state of the health simultaneously from two points of view: that of the strengths and that of the complaint. In this sense, the score obtained has been shown to have a series of characteristics suggesting that it could be a valid measure in the integrated assessment of health.

In the first place, it clearly responds to the integrated concept of health. Thus, despite the demands applied in data analyses, which have borne in mind the most stringent limits in the validation parameters of the confirmatory factorial analysis, the

existence of a single latent health factor has been demonstrated. Thus, with these four instruments that are the foundation for large amounts of research (already mentioned in the introduction of this paper), this score includes the assessment that the adolescents themselves give to their own health, using reliable indicators related to life satisfaction, emotional well-being or quality of life, perception of health and psychosomatic complaint.

Secondly, as a measure, this score fulfils an important requirement, that of economy and parsimony. It is a score created from four validated instruments, with a total of only 20 items, which, in addition to being self-reported, can be administered in groups. It is, therefore, an extremely economic measure that can serve as a screening tool in studies that seek to detect individuals with special characteristics (for example, boys and girls with extreme health scores). Also, it can be used to better guide interventions (have improved knowledge of group strengths and weaknesses) while at the same time be useful as an assessment instrument in intervention programs for these populations. In general, this tool can be used for research that, with epidemiological aims, seeks to have a simple and robust measurement of the state of the population's health to assess and supervise the progress of the different individual types over time.

Thirdly, the integrated health score has detected significant differences depending on the sex and age of the adolescent, and in the direction in which the precedent research tends to show**.** Bearing in mind the methodological characteristics of the study (on the one hand, those results related to the application of the characteristics of the aforementioned measure and, on the other, those related to the broad and representative sample of Spanish adolescents we have worked with from each of the Regions of Spain), these results can be considered an important reference in the assessment of the state of health of adolescents in Spain.

The worse results in the health of the girls could have diverse causes, as explained below. Girls are more willing to express their feelings and unpleasant emotions (Maccoby, 1998). Also, they show greater dissatisfaction with their body image, which specifically affects their self-esteem, life satisfaction and mental health in general (Marcotte, Fortin, Potvin, and Papillon, 2002). On the other hand, some authors say that the girls have a unique understanding of interpersonal relationships, as they usually value relationships more while at the same time demand more from them, which often leads to being more unsatisfied (Brown and Gilligan, 1992). Moreover, they show a greater tendency towards introspection and self-revelation in their private relationships, which can often lead them to «meditate» excessively about difficulties and conclude with a very negative vision of their lives (Rose, Carlson, and Waller, 2007).

In terms of the age-related differences, the results of this work prove that the health of adolescents-measured from a broad and integrated standpoint-shows a decrease throughout adolescence. These results corroborate the statements made by other researchers. However, that decrease generally takes place at the onset of adolescence, between the ages of 11 and 13, and it is as of that age that there is a slight decrease. The various changes (physical, psychological and social) during puberty, which these young people must face at this point in their lives, could help explain the said decrease. Moreover, the decrease in the studied level of health is more marked in the case of the girls, perhaps due to the fact that they are more affected by the negative consequences of puberty (Rutter, 1986).

Fourthly, the measure has detected inequalities in the health of the adolescents associated with the affluence scale of their families. Hence, the adolescents from higher income families have a better health score, as has been shown by other research. Nonetheless, based on the results found by Glendinning *et al.* (1992) and Rahkonen *et al.,* (1995), those inequalities in health are not seen in the case of the differences in the occupational level of the parents. Von Rueden *et al.* (2006) have compared both socioeconomic measures (FAS and ISCO) in their relationship with the health-related quality of life of adolescents and have demonstrated that what really influences the health of adolescents is not so much the occupation of their parents, as the advantages implied by their purchasing power (for example, having the opportunity to visit new places while on holiday, having a computer or enjoying the intimacy and comfort offered by their own bedroom, etc.).

This work has taken one step further in exploring the variables that give rise to inequalities in health by delving into the incidence of macro-systemic economic variables. Differences have been detected between the Regions making up the Kingdom Spain, but at the same time, it has been possible to demonstrate that these differences are not attributable at their economic levels (measured by the respective GDPs). Indeed, the results have shown the inexistence of a lineal relationship between the GDP *per capita* and the adolescents' health score in the various Regions. Nevertheless, the position of some Regions in this sense is remarkable, such as the case of Extremadura, Ceuta, and Melilla, Andalusia and Castilla-la-Mancha, which despite having a low GDP, their adolescents have relatively high health scores; while in other Regions, such as Madrid, Catalonia or the Balearic Islands, it is just the opposite. These results invite us to think about the influences of other variables that are more related to cultural traditions and that have been configured to give rise to socialization practices, to ways of understanding interpersonal relationships and building personal identities, but also to influence the governments of each Region, which control community resources that are so important when defining the quality of life of their citizens. Whatever the case, it would appear that this could be an interesting line of future research in which the importance of these and other variables are explored.

To conclude, it is important to point out that this work stems from a traverse research design, of a more limited weight than a longitudinal study when establishing causal relationships. In addition, the fact that the HBSC study focuses on school populations adds another limitation to this work, since, in the case of the 17-18 year-old adolescent population, we only had access to those who had continued within the educational system (remember that in Spain, secondary education is mandatory to the age of 16).

In spite of these limitations, this study provides valid information from a broad and representative sample of adolescents from 11 to 16 and 17-18 years of age at school in Spain. Specifically, this information is useful and interesting for its practical implications in connection with the clinical assessment and intervention in the adolescent population, since it not only uses a good and, at the same time, simple measuring tool, but rather it also provides information about the current standards of biological, psychological and social health in this population. Furthermore, some of the results of this paper can have

important socio-sanitary implications, since they can serve as a guide to prevention interventions and the promotion of health, at the same time by demonstrating the role played by sex and socioeconomic inequalities, as well as age, on physical, mental and social well-being, during adolescence.

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