HEALTH AND ECONOMIC CONDITIONS: EVIDENCE FROM INDIVIDUAL-LEVEL DATA

Elena Arroyo Borrell

Universitat de Girona

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DOCTORAL THESIS

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Prof. Dr. MARC SAEZ ZAFRA and Dra. GEMMA RENART VICENS, of the University of Girona,

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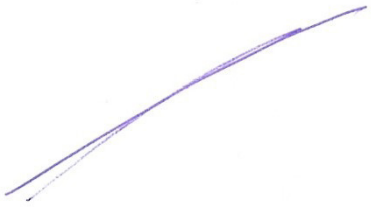

Prof. Dr. Marc Saez Zafra

Dra. Gemma Renart Vicens

Girona, 6 September 2016

"Remember how far you've come, not just how far you have to go"

Rick Warren

Als meus pares,
i a tu, amor.

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List of publications

1. Arroyo, E., Renart, G., Saez, M. (2015). 'How the economic recession has changed the likelihood of reporting poor self-rated health in Spain', *International Journal for Equity in Health*, 14:149, DOI 10.1186/s12939-015-0285-5.

JCR ISI, Public, Environmental and Occupational Health: 1st quartile, position 24 (of 153), Impact Factor (2015): 2.378

2. Arroyo, E., Cabrera-León, A., Renart, G., Saurina, C., Serra-Saurina L., Daponte-Codina, A., Saez, M. (2016). 'Did the consumption of psychotropic drugs increase during the 2008 downturn?', *Administration and Policy in Mental Health and Mental Health Services Research* (under revision).

JCR ISI, Public, Environmental and Occupational Health: 1st quartile, position 23 (of 153), Impact Factor (2015): 2.415

3. Arroyo-Borrell, E., Renart, G., Saurina, C., Saez, M. (2016). 'Influence of the maternal background on children's mental health', *International Journal for Equity in Health* (under revision).

JCR ISI, Public, Environmental and Occupational Health: 1st quartile, position 24 (of 153), Impact Factor (2015): 2.378

4. Arroyo-Borrell, E., García-Gómez, P. (2016). 'Parental unemployment and children's health, health care use and health behaviours', *European Journal of Epidemiology* (under revision).

JCR ISI, Public, Environmental and Occupational Health: 1st quartile, position 7 (of 173), Impact Factor (2015): 7.105

List of abbreviations

AEMPS- Spanish Agency of Medicines and Medical Devices

BMI- Body Mass Index

CI- Confidence Interval

CSMIJ- Centers of Children and Adolescence Mental Health

DIC- Deviance Information Criterion

DHD- Dose per Inhabitant per Day

DWP - Department for Work and Pensions

EHIS- European Health Interview Survey

ENSE- Encuesta Nacional de Salud de España

EPO- Effective Number of Parameters

ESCA- Enquesta de Salut de Catalunya

FACS- Families and Children Survey

GDP- Gross Domestic Product

GHQ- Goldberg Health Questionnaire

INE- Instituto Nacional de Estadística

INLA- Integrated Nested Laplace Approximation

MSSSI- Ministerio de Sanidad, Servicios Sociales e Igualdad

OR- Odds Ratio

PC- Penalising Complexity

QLFS- Quarterly Labour Force Survey

RW- Random Walk

SAH-Self-Assessed Health

SD- Standard Deviation

SDQ- Strengths and Difficulties Questionnaire

SES- Socioeconomic Status

SNHS- Spanish National Health Survey

SRH- Self-Rated Health

UK- United Kingdom

USA- United States of America

WHO- World Health Organisation

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1. Thesis summary

Since the Great Depression of the 1930s, concern about the effects of adverse economic conditions on the health of a population has increased. However, assessing the effect of negative economic conditions on health is difficult, which is why one can find a large number of studies with varying results and, in spite of 100 years of research, the relationship between health and macroeconomic shocks is still not clear.

Since the economic downturn that started in 2008, changes in population's health have been one of the major concerns in public health research not only because of the serious rise in the number of people who are unemployed, have lost their savings or are suffering from economic problems, but also due to government implemented austerity policies, reforms and spending cuts designed to reduce public deficit and debt. In other words, the combined effect of the economic crisis itself and the resulting austerity policies pressure not only health systems, but also an individual's health.

All four papers in this thesis use individual-level data to examine the health consequences for individuals (adults and children) who have suffered an economic shock such as parental unemployment or a financial crisis. The impact of such economic shocks on individuals' health is compared to those who have not suffered from the same economic condition. A significant drawback to this approach is that it uses a subjective health status reported by the individual in question. However, in aggregate data vulnerable people tend to be hidden when in fact they are the most negatively affected by adverse economic conditions. Consequently, one of the focal point of this thesis is identifying those groups most vulnerable to external shocks.

The first three papers are centred on the economic downturn in Spain which, while starting later than in other countries, has been much more severe. The Spanish economy went into recession in the first quarter of 2009, after the GDP had fallen for two consecutive quarters and although it emerged from this first recession in the first quarter of 2010, when the GDP showed positive growth rates, it slipped back into recession again in the second quarter of 2011 (double dip) and did not emerge from that recession until the third quarter of 2013. In fact, in July 2012 the Eurogroup agreed (through the European Stability Mechanism (ESM) under the Financial Sector Adjustment Programme for Spain, 2012) to provide Spain with a EUR 100 billion financial assistance package to recapitalize and restructure its financial institutions.

This thesis aims to clarify how poor economic conditions are associated with some health outcomes of individuals; not only in case of adults, but in the case of children as well. The

first three papers are focused on the 2008 economic downturn in Spain and specifically use individual-level data from the Spanish National Health Survey, a representative survey of the Spanish population. The first two of these three papers are focused on some subjective health indicators for adults, for instance self-rated health (SRH) and the consumption of psychotropic drugs. The third paper, however, aims to analyse the subjective health of children and more specifically mental health disorders in children. In an attempt to move the focus beyond the Spanish financial crisis, the fourth and final paper uses data from UK and, while it too assesses children's health, health behaviour and health care use, the economic condition analysed is specifically parental unemployment.

Previous studies have analysed the relationship between economic conditions and SRH. There is evidence that SRH is a strong predictor of morbidity and mortality. In our first paper, we assess this specific outcome using Spanish and Catalan data and our results indicate that the probability of reporting poor health in 2006 is, despite the grave economic recession the country is experiencing, not significantly different in 2011 and so we have been able to conclude that people rate their health equally in both of these years.

The major concerns during economic difficulties usually address mental health problems. Most of the aggregate and individual level studies agree on the effects of economic downturns on mental health. As Vandoros and colleagues pointed out in their work, a financial crisis affects not only the unemployed by inducing chronic stress, reducing social interaction and causing a lack of self-esteem, but also the employed can suffer mental from disorders resulting from job insecurity and anxiety due to financial instability. Indeed, many countries have experienced grave rates in terms of anxiety, stress and depression. In fact, our second paper aims to assess differences in psychotropic drug consumption during the economic downturn. The results of our analysis show that there is no significant change in the risk of consuming antidepressants and tranquilizers during the economic crisis. However, we conclude that the differences between genders widened in 2011, and women are the most vulnerable group.

As it is also important to assess the consequences of adverse economic conditions on children, given that these may have consequences in their adulthood, our third paper concludes that maternal mental health is negatively associated with the emotional symptoms, behavioural problems, hyperactivity and problems with peers of the child, whereas maternal socioeconomic status (SES) is related to children's mental health, especially the level of education of the mother. Interestingly, we find that the economic downturn has not widened the effects of SES on the mental health of children.

In an effort to analyse children's health outcomes in depth, this thesis uses longitudinal data from United Kingdom that combines children self-reported data with children parental-reported data in order to deal with the relationship between parental unemployment and children's health outcomes, health behaviours and health care use. Our findings suggest that, on the whole, parental unemployment is negatively associated to children's health. And more specifically, the association between children's health and parental unemployment is larger in single-parent families compared to nuclear families.

If this dissertation has one main message, it is that the effects of adverse economic conditions are negative or not, depending on the characteristics of the individual. In general, while it does not seem that the poor economic conditions are strongly negatively associated with individuals' health, in the vulnerable groups individuals' health is certainly affected in the case of women and children. More specifically, children seem, on the whole, to suffer from paternal unemployment, whose consequences may be far-reaching and even impact their adulthood.

Resum de la tesi

Des de la Gran Depressió dels anys 30, la preocupació pels efectes de les condicions econòmiques adverses sobre la salut de la població ha augmentat. No obstant això, avaluar els efectes de les condicions econòmiques negatives sobre la salut és complicat, i és per això que es poden trobar nombrosos estudis amb diferents resultats i, tot i els 100 anys de recerca, la relació entre la salut i els xocs macroeconòmics encara no és clara.

A partir de la crisi econòmica que va començar el 2008, els canvis en la salut de la població han estat una de les majors preocupacions en la investigació en salut pública, i no només a causa de l'increment en el nombre de persones desocupades, que han perdut els seus estalvis o que han d'afrontar problemes econòmics, sinó també a causa de les mesures d'austeritat, reformes i retallades en despesa que han dut a terme els governs per tal de reduir el dèficit públic i el deute. En altres paraules, la combinació dels efectes de la crisi econòmica i les polítiques d'austeritat pressionen no només el sistema de salut, sinó també a la salut de la població.

Els quatre articles d'aquesta tesi utilitzen dades a nivell individual per tal d'examinar la salut dels individus (adults i nens) que han patit un xoc econòmic, com la crisi econòmica o la desocupació dels pares. L'impacte d'aquests xocs econòmics en la salut de l'individu és comparat amb aquells que no han patit aquesta mateixa condició econòmica. Un important inconvenient d'aquesta aproximació és que utilitza informació sobre la salut subjectiva reportada pel mateix individu. No obstant això, utilitzant dades agregades la població més vulnerable tendeix a

quedar amagada quan de fet són els que més negativament poden estar afectats per situacions econòmiques adverses. A més, un dels punts centrals d'aquesta tesi és identificar aquells grups més vulnerables a xocs externs.

Els tres primers articles se centren en la recessió econòmica a Espanya que, tot i començar més tard que en altres països, ha estat molt més greu. L'economia espanyola va caure en recessió el primer trimestre del 2009, després que el PIB hagués caigut durant dos trimestres consecutius, i tot i que en va sortir el primer trimestre del 2010, quan el PIB va mostrar taxes de creixement positives, va tornar a caure en recessió en el segon trimestre del 2011 i no va sortir-ne fins al tercer trimestre del 2013. De fet, el juliol del 2012 l'Eurogrup va acordar, a través del Mecanisme Europeu d'Estabilitat (ESM) en el marc del Programa d'Ajust del Sector Financer d'Espanya, 2012, proporcionar a Espanya 100 bilions d'euros d'ajuda financera per tal de recapitalitzar i reestructurar les institucions financeres.

L'objectiu d'aquesta tesi és clarificar com les condicions econòmiques adverses estan associades a alguns resultats de salut dels individus; i no només en el cas dels adults, sinó també en el dels nens. Els tres primers articles se centren en la crisi econòmica del 2008 a Espanya i, específicament, utilitzen dades a nivell individual de l'Enquesta Nacional de Salut a Espanya, una enquesta representativa de la població espanyola. D'aquests tres articles, els dos primers estan centrats en indicadors subjectius de la salut en adults, en concret la salut autopercebuda i el consum de psicotròpics. El tercer article, tanmateix, té com a objectiu analitzar la salut subjectiva del nen, més específicament, els problemes de salut mental dels nens. En un intent de moure el focus més enllà de la crisi econòmica espanyola, el quart i últim article utilitza dades del Regne Unit per tal d'avaluar la salut, els comportaments en salut i la utilització dels serveis sanitaris del nen quan els seus pares estan desocupats.

Articles previs han analitzat la relació entre les condicions econòmiques i la salut autopercebuda. Hi ha evidència empírica que indica que la salut autopercebuda és un fort predictor de la morbiditat i mortalitat. En el primer article, s'avalua aquest resultat específic de salut utilitzant dades espanyoles i catalanes i els resultats indiquen que la probabilitat de reportar un estat de salut pobre el 2006 no és significativament diferent durant el 2011, tot i la greu recessió econòmica que el país pateix. Per tant, es conclou que la població avalua el seu estat de salut igual en els dos anys analitzats.

Durant les dificultats econòmiques, les principals preocupacions normalment es dirigeixen a problemes de salut mental. La majoria d'estudis que utilitzen dades agregades i dades a nivell individual estan d'acord en els efectes de les crisis econòmiques en la salut mental. Tal

com senyalaven Vandoros i companys en el seu estudi, la crisi econòmica afecta no només els desocupats a patir de l'estrès crònic, la reducció de les interaccions socials i provocant una falta d'autoestima, sinó que també els ocupats poden patir trastorns mentals que resulten de la inseguretat laboral i l'ansietat a causa de la inestabilitat financera. En efecte, molts països han experimentat greus taxes en termes d'ansietat, estrès i depressió. De fet, el segon article té com a objectiu avaluar les diferències en el consum de psicotròpics durant la crisi econòmica. Els resultats de les nostres anàlisis indiquen que no hi ha un canvi significatiu en el risc de consumir antidepressius i tranquil·litzats durant la crisi econòmica. No obstant això, es conclou que les diferències entre els gèneres el 2011 s'han ampliat, sent les dones el grup més vulnerable.

Com que també és important avaluar els efectes de les condicions econòmiques adverses en la salut dels nens, donat que això pot tenir importants conseqüències en la seva edat adulta, el tercer article conclou que la salut mental de la mare està negativament associada amb símptomes emocionals, problemes de conducta, hiperactivitat i problemes del nen amb els companys, mentre que el nivell socioeconòmic (SES) de la mare està relacionat amb la salut mental dels nens, especialment el nivell d'educació de la mare. Curiosament, també es troba que la recessió econòmica no ha ampliat els efectes del SES a la salut mental dels nens.

Amb l'objectiu d'analitzar més a fons els resultats de salut dels nens, aquesta tesi utilitza dades longitudinals del Regne Unit que combinen informació reportada pels pares amb informació reportada pels mateixos adolescents, per tal de donar resposta a la relació entre la desocupació dels pares i la salut, els comportaments en salut i la utilització de serveis sanitaris dels nens. Les troballes suggereixen que, en general, la desocupació dels pares està negativament associada amb la salut dels nens. I més detalladament, l'associació és més forta en famílies monoparentals que en famílies nuclears.

Si aquesta tesi té un missatge principal, és que els efectes de les condicions econòmiques adverses són negatius o no depenen de les característiques de l'individu. En general, mentre que no sembla que les condicions econòmiques negatives estan fortament i negativament associades amb la salut dels individus, la salut dels grups més vulnerables és sens dubte la més afectada, concretament la salut de les dones i dels nens. Principalment, els nens sembla que, en general, pateixen de la desocupació dels pares, i les conseqüències poden ser de llarg abast i fins i tot poden afectar a la seva salut en l'edat adulta.

Resumen de la tesis

Desde la Gran Depresión de los años 30, la preocupación de los efectos de las condiciones económicas adversas sobre la salud de la población ha aumentado. No obstante, evaluar los

efectos de las condiciones económicas negativas sobre la salud es complicado, y por eso se pueden encontrar numerosos estudios con distintos resultados y, a pesar de los 100 años de investigación, la relación entre la salud y los choques macroeconómicos no es clara hasta todavía.

A partir de la crisis económica que comenzó en el año 2008, los cambios en la salud de la población se han convertido en una de las mayores preocupaciones en la investigación en salud pública, y no solo por el incremento en el número de personas desempleadas, que han perdido sus ahorros o que tienen que afrontar problemas económicos, sino también debido a las medidas de austeridad, reformas y recortes en gastos a los que se han visto abocados los gobiernos para reducir el déficit público y la deuda. En otras palabras, la combinación de los efectos de la crisis económica y las políticas de austeridad recaen no solo sobre el sistema de salud, sino también sobre la salud de la población.

Los cuatro artículos de esta tesis utilizan datos a nivel individual para examinar la salud de los individuos (adultos y niños) que han sufrido un choque económico, como por ejemplo la crisis económica o la desocupación de los padres. El impacto de estos choques económicos en la salud del individuo es comparado con aquellos que no han sufrido la misma situación económica. Un inconveniente importante de esta aproximación es que utiliza información sobre la salud subjetiva reportada por el mismo individuo. No obstante, con datos agregados la población más vulnerable tiende a ocultarse cuando, de hecho, son los que pueden estar más afectados por las situaciones económicas adversas. Además, uno de los puntos centrales de esta tesis es identificar precisamente los grupos más vulnerables a choques externos.

Los tres primeros artículos se centran en la recesión económica en España que, aunque comenzó más tarde que en otros países, ha sido mucho más grave. La economía española cayó en recesión el primer trimestre del 2009, después que el PIB hubiera caído durante dos trimestres consecutivos, y aunque se recuperó en el primer trimestre del 2010, cuando el PIB mostró tasas de crecimiento positivas, volvió a caer en recesión el segundo trimestre del 2011, no recuperándose hasta el tercer trimestre del 2013. De hecho, en julio del 2012 el Eurogrup acordó, a través del Mecanismo Europeo de Estabilidad (ESM) en el marco del Programa de Ayudas del Sector Financiero de España, 2012, proporcionar a España 100 billones de euros de ayuda financiera para recapitalizar y reestructurar las instituciones financieras.

El objetivo de esta tesis es clarificar como las condiciones económicas adversas se asocian a los resultados de la salud de los individuos; y no solo en el caso de los adultos, sino también en el de los niños. Los tres primeros artículos se centran en la crisis económica del 2008 en

España y, específicamente, utilizan datos a nivel individual de la Encuesta Nacional de Salud en España (ENSE), una encuesta representativa de la población española. De estos tres artículos, los dos primeros están centrados en indicadores subjetivos de la salud en adultos, por ejemplo la salud autopercibida y el consumo de psicotrópicos. El tercer artículo, sin embargo, tiene como objetivo analizar la salud subjetiva del niño, más específicamente, los problemas de salud mental en niños. Con el objetivo de ir más allá de la crisis económica española, el cuarto y último artículo utiliza datos del Reino Unido para evaluar la salud, el comportamiento en salud y la utilización de los servicios sanitarios del niño cuando sus padres están desocupados.

Artículos previos han analizado la relación entre las condiciones económicas y la salud autopercibida. Hay evidencia empírica que indica que la salud autopercibida es un fuerte predictor de la morbilidad y mortalidad. En el primer artículo, se evalúa este resultado específico de salud utilizando datos españoles y catalanes y los resultados indican que la probabilidad de reportar un estado de salud pobre en 2006 no es significativamente diferente durante el 2011, a pesar de la grave recesión económica que sufre el país. Por lo tanto, se concluye que la población evalúa su estado de salud igual en los dos años analizados.

Durante las graves dificultades económicas, las principales preocupaciones generalmente se dirigen a problemas de salud mental. La mayoría de estudios que utilizan datos agregados y datos a nivel individual coinciden en los efectos de las crisis económicas en la salud mental. Tal y como señalaban Vandoros y sus colegas en su estudio, la crisis económica afecta no solo a los desempleados por sufrir estrés crónico, reducción de las interacciones sociales y una falta de autoestima, sino que también los ocupados pueden sufrir trastornos mentales derivados de la inseguridad laboral y la ansiedad a causa de la inestabilidad financiera. En efecto, muchos países han experimentado graves tasas en términos de ansiedad, estrés y depresión. De hecho, el segundo artículo tiene como objetivo evaluar las diferencias en el consumo de psicotrópicos durante la crisis económica. Los resultados de nuestros análisis indican que no hay un cambio significativo en el riesgo de consumir antidepresivos y tranquilizantes durante la crisis económica. Sin embargo, se concluye que las diferencias entre géneros en 2011 se han ampliado considerablemente, siendo las mujeres el grupo más vulnerable.

Puesto que también es importante evaluar las consecuencias de las condiciones económicas adversas en la salud de los niños, ya que pueden tener consecuencias importantes en su edad adulta, el tercer artículo concluye que la salud mental de la madre está negativamente asociada a los síntomas emocionales, hiperactividad, problemas de conducta y problemas del niño con los compañeros, mientras que el nivel socioeconómico (SES) de la madre está relacionado con la salud mental de los niños, especialmente el nivel de educación de la madre. Curiosamente,

se concluye que la recesión económica no ha ampliado los efectos del SES en la salud mental de los niños.

Con el objetivo de analizar más profundamente los resultados de salud de los niños, esta tesis utiliza datos longitudinales del Reino Unido que combinan datos reportados por los propios adolescentes con datos reportados por los padres, para dar respuesta a la relación entre la desocupación de los padres y la salud, el comportamiento en salud y la utilización de servicios sanitarios de los niños. Los hallazgos sugieren que, en general, el desempleo de los padres se asocia negativamente con la salud de los niños. Más detalladamente, la relación es más fuerte en familias monoparentales que en familias nucleares.

Si esta tesis transmite un mensaje principal es que los efectos de las condiciones económicas adversas son negativos o no dependiendo de las características del individuo. En general, no parece que las condiciones económicas negativas estén fuertemente y negativamente asociadas a la salud de los individuos. Sin embargo, la salud de los grupos más vulnerables, concretamente la salud de las mujeres y los niños, si resulta la más afectada. Principalmente, los niños parece que, en general, sufren la desocupación de los padres, y las consecuencias pueden ser de largo alcance e inclusive pueden afectar a su salud en la edad adulta.

2. General introduction

The first studies looking into the association between negative economic conditions and health outcomes began in the 1930s when the economic instability of that period saw an increase in health problems among the population (Colledge, 1982). Nevertheless, while there are a large number of studies their results vary and, in spite of 100 years of research, the relationship between health and macroeconomic shocks is still unclear (Karanikolos et al., 2013). For instance, a number of researchers show that when unemployment increases, mortality rates tend to improve, whereas others demonstrate that crises are strongly related to poorer health outcomes, especially in the case of mental health disorders. Such contradictory results have led to an extensive research effort seeking to provide a better approach to understanding the influence adverse economic conditions may have on health (Ruhm, 2000; Marmot, 2002; Bezruchka, 2009; Miller et al., 2009; Stevens et al., 2011).

As a result of the gravity of the 2008 financial crisis, concern about adverse economic conditions and health has greatly increased (Katikireddi et al., 2012; De Vogli et al., 2013; Karanikolos et al., 2013; Vandoros et al., 2013; Cortès-Franch & González López-Valcárcel, 2014), and while all the OECD countries' economies were hit by the 2008 financial crisis, Spain was one of those hardest hit with its citizens having to rapidly come to terms with the consequences. Following the introduction of the Euro (1999), Spain experienced an economic boom resulting from a strong stock exchange, which peaked at 125% of the Gross Domestic Product (GDP) in 2007, coupled with a property boom that saw the construction sector jump from 7.5% of the GDP to 10% (Weisbrot, 2011). However, with the global financial crisis in 2008 the Spanish financial system collapsed as a result of its dependence on the construction sector and its lack of a growth model based on competitiveness. Spain's GDP growth fell from 3% to below -3% between the first quarter of 2008 and the first quarter of 2009 and, consequently, Spain plunged into recession during this period. The Spanish economy then emerged from that recession in the first quarter of 2010, only to once again slip back into recession in the second quarter of 2011 from which it did not emerge until the third quarter of 2013 (Achuthan & Banerji, 2008; HM Treasury, 2010). Meanwhile, unemployment rates rose from 8.2% in 2007 to over 26% in 2013 (INE, 2016). Youth unemployment (16-25 age group) levels leapt from 15.4% in 2007 to 51.6% in 2014 (Eurostat, 2016) making them the worst in Europe. The economic crisis directly affected the housing market which, in turn, led to a crash in the building sector causing a 20% per annum fall in employment (Bentolila et al., 2012). This was also translated into an enormous number of evictions which saw almost 100 families a day being evicted in 2014 (INE, 2016). Furthermore, government austerity policies, reforms and spending cuts, designed and implemented to reduce public deficit and debt, furthered the financial pressure on the Spanish population. As

a result, Spain is one of the countries that has suffered most at the hands of the global financial crisis and, as such, requires greater attention.

This thesis looks at adults and children alike and aims to clarify to what extent adverse economic conditions are associated with an individual's health outcomes. In an effort to analyse the effects Spanish economic downturn on its population's health in detail, the first paper was motivated by one of the key results from the Spanish National Health Survey (SNHS) 2011–2012 in which 75.3% of the population considered their health as being good or very good (Ministry of Health, Social Services and Equity, 2011). This is not only 5.3 points higher than that recorded in 2006, but is also the highest percentage since the survey began. Interestingly, despite the financial recession and budget cuts that Spain has endured since 2008, it would seem that, in fact, people self-rate their health as being much better than prior to the severe economic downturn. The literature dealing with this theme has some contradictory results. On the one hand, studies from Greece report that the likelihood of reporting poor self-rated health during times of recession is higher and associated with bad economic times (Zavras et al., 2013; Vandoros et al., 2013), whereas in Poland Pawel & Worach-Kardas (2014) state that unemployment does not always have a detrimental effect on a person's health and they find that unemployment does not significantly contribute to self-rated health status.

Recalling the line of reasoning in the first paper, most studies agree that mental health problems worsen during an economic crisis (Brenner & Mooney, 1983; Catalano et al., 2011). The majority of aggregate and individual-level studies agree that not only do adverse economic conditions affect mental health, but they also affect the likelihood of suicides being committed (Goldman-Mellor et al., 2010). Hence, the gravity of this particular financial crisis has meant that investigating the association between economic downturn and mental health is more important than ever. A financial crisis not only affects the unemployed in terms of chronic stress, a reduction in social interaction and a lack of self-esteem, it also affects the employed, who may suffer from mental disorders as a result of job insecurity and anxiety (Vandoros et al., 2013). Indeed, in many countries the rates of anxiety, stress and depression have increased in times of economic downturn (Katikireddi et al., 2012). Thus, the second paper attempts to analyse the evolution of psychotropic drug consumption to determine whether there has been an increase in mental health problems during the financial crisis in specific subpopulations. Although some authors have already pointed out that mental health problems have increased during the financial crisis in Spain, the evolution of self-reported antidepressant and tranquilizer consumption in specific groups of the population has yet to be fully analysed (Bartoll et al., 2013; Gili et al., 2013; Urbanos-Garrido & Lopez-Valcarcel, 2015).

As this would not be a representative study if the dissertation were only focused on the consequences of negative economic conditions on adult health, interesting area of research is presented here, namely, how adverse economic conditions affect children; the group considered to be the most vulnerable to external shocks (Mendoza, 2009). More specifically, the third paper addresses how a mother's socioeconomic status (SES) and maternal mental health problems are associated with the mental health of the child, and determines whether the Spanish financial crisis has had a detrimental effect on these relationships. In fact, the World Health Organization (WHO) claims that approximately 10%-20% of children and adolescents around the world suffer from mental health problems, and places special concern on the healthy development of these children and their future productive lives (WHO, 2016). Furthermore, 50% of a population's mental health problems are considered to have begun during childhood (Kessler et al., 2005). In Spain, the percentage of children and adolescents suffering from any mental health disorder is also between 10%-20%. However, when only the most severe cases are considered it is around 4%-6% (Fonseca-Pedrero et al., 2011). Given the importance of the mother as a child's caregiver (e.g. providing food and protection), greater attention is devoted to how maternal mental health affects the mental health of a child. Alongside this, maternal SES is also of particular interest because mothers tend to be more efficient at taking care of their children (Feinstein et al., 2008). As Feinstein et al. (2008) claim, more highly educated mothers are able to be more effective in providing the social support required to cope with the effects of a mother's mental health disorders on her children's health. However, few studies have focused on how both maternal health and a mother's SES may be associated with specific outcomes in the mental health of children.

Unemployment and working conditions are considered to be one of the most important social determinants of health (CSDH, 2008). In this sense, building on the discourse of the third paper and in order to provide greater insight into how adverse economic conditions are associated with children's health, the fourth paper directs its attention towards how parental unemployment is associated with children's health in terms of health outcomes, health behaviours and health care use. Recently, a larger number of researchers have focussed their attention on the effect parental unemployment has on a child's health outcomes, albeit with a mixed bag of results. This is an area still considered to have very little literature dedicated to it (Schaller & Zerpa, 2015). That said, it is worth mentioning the study of Mörk et al. (2014) which concludes that children whose parents are unemployed are 17% more likely to be hospitalised, especially when it is the mother who is unemployed. In addition, in the work of Lindo (2011), which used longitudinal data, it was found that a fathers' job loss is negatively and significantly related to infant health, reducing birth weights by 4.5%. Among the studies carried out on this subject,

a certain number of them highlight the importance of child health in terms of education and future health outcomes and earnings in adulthood.

The empirical framework used to address these analyses can be classified into two methodological approaches: individual-level and aggregate data. In this thesis, we use individual-level data to examine the health consequences for individuals (adults and children) who have suffered an economic shock such as parental unemployment or a financial crisis. The impact of such economic shocks on individuals' health is compared to those who have not suffered from the same economic condition. Admittedly, a significant drawback to this approach is that it uses a subjective health status reported by the individual in question. However, in aggregate data vulnerable people tend to be masked when in fact they are the most negatively affected by adverse economic conditions. Consequently, one of the focal points of this thesis is to identify those groups most vulnerable to external shocks.

This thesis is structured thus: once we have introduced the focus, we present the hypothesis of the thesis followed by the general and specific objectives. Then, in the following section, we include the transcript of the four articles and, finally, we present the general and specific conclusions, the limitations and the main contributions of this thesis.

References

Achuthan L, Banerji A. The risk of redefining recession [available at: http://money.cnn.es/2008/05/05/news/economy/recession/, last access: 09-08-2016].

Bartoll X, Palència L, Malmusi D, Suhrcke M, Borrell C. The evolution of mental health in Spain during the economic crisis. Eur J Public Health. 2013;24(3):415-418.

Bentolila S, Cahuc P, Dolad JJ, Le Barbanchon T. Two-Tier Labour Markets in the Great Recession: France versus Spain. The Economic journal. 2012;122(562):F155-F187.

Bezruchka S. The effect of economic recession on population health. CMAJ. 2009;181(5):281–285.

Brenner MH, Mooney A. Unemployment and health in the context of economic change. Soc Sci Med. 1983;17(16):1125-38.

Catalano R, Goldman-Mellor S, Saxton K, Margerison-Zilko C, Subbaraman M, LeWinn K, Anderson E. The health effects of economic decline. Annual Review of Public Health. 2011;32:431-50.

Colledge M. Economic cycles and health. Towards a sociological understanding of the impact of the recession on health and illness. Soc Sci Med. 1982;16(22):1919–27.

Cortès-Franch I, González López-Valcárcel B. The economic-financial crisis and health in Spain. Evidence and viewpoints. SESPAS report 2014 [in Spanish]. Gaceta Sanitaria. 2014;28(S1):146.

CSDH: Closing the Gap in a Generation: Health Equity Through Action on the Social Determinants of Health. Final report of the Commission on Social Determinants of Health. World Health Organization, Geneva (2008).

De Vogli R, Marmot M, Stuckler D. Excess suicides and attempted suicides in Italy attributable to the GREAT Recession. J Epidemiol Community Health. 2013;67:378–9.

Eurostat. [Available at: http://ec.europa.eu/eurostat/, last access: 30-01-2016].

Feinstein L, Duckworth K, Sabates R. Education and the family. Passing success across the generations. London: Routledge 2008.

Fonseca-Pedrero E, Paino M, Lemos-Giráldez S, Muñiz J. Prevalence of emotional and behavioral symptoms in Spanish adolescents using the Strengths and Difficulties Questionnaire (SDQ) [in Spanish]. Revista de Psicopatología y Psicología Clínica. 2011;16:15-25.

Gili M, Roca M, Basu S, McKee M, Stuckler D. The mental health crisis of economic crisis in Spain: evidence from primary care centers, 2006 and 2010. Eur J Public Health. 2013;23(1):103–8.

Goldman-Mellor SJ, Saxton KB, Catalano RC. Economic contraction and mental health: A review of the evidence, 1990–2009. International Journal of Mental Health. 2010;39(2):6–31.

HM Treasury. Glossary of treasury terms [available at: http://webarchive.nationalarchives.gov.uk/20130129110402/http://www.hm-treasury.gov.uk/junebudget_glossary.htm, last access: 09-08-2016].

Karanikolos M, Mladovsky P, Cylus J, Thomson S, Basu S, Stuckler D, Mackenbach J, McKee M. Financial crisis, austerity, and health in Europe. Lancet. 2013;381(9874):1323-31.

Katikireddi SV, Niedzwiedz CL, Popham F. Trends in population mental health before and after the 2008 recession: a repeat cross-sectional analysis of the 1991-2010 health surveys of England. BMJ Open. 2012;2(5):1-9.

Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry. 2005;62(6):593-602.

Lindo JM. Parental Job Loss and Infant Health. Journal of Health Economics. 2011;30(5):869-879.

Ministry of Health, Social Services and Equity: National Health Survey in Spain 2006 and 2011. Householder's questionnaire and adult's questionnaire. [Available at: http://www.msssi.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2006.htm, last access: 15-09-2013. http://www.msssi.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2011.htm, last access: 15-09-2013].

National Statistics Institute (INE). Active Population Survey. [Available at: http://www.ine.es, last access: 15-01-2016].

National Statistics Institute (INE). Foreclosure Statistics. [Available at: http://www.ine.es, last access: 15-01-2016].

Marmot M. The influence of income on health: views of an epidemiologist. Health Aff (Millwood). 2002;21(2):31-46.

Mendoza RU. Aggregate shocks, poor households and children: transmission channels and policy responses. Social Policy Working Paper 2009. Bangkok: UNICEF. [Available at: http://www.unicef.org/policyanalysis/files/Postscript_Formatted_AGGREGATE_SHOCKS_AND_CHILDREN_3.04.09.pdf, last access 09-08-2016].

Miller DL, Page ME, Stevens AH, Mateusz F. Why are recessions good for your health? Am Econ Rev. 2009;99:122–7.

Mörk E, Sjögren A, Svaleryd H. Parental Unemployment and Child Health. CESifo Economic Studies. 2014;60(2):366-401.

Pawel S, Worach-Kardas H. Living with long-term unemployment-effects in health and quality of life. J Health Sci. 2014;4(2):45–60.

Ruhm CJ. Are recessions good for your health? Quarterly Journal of Economics. 2000;115(2):617-650.

Schaller J, Zerpa M. Short-run effects of parental job loss on child health. NBER Working Paper 2015, No. 21745.

Stevens AH, Miller DL, Page ME, Filipski M. The Best of Times, the Worst of Times: Understanding Pro-cyclical Mortality. NBER Working Paper 2011, No. 17657.

Urbanos-Garrido RM, Lopez-Valcarcel BG. The influence of the economic crisis on the association between unemployment and health: an empirical analysis for Spain. Eur J Health Econ. 2015;16(2):175-184.

Vandoros S, Hessel P, Leone T, Avendano M. Have health trends worsened in Greece as a result of the financial crisis? A quasi-experimental approach. Eur J Public Health. 2013;23(5):727–31.

Weisbrot M. Spain's Troubles are Tied to Eurozone Policies. Center for Economic and Policy Research. Washington DC 2011: USA.

Zavras D, Tsiantou V, Pavi E, Mylona K, Kyriopoulos J. Impact of economic crisis and other demographic and socio-economic factors on self-rated health in Greece. Eur J Public Health. 2012;23(2):206–10.

World Health Organization (WHO). 10 facts on mental health. Fact File 2016. [Available at: http://www.who.int/features/factfiles/mental_health/mental_health_facts/en, last access: 17.08.2016].

3. Hypothesis

This section outlines the specific hypothesis of each of the four articles contained within this thesis.

1. During the financial crisis, the likelihood of Spanish and Catalan individuals reporting poor self-rated health has increased.

1.1 However, factors such as characteristics, socioeconomic status and health outcomes of individuals, affect equally the self-rated health in both periods studied (2006 and 2011).

2. The risk of both antidepressant and tranquilizer drug consumption has increased during the economic downturn.

2.1 Both men and women have an increased risk of consuming psychotropic drugs, particularly noticeable in 2011.

2.2 Taking into account current activity status, the retired and unemployed are the most vulnerable groups in 2011.

3. Maternal mental health problems and a mother's low socioeconomic status are associated with mental health disorders in the child.

3.1 Mental health disorders (i.e. emotional symptoms, hyperactivity, behavioural problems, problems with peers and non-prosocial behaviour of children) have deteriorated during the financial crisis.

3.2 The covariates of children enable us to suppose that children with poor health behaviour and bad health conditions have poorer mental health.

3.3 During the economic downturn, the low socioeconomic status of the mother aggravates the mental health disorders of the child.

4. Parental unemployment is negatively associated to children's health.

4.1 The association between children's health and parental unemployment is larger in single-parent families compared to nuclear families.

4.2 There are differences between mother's and father's unemployment.

4.3 Conclusions may differ depending on whether the health outcomes are reported by parents or the adolescent.

4. Objectives

Following the gravity of the 2008 economic downturn, the need to observe how an individual's health is affected by changes in economic conditions has increased. In this sense, the main objective of this thesis is to provide an insight into how adverse economic conditions affect a number of health outcomes in adults and children. The specific objectives of this thesis, explicitly addressed in each paper, are the following:

Paper 1. Assess whether the likelihood of reporting poor self-rated health has changed at all during the global financial crisis, in order to clarify the increase in the percentage of people who rate their health as good or very good during the 2008 economic downturn.

Paper 2. Evaluate whether psychotropic drug consumption increased during the 2008 economic downturn to better understand mental disorders during the 2008 crisis and to assess which groups are the most vulnerable.

Paper 3. Identify the relationship between a mother's socioeconomic status (SES) and her mental health with her children's mental health, and determine whether the effects of SES on children's mental health have increased during the financial crisis.

Paper 4. Investigate the association between the unemployment status of parents and a large range of child health and child health behaviour outcomes using data from the Families and Children Study (FACS) in the UK.

5. Papers

1. Arroyo, E., Renart, G., Saez, M. (2015). 'How the economic recession has changed the likelihood of reporting poor self-rated health in Spain', *International Journal for Equity in Health*, 14:149, DOI 10.1186/s12939-015-0285-5.

2. Arroyo, E., Cabrera-León, A., Renart, G., Saurina, C., Serra-Saurina L., Daponte-Codina, A., Saez, M. (2016) 'Did the consumption of psychotropic drugs increase during the 2008 downturn?', *Administration and Policy in Mental Health and Mental Health Services Research* (under revision).

3. Arroyo-Borrell, E., Renart, G., Saurina, C., Saez, M. (2016) 'Influence of the maternal background on children's mental health', *International Journal for Equity in Health* (under revision).

4. Arroyo-Borrell, E., García-Gómez, P. (2016) 'Parental unemployment and children's health, health care use and health behaviours', *European Journal of Epidemiology* (under revision).

5.1
How the economic recession has changed the likelihood of reporting poor self-rated health in Spain

1. Arroyo, E., Renart, G., Saez, M. (2015). 'How the economic recession has changed the likelihood of reporting poor self-rated health in Spain', *International Journal for Equity in Health*, 14:149, DOI 10.1186/s12939-015-0285-5.

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RESEARCH Open Access

How the economic recession has changed the likelihood of reporting poor self-rated health in Spain

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Abstract

Background: Between 2006 and 2011 self-rated health (SRH) (the subjective report of an individual's health status) actually improved in Spain despite its being in the grips of a serious economic recession. This study examines whether the likelihood of reporting poor health has changed because of the global financial crisis. It also attempts to estimate the differences between SRH and other self-perceived measures of health among groups before and during the current economic crisis in Spain.

Methods: Cross-sectional population-based surveys were conducted in Spain (ENSE 2006 and ENSE 2011) and in Catalonia (ESCA 2006 and ESCA 2011) in 2006 and again in 2011. In this research work we have used random effects logistic models (dependent variable SRH 1 Poor, 0 Good) and exact matching and propensity score-matching.

Results: The results of the ENSE explanatory variables are the same in both 2006 and 2011. In other words, all diseases negatively affect SRH, whereas alcohol habits positively affect SRH and obesity is the only disease unrelated to SRH. ESCA explanatory variables' results show that in 2006 all diseases are significant and have large odds ratio (OR) and consequently those individuals suffering from any of these diseases are more likely to report poor health. In 2011 the same pattern follows with the exception of allergies, obesity, high cholesterol and hypertension, albeit they are not statistically significant. Drinking habits had a positive effect on SRH in 2006 and 2011, whereas smoking is considered as unrelated to SRH. The likelihood of reporting poor health in 2006 is added as a variable in with the logistic regression of 2011 and is not, in either the ENSE data or the ESCA data, significant. Furthermore, neither is it significant when controlling by age, gender, employment status or education.

Conclusions: The results of our analysis show that the financial crisis did not alter the likelihood of reporting poor health in 2011. Therefore, there are no differences between our perceived health in either 2006 or in 2011.

Keywords: Self-rated health, Chronic conditions, Health econometrics, Economic downturn, Health surveys

Background

The introduction of the Euro (1999) in Spain led to a period of an economic boom based on the stock exchange market, which peaked at 125 % of the GDP in 2007, and a housing boom, which saw the construction sector go from 7.5 to 10 % of the GDP [1]. With the global financial crisis in 2008, the Spanish financial system collapsed as a result of its dependence on the construction sector and the lack of a growth model based on competitiveness. In 2010, 20 % of the population was unemployed and the external deficit had reached 10 % of the GDP. This debt continued to increase, reaching 90 % of the GDP in 2012 [2]. Thus, Spain is one of the countries that have most suffered from the global financial crisis. Catalonia, the region that accounts for 16 % of Spain's population and almost a twenty per cent of its economy, has been defined as "another country" [3] since, apart from reasons of national identity, the financial crisis has not affected it as badly as other Spanish regions [2, 4].

One of the key results from the Spanish National Health Survey (ENSE) 2011–2012 is that 75.3 % of the

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population considered their health as being good or very good [5]. This is not only 5.3 points higher than that recorded in 2006, but it is also the highest percentage since the survey began. Interestingly, despite the financial recession and budget cuts that Spain has endured since 2008, it would seem that in fact people self-rate their health as much better than prior to the severe economic downturn. In this light two questions beg to be asked: (i) is the increase of the self-perceived health significant and, (ii) how can this improvement in subjective health be explained? Furthermore, the survey has also revealed that chronic pathologies such as arterial hypertension, high cholesterol, obesity and diabetes, in reality have actually continued to rise (for instance, high cholesterol in the population has increased from 8.2 to 16.4 % since 2003). Thus we sought to address whether the factors that affect self-rated health (SRH) changed or not during the financial crisis in Spain.

Self-rated health it is also known as self-assessed health or self-perceived health and is the subjective report of one's health status reflecting "perceived" or "subjective" health. According to the World Health Organization (WHO), individuals rate their current status on a four or five point scale ranging from very good to very bad. Furthermore, all direct evidence of the health status of individuals is known as "actual" or "objective" health. Some health-related factors, such as life stress and/or life habits, are associated with objective health [6].

There is evidence that SRH is a strong predictor of morbidity and mortality [7–9]. There is also research that estimates the factors that influence SRH, provides objective measures and analyses the relationship between said factors [6, 10–12].

There is enough evidence to demonstrate the impact of an economic downturn on health [13, 14] and there are a number of studies testing how these factors affect SRH and how objective measures may change during a crisis. Åhs and Westerling find that the differences in SRH between the unemployed and the employed are greater when unemployment levels are high and that during periods of recession a greater number of unemployed groups are afflicted with poor health than when unemployment is low [15]. Bambra and Eikemo conclude that in every country in Europe, the unemployed report higher rates of poor health than those in employment [16]. The negative relationship between health and unemployment is consistent across Europe, but to what extent does this depend on the welfare state regime? On the other hand, Pawel and Worach-Kardas state that unemployment does not always have a detrimental effect on a person's health and they find that unemployment does not significantly contribute to self-rated health status [17].

Some research in the United States suggests that during an economic downturn the health of the population actually improves [18]. Recently, Malat and Timberlake have shown that at the beginning of a period of high unemployment SRH averages are lowered. Yet, as unemployment rapidly increases, average health improves [19]. Also, there is a further line of thought which states that higher unemployment rates are associated with lower population mortality and higher unemployment serves to improve health [20].

In the ambit of the dire financial recession experienced in Greece, Zavras et al. put forward the idea that the likelihood of reporting poor SRH is higher in times of economic crisis and they also found some associations between SRH and the economic crisis [21]. Along these same lines, Kyriopoulos et al. argue that high-income earners seem to have better health and turn the spotlight away from themselves and onto the impact the economic crisis has on the health status of the middle and upper classes [22]. Vandoros et al. conclude that SRH has worsened as a result of the recent financial crisis [23].

In Spain, Regidor et al. attempted to identify any changes in health indicators during the financial crisis and concluded that Spanish health actually improved at a rate equal to or higher than what had occurred in the years prior to the recession [24].

Our objective is to examine whether the likelihood of reporting poor health has changed at all during the global financial crisis. The study is focused on estimating the differences between SRH, and other self-perceived measures of health, among groups both before and during the financial crisis in Spain.

Methods

Data setting

This study is based on the data we compared from two cross-sections of the Spanish National Health Survey, namely 2006 (i.e. prior to the economic downturn) and 2011, (in the middle of the economic crisis) [5]. We also used data from the Catalan Health Survey (ESCA), which is a survey that is similar to that of the ENSE but is carried out by Catalan government's Department of Health [25]. Again, data before the economic crisis (ESCA-2006) was used and compared to the data amassed after the recession had begun (ESCA-2011). Even if ESCA and ENSE are rather similar, both data sets are interesting to use because of the economic differences between Spain and the region of Catalonia (4).

In 1987 the MSSSI (Ministry of Health, Social Services and Equity) implemented the, now periodic, ENSE study. Nowadays, the ENSE is conducted jointly between the MSSSI and the INE (National Statistics Institute). It is held every five years, alternating every two-and-a-half years with the European Health Survey, of which both surveys share some standardised variables. The ENSE aims to measure the characteristics and the distribution

of morbidity in the Spanish population. Furthermore, it analyses the traits and distribution of behaviours and habits related to health and it also identifies the population's use of medical services. All of these patterns relate to personal, demographic and territorial variables.

The ENSE survey consists of three questionnaires: one for households, another for adults and a third for minors (aged 0 to 15). A stratified tri-stage sample type is used. The first-stage unit is the census tract and the second-stage unit is the main family residence. One adult (aged 16 or over) is selected from each home to fill out the Adult's Questionnaire and, should there be any minors, one is selected to fill out the Minor's Questionnaire. A sample is uniformly assigned and in proportion to the size of the community. ENSE-2006 was conducted from June 2006 to June 2007. The sample of approximately 31,300 households distributed among 2236 census sections was selected, of which 29,478 of the collection were adults (direct interview) and 1822 minors (interviewed in the presence of their mother, father or guardian). The participation rate in this survey was 96 %. ENSE-2011 ran over a twelve month period from July 2011 to June 2012. The sample consisted of 21,508 households made up of 21,007 adults and 5495 children. Hence, 26,502 interviews were carried out. In this case, the participation rate was 71.08 %.

ESCA-2006 was completed between December 2005 and July 2006. There were 18,126 people interviewed, 15,926 of them were adults and 2200 were minors (aged 14 or younger). The response rate was 85.3 %. ESCA-2011 included some changes. The survey is now uninterrupted so that ESCA-2011 falls within the ESCA-2010–14 plan. The study is conducted in two stages with a total of 4828 people being interviewed, of whom 3901 were adults and 927 were minors (14 or younger).

Statistical methods

Initially, we conducted four random effects logistic regressions which, in turn, obtained four models (ENSE 2006; ENSE 2011; ESCA 2006; ESCA 2011).

The dependent variable for the ENSE survey was the responses to the question, 'How would you define your health status over the past 12 months?' 'Very good, good, fair, bad or very bad'. In the case of the ESCA survey, the question was, 'How would you rate your general health?' 'Excellent, very good, good, fair or bad'. In order to have the same dependent variable for both surveys, we created a dependent dichotomous variable and regrouped the answers into good SRH (0), which includes excellent, very good and good, and poor SRH (1), which includes fair, bad and very bad.

We used several demographic, socio-economic and disease-related factors to evaluate influences on SRH. Confounding variables were gender (female, male) and age in years (15–35, 36–45, 46–55, 56–65, 66–75, 76+). An ordinal variable was education, which is grouped onto a four ordinal scale (no education/qualification, primary education, secondary education and tertiary education). Employment status was considered a nominal variable (employed, pensioner, student, housewife, short-term unemployment (-1 year) and long-term unemployment (+1 year)) as well as marital status (single, married, widowed, separated and divorced). Only for the ENSE survey did we also include a region variable in order to identify all the autonomous communities for a later comparison.

In the case of explanatory variables, we used some health measures as binary variables (no, yes) such as hypertension, diabetes, high cholesterol, varicose veins in the legs, upper back pain, lower back pain, chronic allergies, anxiety and depression, and migraine or frequent headaches. Note, headaches along with all the other illnesses taken into account were also subjective health measures (i.e. Have you had frequent headaches in the last 12 months?). Days of hospitalisation per year were used in ENSE and ESCA 2006 but in ESCA 2011 we used the number of hospitalisations per year instead (both categories were used as discrete variables). With lifestyle habits, we used smoking as a nominal variable (no, yes, in the past) and alcohol used as a binary variable (no, yes). We used the Body Mass Index (BMI) as an ordinal variable (underweight to normal, overweight, obese), and finally, the mental health variable is described on a scale of 0 (good mental health) to 12 (poor mental health) and calculated by each survey. However, with ESCA 2011 we used risk of poor mental health as a binomial (no, yes), which was also calculated by the survey. All these variables are self-rated measures so none of them can be considered objective measures.

We specified random effects logistic regressions. In mixed models terminology, we allowed (some of the) coefficients to be random effects [26], i.e. to be different for the various levels we considered. Thus, we allowed the intercept to be different for each individual, capturing specific individual characteristics not already included in the model (i.e. unobserved individual heterogeneity). In this case, we assumed that random effects were identical and independent of Gaussian random variables with constant variance (R-INLA project. Random walk model of order 1 (RW1)). (See more in http://www.math.ntnu.no/inla/r-inla.org/doc/latent/rw1.pdf).

As both the ENSE and the ESCA are cross-sections, respondents to either of the 2006 surveys are not the same respondents as those who participated in 2011. Therefore, the differences in the probability of declaring fair, poor or very poor health between 2006 and 2011, if any, could simply be as a consequence of the change in the composition of the sample. To make sure results were comparable we used exact matching. That is to say, we attempted to

ensure that the 'control' (respondent of the ENSE or ESCA in 2006) matched each 'case' (respondent of the ENSE or ESCA in 2011) and had exactly the same values for the variables used for matching. In particular, the variables used for matching the same explanatory variables were entered into (random effects) logistic regressions for 2006.

Once the individuals were matched, we estimated two random effects logistic regressions for 2011 (i.e. one for the ENSE and one for the ESCA) including as a variable of interest the probability of declaring fair, poor or very poor health, (obtained as a result of the estimation of logistic regressions for 2006), and as control variables all the explanatory variables used in the logistic regressions for 2011.

Given the complexity of our model, we preferred to perform inferences using a Bayesian framework. This approach is considered the most suitable for accounting model uncertainty, both in the parameters and in the specification of the models. Furthermore, only under the Bayesian approach is it possible to model extra variability (not captured by the binomial link), with relatively sparse data in some cases. Finally, within the Bayesian approach, specifying a hierarchical structure on the (observable) data and (unobservable) parameters, which are all considered as random quantities, is straightforward. In particular, we followed the Integrated Nested Laplace Approximation (INLA) approach [27], within a (pure) Bayesian framework. All analyses have been made with the free software R (version 3.0.2) [28], available through the INLA library (R-INLA Project. See more in http://www.r-inla.org/home) [27].

Results

Tables 1 and 2 (see tables online) show the descriptors of the samples used from the ENSE and the ESCA surveys, respectively. The first two columns (2006 and 2011, respectively) in each table depict the distribution of each and every one of the variables analysed, along with the percentage of those who declared their self-reported heath status as being poor. In the ENSE case (see Table 1) overall the descriptors show a slightly lower percentage of people with poor self-reported health in 2011, (compared to 2006), in all the variables minus in Aragón and the Canary Islands or in anxiety and depression where the 2011 percentages are slightly higher. In very general terms, the ESCA (see Table 2) illustrates that the percentage of those who identified themselves as having poor health dropped slightly from 2006 to 2011. However, this was the opposite case for those in the 15–35 year old age bracket, for those with chronic upper or lower back pain, or suffering from migraines. Neither was it true for those identified as having no education/qualification, secondary education or tertiary education, nor among those who were single or separated, as all of these groups showed higher percentages in 2011.

Tables 3 and 4 show the results obtained from the initial estimations of the logistics models. In Table 3 (ENSE 2006) we can see how the different variables introduced into the model influence the likelihood of claiming to be in poor health. Having said this, this does not hold true for the variables of gender, for those who are overweight, for the short-term unemployed, or for all those (minus the widowed) in the marital status category, nor does it hold true for some of the autonomous communities. ENSE 2011 follows very similar lines as 2006 ENSE, i.e. some autonomous communities, gender, those who are overweight, the short-term unemployed or those married or widowed, did not significantly influence the probability of declaring one's health status as poor (the 95 % credible interval did contain the zero). We must point out that in ENSE 2006 individuals (with any disease taken into account) tend to report a poorer self-rated health [odds ratio (OR)≥1]. Particularly, the probability of rating poor health increases when an individual suffers from diabetes, arthritis or depression [OR≥2]. As for BMI, being overweight is not statistically significant, whereas being obese (BMI > 30 kg/m2) does have a negative impact on reported health [OR = 1.29]. Mental health disorders also worsen self-reported health [OR = 1.27] as does days of hospitalization [OR = 1.15]. In terms of habits, currently smoking [OR = 1.18] or being an ex-smoker [OR = 1.14] increases the probability of rating one's health as poor, whereas alcohol usage increases the probability of reporting good health [OR = 0.77]. With demographic and socio-economic variables, age indicates that older individuals have a higher probability of rating their health as poor or very poor. Surprisingly, gender is not statistically significant. In terms of education, the higher the education level, the lower the OR observed were, so individuals with tertiary studies are less likely to report poor health [OR = 0.46]. Employment status indicates that pensioners [OR = 1.60] and housewives [OR = 1.13] have a higher probability than the employed of rating their health as poor. Although the short-term unemployed are not statistically significant, the long-term unemployed are more likely to report poorer health than those who are employed [OR = 1.48]. Students were not statistically significant at all. Finally, marital status showed that only widowed or separated individuals reported better health than singles [OR≤1] and being married or divorced was not statistically significant. However, the data from the 2011 Spanish National Health Survey did highlight some differences. All the diseases examined along with BMI, mental health, days of hospitalization, smoking, alcohol habits and education follow the same pattern, whereas age and its impact on self-reported health changed. In 2011 OR are greater than in 2006. So the likelihood of reporting poor health as you get older is much greater.

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Table 1 Descriptive statistics for SRH in relation to demographic and socio-economic variables in ENSE survey

	% population in 2006 (*N* = 29,478)	% population in 2011 (*N* = 21,007)	% with poor SRH 2006	% with poor SRH 2011
Reported good SRH[a]	62.10	67.90		
Gender: Male	38.80	45.90	32.08	25.91
Female	61.20	54.10	43.80	37.32
Age: From 15 to 35 y.o.[b]	22.90	22.90	19.33	11.33
From 36 to 45 y.o.	19.90	18.70	26.01	18.58
From 46 to 55 y.o.	16.50	16.70	36.66	28.14
From 56 to 65 y.o.	14.50	14.90	50.26	39.82
From 66 to 75 y.o.	14.00	12.90	58.15	48.56
≥75 y.o	12.20	13.80	67.10	65.92
Regions: Catalonia	8.10	10.80	39.82	30.26
Andalusia	8.20	11.90	39.90	32.79
Aragon	9.30	4.10	34.94	36.00
Asturias	3.30	3.90	42.66	37.15
Balearic Islands	5.80	3.50	30.97	30.03
Canary Islands	3.80	5.10	38.48	38.98
Cantabria	5.90	3.60	34.43	32.04
Castile- Leon	4.50	6.20	35.91	31.56
Castile- La Mancha	3.70	4.90	39.05	31.28
Region of Valencia	5.70	8.10	42.07	31.16
Extremadura	3.10	4.10	44.28	33.76
Galicia	11.50	6.00	52.75	41.11
Madrid	6.90	9.20	34.10	25.26
Murcia	6.70	3.80	44.39	35.90
Navarre	5.60	3.70	34.53	25.91
Basque Country	3.70	5.60	32.77	30.30
La Rioja	2.40	3.40	30.96	28.51
Ceuta and Melilla	1.80	2.10	39.21	29.02
Hypertension	25.81	25.66	60.43	55.31
Diabetes	7.61	8.84	70.45	66.40
High cholesterol level	19.10	21.64	56.99	53.23
Varicose veins in the legs	15.91	14.25	60.58	56.61
Arthrosis, arthritis or rheumatism	26.82	23.89	71.82	68.12
Upper back pain	23.48	18.48	66.00	62.44
Lower back pain	23.94	21.77	65.60	59.93
Chronic allergies	11.89	12.32	44.67	38.45
Anxiety, depression	17.54	9.15	72.22	74.45
Migraine or frequent headaches	13.28	10.23	60.65	55.33
Days of hospitalisation	0.76	0.24		
Smoking				
No	52.40	54.70	43.84	34.88
Yes	26.60	25.30	31.32	25.28
In the past	21.00	19.90	37.86	32.96
Alcohol	52.30	49.30	32.14	23.08

Table 1 Descriptive statistics for SRH in relation to demographic and socio-economic variables in ENSE survey *(Continued)*

BMI[c]				
Underweight to normal	46.00	45.20	30.26	22.54
Overweight	37.50	37.20	38.94	31.33
Obese	16.50	17.50	51.73	45.08
Mental health (mean)	1.68	1.59		
Education				
No education	14.40	14.60	66.97	62.20
Primary	46.60	44.60	43.86	35.53
Secondary	18.20	19.90	26.06	20.24
Tertiary	20.90	20.90	21.51	14.90
Employment status				
Employed	45.80	40.40	25.05	17.27
Pensioner	28.50	25.80	61.35	54.03
Student	3.30	5.90	12.07	6.94
Housewife	16.00	15.10	47.18	44.08
Short-term unemployed	5.00	6.40	32.03	18.92
Long-term unemployed	1.40	6.40	45.25	31.84
Marital status				
Single	24.10	28.20	26.86	19.68
Married	57.40	52.30	39.20	31.66
Widowed	12.90	13.10	62.49	59.21
Separated	3.10	2.40	38.44	34.51
Divorced	2.50	4.00	41.62	34.84

[a]self-rated health
[b]years old
[c]Body Mass Index

Again, gender seems to be unrelated to self-reported health ($p > 0.05$). In terms of employment status, it seems that differences between being employed and/or any other situation have been reduced. For example, pensioners [OR = 1.30] and the long-term unemployed [OR = 1.30] still rate their health as poor but not as bad as they did in 2006. Students are still better off than employed individuals [OR = 0.61], but the differences are smaller than in 2006. The only group whose status had increased its impact was housewives [OR = 1.21]. Short-term unemployment remains unrelated to SRH. Finally, once again those widowed report better health than those who are single [OR = 0.68] and now also better than those who are married [OR = 0.87]. Being divorced or separated is not statistically significant.

The results of ESCA 2006 (Table 4) were in line with ENSE 2006. Almost all of the variables introduced into the model (with the exception of marital status, long-term unemployment,being an ex-smoker or a female) affected the likelihood of reporting poor health. However, this would vary considerably in 2011 when many of the variables became statistically insignificant. These variables included age (albeit only in the 46–55 year age group), hypertension, high cholesterol, allergies, current smoker, alcohol use, being overweight, being a student and the short-term unemployed. We should highlight the fact that being female now increases the likelihood of reporting good health [OR = 0.76]. In terms of education, having higher levels of studies increases the chance of reporting good health when compared to 2006. In 2011 there are smaller OR and this shows that in 2011 studies were more important for reporting good health than in 2006.

Lastly, Table 5 contains (for ENSE 2011 and ESCA 2011, respectively), the results from the logistics models using as the explanatory variable (from 2006) the likelihood of perceiving oneself as being in poor health. In both cases the variable was not statistically significant (the 95 % credible interval did contain the zero), i.e. the likelihood of declaring poor health in 2006 had no bearing on whether poor health was declared or not in 2011. The tables show the same results for all the categories that were analysed (gender, age, education levels and employment status).

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Table 2 Descriptive statistics for SRH in relation to demographic and socio-economic variables in ESCA survey

	% population in 2006 (*N* = 15,926)	% population in 2011 (*N* = 3901)	% with poor SRH 2006	% with poor SRH 2011
Reported good SRH[a]	74.30	76.30		
Gender: Male	49.50	50.10	20.54	19.68
Female	50.50	49.90	30.74	27.71
Age: From 15 to 35 y.o.[b]	33.40	32.80	7.49	8.29
From 36 to 45 y.o.	17.90	17.90	14.84	12.05
From 46 to 55 y.o.	14.90	14.40	26.05	21.39
From 56 to 65 y.o.	12.50	13.20	37.89	33.33
From 66 to 75 y.o.	10.60	9.40	50.09	43.84
≥ 75 y.o	10.60	12.50	61.85	58.11
Hypertension	21.10	25.71	49.96	44.47
Diabetes	6.28	8.02	64.70	60.06
High cholesterol level	15.36	21.10	46.47	40.83
Varicose veins in the legs	19.86	19.35	46.82	44.77
Arthrosis, arthritis or rheumatism	24.37	27.20	59.31	51.27
Upper back pain	28.01	25.07	46.90	48.26
Lower back pain	30.13	29.61	46.19	48.66
Chronic allergies	15.70	14.84	31.51	31.09
Anxiety, depression	17.83	20.51	55.99	53.38
Migraine or frequent headaches	18.87	19.41	42.96	43.86
Days of hospitalisation	0.7			
Number hospitalisations		0.13		
Smoking				
No	52.30	51.60	27.64	24.52
Yes	28.20	28.70	17.42	17.05
In the past	19.40	19.80	25.77	23.89
Alcohol	71.90	66.60	19.74	17.62
BMI[c]				
Underweight to normal	50.20	50.60	18.70	14.29
Overweight	36.40	35.30	29.36	19.30
Obese	13.40	14.10	42.27	35.90
Mental health				
Mean	0.78			
Risk poor mental health		11.90		
Education				
No education/qualification	14.70	12	56.80	58.00
Primary	42.40	38.20	29.22	26.95
Secondary	20.30	21.90	13.71	15.83
Tertiary	22.60	27.90	9.54	10.65
Employment status				
Employed	58.80	51.70	13.13	11.58
Pensioner	17.30	18.90	50.57	46.28
Student	6.40	8.60	3.69	5.03
Housewife	13.10	10.20	44.60	42.71

Table 2 Descriptive statistics for SRH in relation to demographic and socio-economic variables in ESCA survey *(Continued)*

Short-term unemployed	3.50	8.90	24.13	13.72
Long-term unemployed	0.90	1.80	36.36	26.15
Marital status				
Single	30.50	31.60	11.64	11.92
Married	57.10	55.10	28.39	25.10
Widowed	8.30	8.20	57.81	57.01
Separated	2.50	2.50	28.25	28.87
Divorced	1.70	2.50	26.77	26.26

[a]self-rated health
[b]years old
[c]Body Mass Index

Discussion

This is the first study to analyse the increase in SRH in the 2006 and 2011 surveys carried out in Spain. Our results show that the probability of reporting poor health in 2006 is, despite the grave economic recession the country is experiencing, not significantly different in 2011 and so we have been able to conclude that people rate their health equally in both of these years.

In general, SRH improves in all the countries which have been affected by the global financial crisis such as the USA, Japan and Europe; albeit with the exception of Greece. However, these conclusions are based on cross-sectional data so the individuals involved are not the same and it has been proven that this can bias the results [29, 30].

In order to control any cross-sectional problems that could change the results, we matched individuals from 2006 to 2011 by using the same health factors and demographic characteristics. Since the probability in 2006 of reporting poor health is not significant in the logistic regression for 2011 (both ENSE and ESCA), we can conclude that the individuals rate their health equally for both years; even in the economic downturn.

Interestingly the same conclusions were drawn during the Baltic States transition from 1994–1999 [31]. Other studies which also concern the current recession, report that the health of the population does not have to decline during a financial crisis [17, 32, 33]. Furthermore, in concordance with our results, Urbanos-Garrido and López-Valcárcel [34], using both the Spanish Health Survey for the years 2006 and 2011–2012 and, above all, a matching technique, find that the change in the percentage of (self-declared) poor health after the crisis, for the total population (never employed, unemployed and employed), although negative, was not statistically significant. In contrast, Regidor *et al.* [24], although they did not use the same statistical method (matching in particular) find that poor self-reported health showed statistically significant downward trends during the recession.

Our results are not consistent with the findings in the studies coming from Greece which conclude that the economic crisis does in fact have a negative impact on SRH [21–23]. However, only Vandoros *et al.* [23] use an experimental method to control for observational effects and, therefore, their results are directly comparable with ours. Having said this, the short-term consequences of the crisis in Greece, for both SRH and suicide indicators, have proved worse than in Spain. As Stuckler et al. pointed out in their work, Greece has experienced the highest increase in suicides between 2007 and 2008 (17 %) [35], whereas, according to Lopez Bernal et al., Spain has suffered an increase in the suicide rate 8 % above the trend [36]. On the other hand, the long-term consequences for both countries are expected to be severe and irreversible due to the increase in poverty, unemployment and social exclusion that both countries are experiencing.

Therefore, most of the studies, including our own, find that the perception of poor health did not increase as a consequence of the crisis or the cuts in health care budgets. On the one hand, it has been argued that this fact could be explained, at least in Europe, by the effect of unemployment insurance. Ferrarini et al. [37] point out that unemployment insurance mitigated adverse health effects both on an individual and a country-level during the financial crisis [16, 17]. In Spain, however, perhaps because unemployment levels double those of the European average, unemployment in general and long-term unemployment in particular, has had a significant negative impact on self-assessed health. This is true in both our own case as well as in that of Urbanos-Garrido and López-Valcárcel [34], in spite of both studies' entire samples not registering any statistically significant impact. On the other hand, and according to López-Casasnovas [38], so far cuts in health care budgets in Spain do not appear to have resulted in lower health care quality.

In general, people rate their health by taking into account a certain reference group or situation. Thus, people compare themselves to others (friends, relatives) and their current situation (in terms of health, job and income) [10, 12, 17, 19, 29]. We believe that today the reference group or situation has changed (decreased)

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Table 3 Logistic regression of poor SRH[a] on demographic and socio-economic variables in ENSE survey

	2006		2011	
	OR (95 % CI)		OR (95 % CI)	
Gender: (Male)				
Female	1.04	(0.96, 1.12)	0.96	(0.87, 1.05)
Age (From 15 to 35 years old)				
From 36 to 45 y.o.[b]	1.13	(1.02, 1.25)	1.29	(1.11, 1.49)
From 46 to 55 y.o.	1.39	(1.25, 1.56)	1.54	(1.33, 1.78)
From 56 to 65 y.o.	1.50	(1.32, 1.70)	1.76	(1.49, 2.08)
From 66 to 75 y.o.	1.38	(1.18, 1.62)	1.92	(1.57, 2.35)
≥ 75 y.o	2.00	(1.69, 2.36)	3.66	(2.96, 4.52)
Regions (Catalonia)				
Andalusia	0.72	(0.62, 0.83)	0.93	(0.79, 1.09)
Aragon	0.70	(0.61, 0.81)	1.21	(0.99, 1.49)
Asturias	0.73	(0.60, 0.89)	0.90	(0.72, 1.12)
Balearic Islands	0.50	(0.42, 0.59)	0.78	(0.62, 0.99)
Canary Islands	0.69	(0.57, 0.83)	1.16	(0.95, 1.41)
Cantabria	0.88	(0.75, 1.04)	0.74	(0.59, 0.91)
Castile- Leon	0.69	(0.58, 0.82)	0.90	(0.75, 1.08)
Castile- La Mancha	0.70	(0.58, 0.84)	0.77	(0.62, 0.94)
Region of Valencia	1.01	(0.86, 1.18)	0.97	(0.82, 1.16)
Extremadura	0.84	(0.69, 1.03)	0.79	(0.64, 0.99)
Galicia	1.22	(1.07, 1.40)	1.22	(1.01, 1.47)
Madrid	0.63	(0.54, 0.74)	0.81	(0.68, 0.96)
Murcia	1.06	(0.91, 1.24)	1.02	(0.82, 1.27)
Navarre	0.63	(0.54, 0.75)	0.72	(0.57, 0.91)
Basque Country	0.73	(0.60, 0.88)	0.90	(0.74, 1.09)
La Rioja	0.83	(0.67, 1.04)	0.88	(0.70, 1.11)
Ceuta and Melilla	0.79	(0.62, 1.02)	1.50	(1.15, 1.96)
Hypertension	1.38	(1.28, 1.49)	1.39	(1.27, 1.52)
Diabetes	2.04	(1.81, 2.30)	1.85	(1.63, 2.12)
Cholesterol	1.25	(1.15, 1.35)	1.44	(1.32, 1.58)
Varicous veins	1.24	(1.14, 1.35)	1.23	(1.11, 1.37)
Arthrosis, arthritis or rheumatism	2.44	(2.26, 2.63)	2.37	(2.16, 2.61)
Upper back pain	1.67	(1.54, 1.81)	1.60	(1.44, 1.78)
Lower back pain	1.93	(1.78, 2.09)	1.76	(1.60, 1.94)
Allergy	1.26	(1.14, 1.38)	1.32	(1.17, 1.47)
Anxiety, depression	2.11	(1.94, 2.30)	1.86	(1.63, 2.14)
Migraine	1.54	(1.40, 1.69)	1.57	(1.39, 1.78)
Days of hospitalisation	1.15	(1.14, 1.17)	1.00	(1.00, 1.01)
Smoking (No)				
Yes	1.18	(1.09, 1.28)	1.24	(1.12, 1.37)
In the past	1.14	(1.05, 1.23)	1.16	(1.05, 1.29)
Alcohol	0.77	(0.72, 0.82)	0.71	(0.66, 0.76)
BMI[c] (Underweight to normal)				
Overweight	1.03	(0.95, 1.11)	1.00	(0.92, 1.10)

Table 3 Logistic regression of poor SRH[a] on demographic and socio-economic variables in ENSE survey *(Continued)*

Obese	1.29	(1.18, 1.42)	1.26	(1.13, 1.42)
Mental health	1.26	(1.25, 1.28)	1.24	(1.22, 1.26)
Education (No education/qualification)				
Primary	0.72	(0.65, 0.79)	0.72	(0.65, 0.81)
Secondary	0.58	(0.51, 0.65)	0.53	(0.46, 0.62)
Tertiary	0.46	(0.41, 0.52)	0.46	(0.40, 0.54)
Employment status (Employed)				
Pensioner	1.60	(1.43, 1.80)	1.30	(1.12, 1.50)
Student	0.57	(0.45, 0.71)	0.61	(0.47, 0.79)
Housewife	1.13	(1.02, 1.25)	1.21	(1.05, 1.38)
Short-term unemployed	1.13	(0.98, 1.30)	0.93	(0.78, 1.12)
Long-term unemployed	1.48	(1.16, 1.88)	1.30	(1.11, 1.52)
Marital status (single)				
Married	0.98	(0.90, 1.07)	0.87	(0.78, 0.97)
Widowed	0.76	(0.67, 0.87)	0.68	(0.59, 0.80)
Separated	0.83	(0.69, 1.00)	0.82	(0.64, 1.06)
Divorced	1.11	(0.90, 1.37)	1.06	(0.87, 1.29)
Mean	0.46		0.43	
DIC[d]	26929.17		18098.01	
EPO[e]	57.29		57.07	
Random effects-heterogeneity	5.4E–05	(7.86E–04, 1.49E–05)	5.4E–05	(7.96E–04, 1.50E–05)

[a]self-rated health
[b]years old
[c]for Body Mass Index
[d]deviance information criterion
[e]effective number of parameters

and as a consequence people now overrate their health because they know that as a result of the financial recession the situation around them is much more difficult and complicated. This would seem to be why they rate their health as better than prior to the recession, when in fact they should rate their health equally; as our results show.

Limitations

We acknowledge that this study has its limitations. First, we analysed SRH as a dichotomous (good and poor SRH) dependent variable instead of a categorical variable (excellent, very good, good, regular, bad and very bad SRH) so that differences between the levels of answers cannot be perceived. Second, all the measures of health we used are based on self-reported health and so increase the probability of recall bias. Also, even if SRH is generally accepted as being valid, reliable and predictive of mortality [7–9], it might not have the same meaning to everyone because it is subject to an individual's perceptions and expectations. Finally, there are further measures, which have not included in our analysis, but which can also affect our SRH.

Conclusions

The economic crisis in Spain is associated with increased income inequality and this leads to some possible effects on health. Most people tend to think that the economic crisis has had a negative impact on health because of an increase in certain chronic diseases such as hypertension, high cholesterol, obesity and diabetes, and a negative impact on the SRH. Despite this, our results show that the majority of Spanish citizens describe their health as good or very good, so we can conclude that people value their health equally for both years; even in the economic downturn.

Therefore, our findings confirm that the crisis does in fact have an impact on health. In other words, if the crisis had no impact on SRH, our findings would have shown a decrease in the likelihood of reporting poor health. So, governments should take this study into account because the trend has changed and SRH is no longer increasing. This is indeed significant and decision-makers must take this into consideration and design policies that protect the health of all the different groups that make up the population.

Table 4 Logistic regression of poor SRH[a] on demographic and socio-economic variables in ESCA survey

	2006		2011	
	OR (95 % CI)		OR (95 % CI)	
Gender (Male)				
Female	0.97	(0.87, 1.10)	0.76	(0.59, 0.97)
Age (From 15 to 35 years old)				
From 36 to 45 y.o.[b]	1.53	(1.28, 1.84)	0.99	(0.68, 1.45)
From 46 to 55 y.o.	2.14	(1.79, 2.57)	1.47	(1.00, 2.18)
From 56 to 65 y.o.	2.19	(1.78, 2.68)	1.40	(0.91, 2.15)
From 66 to 75 y.o.	2.70	(2.10, 3.46)	1.48	(0.85, 2.56)
≥ 75 y.o	4.12	(3.17, 5.35)	2.13	(0.92, 4.95)
Hypertension	1.42	(1.28, 1.59)	1.20	(0.96, 1.51)
Diabetes	2.33	(1.96, 2.76)	2.34	(1.71, 3.21)
Cholesterol	1.21	(1.07, 1.34)	1.15	(0.91, 1.44)
Varicous veins	1.34	(1.20, 1.49)	1.31	(1.04, 1.66)
Arthrosis, arthritis or rheumatism	1.98	(1.77, 2.22)	1.80	(1.44, 2.25)
Upper back pain	1.53	(1.37, 1.71)	1.36	(1.08, 1.73)
Lower back pain	1.74	(1.56, 1.93)	2.62	(2.10, 3.27)
Allergy	1.32	(1.17, 1.50)	1.15	(0.88, 1.51)
Anxiety, depression	1.78	(1.58, 2.00)	2.32	(1.84, 2.92)
Migraine	1.39	(1.24, 1.56)	2.11	(1.66, 2.66)
Days of hospitalisation	1.05	(1.03, 1.06)	1.52	(1.25, 1.89)
Smoking (No)				
Yes	1.23	(1.08, 1.39)	1.02	(0.78, 1.33)
In the past	1.11	(0.98, 1.27)	0.84	(0.64, 1.10)
Alcohol				
Alcohol (No drinking)				
Moderate drinking	0.75	(0.68, 0.83)	0.76	(0.61, 0.94)
Risk drinking	0.74	(0.56, 0.96)	0.66	(0.38, 1.13)
BMI[c] (Underweight to normal)				
Overweight	1.13	(1.02, 1.26)	0.90	(0.70, 1.17)
Obese	1.30	(1.13, 1.49)	1.49	(1.09, 2.04)
Mental health	1.29	(1.25, 1.32)		
Mental health (normal)				
Risk poor mental health			2.45	(1.84, 3.27)
Education (No education/qualification)				
Primary	0.85	(0.75, 0.97)	0.61	(0.46, 0.82)
Secondary	0.63	(0.53, 0.74)	0.53	(0.37, 0.76)
Tertiary	0.47	(0.39, 0.56)	0.38	(0.27, 0.55)
Employment status (Employed)				
Pensioner	1.60	(1.33, 1.92)	2.12	(1.40, 3.21)
Student	0.56	(0.38, 0.82)	0.70	(0.34, 1.37)
Housewife	1.30	(1.10, 1.53)	1.49	(1.01, 2.19)
Short-term unemployed	1.59	(1.24, 2.03)	1.06	(0.70, 1.58)
Long-term unemployed	1.40	(0.88, 2.22)	1.42	(0.70, 2.78)
Marital status (single)				
Married	1.09	(0.95, 1.26)	0.96	(0.71, 1.30)
Widowed	0.86	(0.70, 1.06)	0.99	(0.64, 1.54)

Table 4 Logistic regression of poor SRH[a] on demographic and socio-economic variables in ESCA survey *(Continued)*

Separated	1.19	(0.88, 1.61)	0.96	(0.49, 1.84)
Divorced	0.92	(0.63, 1.32)	0.82	(0.43, 1.52)
Mean	0.37		0.35	
DIC[d]	11861.07		inf	
EPO	40.98		inf	
Random effects- heterogeneity	5.37E−05	(7.90E−04, 1.49E−05)	5.38E−05	(7.90E−04, 1.49E−05)

[a]self-rated health
[b]years old
[c]for Body Mass Index
[d]deviance information criterion

Table 5 Probability of reporting poor SRH in 2006 in Logistic Regression 2011

ENSE data SRH[a]	0.09	(−0.26, 0.44)
For groups lineal approach		
Gender [Male]	−0.21	(−1.08, 0.66)
Gender [Female]	0.30	(−0.10, 0.71)
Age [From 15 to 35 years old]	0.98	(−2.24, 4.18)
Age [From 36 to 45 y.o.[b]]	0.34	(−1.82, 2.50)
Age [From 46 to 55 y.o.]	−1.60	(−3.25, 0.04)
Age [From 56 to 65 y.o.]	−0.27	(−1.25, 0.71)
Age [From 66 to 75 y.o.]	0.60	(−0.47, 1.67)
Age [≥ 76 y.o.]	0.47	(−0.07, 1.02)
Education [No education]	0.30	(−0.31, 0.88)
Education [Primary]	−0.26	(−0.76, 0.26)
Education [Secondary]	1.78	(−0.85, 4.39)
Education [Tertiary]	−1.08	(−4.31, 2.14)
Employment status [Employed]	0.14	(−0.22, 0.50)
Employment status [Unemployed]	−1.81	(−3.92, 0.24)
ESCA data SRH[a]	−0.07	(−0.57, 0.43)
For groups lineal approach		
Gender [Male]	−0.20	(−1.21, 0.79)
Gender [Female]	0.06	(−0.54, 0.66)
Age [From 15 to 35 years old]	0.96	(−0.37, 2.21)
Age [From 36 to 45 y.o.[b]]	0.04	(−1.57, 1.57)
Age [From 46 to 55 y.o.]	−0.14	(−1.76, 1.33)
Age [From 56 to 65 y.o.]	−1.15	(−2.65, 0.31)
Age [From 66 to 75 y.o.]	1.35	(−0.03, 2.75)
Education [No education]	0.42	(−0.66, 1.51)
Education [Primary]	−0.23	(−1.05, 0.58)
Education [Secondary]	0.25	(−0.98, 1.44)
Education [Tertiary]	−0.16	(−1.48, 1.08)
Employment status [Employed]	−0.07	(−0.59, 0.44)
Employment status [Unemployed]	0.71	(−1.52, 2.86)

[a]self-rated health
[b]years old; the 95 % credible interval did not contain the zero (statistically significant)

In a situation such as that which currently exists in our country, where the recession has lasted a considerable amount of time, governments have been forced to make cuts to public budgets in order to reduce the budget deficit, and this affects the most vulnerable population groups such as the long-term unemployed. The authorities should pay more attention to these groups and continue researching ways to avoid this. In this sense, the future challenge for policy, in view of the current economic scenario agents, is to prioritize cost-effective evaluation of public policies to improve equity, efficiency and the quality of health care.

Key points

- This is the first study to analyse the increase in SRH in the 2006 and 2011 surveys carried out in Spain.
- The probability of reporting poor health in 2006 is not significantly different in 2011.
- Decision-makers must take into consideration that SRH actually do not improve, in contrast to the last National Health Survey's conclusion (ENSE).
- Cross-sectional problems can be controlled with exact matching and propensity score-matching.

Competing interests
The authors declare that they have no conflict of interest.

Authors' contributions
MS had the idea for the paper. EA requested data, performed the literature search, wrote part of the introduction, results, discussion and conclusions. GR wrote part of the introduction, results, discussion and conclusions and made all the tables. MS performed the analysis, wrote the methods and part of discussion and conclusions. All authors read and approved the final manuscript.

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References

1. Weisbrot M. Los problemas de España provienen de las políticas de la zona del euro. Center for Economic and Policy Research. Washington DC: USA; 2011.
2. Spanish National Statistics Institute (INE). Basic data. http://www.ine.es. Accessed 10 Oct 2013.
3. Buck T. Catalonia: another country. The financial times. 2014.
4. Sala-i-Martin X. És l'hora dels adéus? Rosa dels Vents. 2014.
5. Ministry of Health, Social Services and Equity: National Health Survey in Spain 2006 and 2011. Householder's questionnaire and adult's questionnaire: http://www.msssi.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2006.htm. Accessed 15 Sept 2013. http://www.msssi.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2011.htm. Accessed 15 Sept 2013.
6. Wu S, Wang R, Zhao Y, et al. The relationship between self-rated health and objective health status: A population-based study. BMC Public Health. 2013; 13:320–29.
7. Jylhä M. What is self-rated health and why does it predict mortality? Towards a unified conceptual model. Soc Sci Med. 2009;69(3):307–16.
8. Idler EL, Benyamini Y. Self-rated health and mortality: a review of twenty-seven community studies. J Health Soc Behav. 1997;38(1):21–37.
9. Kaplan GA, Camacho T. Perceived Health and Mortality: a nine-year follow-up of the human Population Laboratory Cohort. Am J Epidemiol. 1983; 117(3):292–304.
10. Gumà J, Cámara AD. ¿Informa la salud autopercibida sobre las condiciones objetivas de salud? Algunas conclusiones a partir del análisis demográfico de microdatos de la Encuesta Nacional de Salud. Estadística Española. 2014;56(183):61–76.
11. Gupta S, Adam E, McDade T. Objective versus Subjective Measures of Health: Systematic differences, determinants and biases. (Preliminary version 2010).
12. Baker M, Stabile M, Deri C. What do self-reported, objective, measures of health measure? J Hum Resour. 2004;39(4):1067–93.
13. Marmot M, Bell R. How will the financial crisis affect health? BMJ. 2009; 338(1):858–60.
14. Musgrove P. The economic crisis and its impact on health and health care in Latin America and the Caribbean. Int J Health Serv. 1987;17(3):411–41.
15. Åhs A, Westerling R. Self-rated health in relation to employment status during periods of high and of low levels of unemployment. Eur J Public Health. 2006;16(3):294–304.
16. Bambra C, Eikemo TA. Welfare state regimes, unemployment and health: A comparative study of the relationship between unemployment and self-reported health in 23 European countries. J Epidemiol Community Health. 2009;63:92–8.
17. Pawel S, Worach-Kardas H. Living with long-term unemployment- effects in health and quality of life. J Health Sci. 2014;4(2):45–60.
18. Catalano R. Health, medical care, and economic crisis. N Engl J Med. 2009; 360(8):749–51.
19. Malat J, Timberlake JM. County-level unemployment change and trends in SRH. Sociol Focus. 2013;46(1):25–46.
20. Tapia Granados JA, Diez-Roux AV. Life and death during the Great Depression. Proc Natl Acad Sci U S A. 2009;106(41):17290–5.
21. Zavras D, Tsiantou V, Pavi E, Mylona K, Kyriopoulos J. Impact of economic crisis and other demographic and socio-economic factors on self-rated health in Greece. Eur J Public Health. 2012;23(2):206–10.
22. Kyriopoulos II, Zavras D, Pavi E, Kyriopoulos J. Socioeconomic Inequalities Concerning the Self-Rated Health Status in Greece: A Comparative Analysis of Post-Crisis Effects. Value Health J. 2012;15(7):A320.
23. Vandoros S, Hessel P, Leone T, Avendano M. Have health trends worsened in Greece as a result of the financial crisis? A quasi-experimental approach. Eur J Public Health. 2013;23(5):727–31.
24. Regidor E, Barrio G, Bravo MJ, De la Fuente L. Has health in Spain been declining since the economic crisis? J Epidemiol Community Health. 2013; 68:280–82.
25. General Direction of Regulation, Planning and Health Resources. Department of Health, Government of Catalonia. Catalan Health Survey in Catalonia 2006 and 2010-2014. Methodology in detail. Government of Catalonia. 2012. http://salutweb.gencat.cat/ca/el_departament/estadistiques_sanitaries/enquestes/enquesta_salut_catalunya. Accessed 10 Oct 2013.
26. Pinheiro JC, Bates D. Mixed-effects Models in S and S-Plus. New York: Springer; 2000.
27. Rue H, Martino S, Chopin N. Approximate Bayesian inference for latent Gaussian models by using integrated nested Laplace approximations (with discussion). J R Stat Soc Ser B. 2009;71:319–92. http://www.math.ntnu.no/~hrue/r-inla.org/papers/inla-rss.pdf. Accessed 1 May 2014.
28. R Core Team. R. A language and environment for statistical computing. R Vienna, Austria: Foundation for Statistical Computing; 2013. http://www.R-project.org. Accessed 1 May 2014.
29. Groot W. Scale of reference bias and the evolution of health. Eur J Health Econ. 2003;4(3):176–83.
30. Orfila F, Ferrer M, Lamarca R, Alonso J. Evolution of self-rated health status in the elderly: Cross-sectional vs. longitudinal estimates. J Clin Epidemiol. 2000;53(6):563–70.
31. Monden CWS. Changing social variations in self-assessed health in times of transition? The Baltic States 1994-1999. Eur J Pub Health. 2005;15(5):498–503.
32. Dávila Quintana CD, González L-VB. The economic crisis and health. Gac Sanit. 2009;23(4):261–65.
33. Ruhm CJ. Healthy living in hard times. J Health Econ. 2005;24(2):341–63.
34. Urbanos-Garrido RM, López-Valcárcel BG. The influence of the economic crisis on the association between unemployment and health: an empirical analysis for Spain. Eur J Health Econ. 2015;16(2):175–84.
35. Stuckler D, Basu S, Suhrcke M, et al. Effects of the 2008 recession on health: a first look at European data. Lancet. 2011;378:124–5.
36. López-Bernal JA, Gasparrini A, Artundo C, et al. The effect of the late 2000s financial crisis on suicides in Spain: an interrupted time-series analysis. Eur J Public Health. 2013;23:732–6.
37. Ferrarini T, Nelson K, Sjöberg O. Unemployment insurance and deteriorating self-rated health in 23 European countries. J Epidemiol Community Health. 2014;68(7):657–62.
38. López-Casasnovas G. La crisis económica española y sus consecuencias sobre el gasto social. Informe SESPAS 2014 Gac Sanit. 2014;28 Supl 1:18–23.

5.2
Did the consumption of psychotropic drugs increase during the 2008 downturn?

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Did the consumption of psychotropic drugs increase during the 2008 downturn?

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ABSTRACT

Objective: To analyse differences in psychotropic drug consumption (antidepressants and tranquilizers, respectively), in the Spanish population between 2006 and 2011-2012 (i.e. before and during the financial crisis) while taking into account both gender and employment situation. Methods: Two surveys, using cross-sectional population-based face-to-face interviews with adults (>15 years old) from Spain, were carried out, one in 2006 and the other in 2011-2012. We specify random effects logistic regressions and use Bayesian methods for the inference.

Results: While, on the whole, the financial crisis has had no significant effect on the consumption of psychotropic drugs (Odds Ratio (OR)=0.56, 95%confidence interval (CI) CI=[0.18-2.53] for antidepressants; OR=1.21, 95%CI=[0.26-5.49] for tranquilizers), it has widened the gap in the differences in consumption between men and women. In the case of antidepressants, their use has actually been reduced, but the difference in usage between retired men and women widened significantly. In terms of tranquilizers, the differences between sexes are greater for women who have either been unemployed long-term, are retired or are housewives. Barring that of students, the risk of women taking tranquilizers has increased in all groups.

Conclusions: The differences in the probability of consuming psychotropic drugs increased between women and men during the financial crisis and female homemakers and the short-term unemployed were the most vulnerable groups in 2011-2012. Our research contributes to furthering knowledge regarding mental health during periods of economic recession and provides evidence of the need to focus future research efforts, along with healthcare and social interventions, on specific subpopulations.

Keywords

economic downturn; mental health; psychotropic drugs; drug utilization; health surveys; cross-sectional studies.

1.- Introduction

While all the OECD countries' economies were hit by the 2008 financial crisis, Spain was one of those hardest hit and its citizens had to rapidly come to terms with the consequences. Spain's Gross Domestic Product (GDP) growth fell from 3% to below -3% between the first quarter of 2008 and the first quarter of 2009 and, consequently, Spain went into recession during this period. The Spanish economy then emerged from that recession in the first quarter of 2010, only to once again slip back into recession in the second quarter of 2011 from which it did not emerge until the third quarter of 2013 [1]. Meanwhile, unemployment rates jumped from 8.2% in 2007 to over 26% in 2013 [2]. Youth unemployment (16-25 age group) levels, which rose from 15.4% in 2007 to 51.6% in 2014 [3], were the worst in Europe and the likelihood of finding a job decreased by 15 percentage points (p.p.) for men and 8 p.p. for women [4]. The economic crisis directly affected the housing market which, in turn, led to a crash in the building sector causing a 20% per annum fall in employment [5]. This was also translated into an enormous number of evictions which saw almost 100 families a day being evicted in 2014 [6].

Since the Great Depression in 1930, concern about the effects of economic downturns on the health of a population has increased [7-9] and while some controversial conclusions are to be found in the literature, most studies agree that mental health problems worsen during economic crises [10,11]. The majority of aggregate and individual level studies agree that not only do adverse economic conditions affect mental health, but they also affect the likelihood of suicides being committed [12]. The current financial crisis is not only the worst macroeconomic shock since the Great Depression [13], but the corresponding austerity measures introduced by governments have only served to aggravate an already difficult situation. Hence, the gravity of the financial crisis has meant that investigating the association between economic downturn and mental health is even more important than ever [14-20].

A financial crisis not only effects the unemployed in terms of chronic stress, a reduction in social interaction and a lack of self-esteem, it also effects the employed, who may suffer from mental disorders as a result of job insecurity and anxiety [21]. Indeed, in many countries the rates of anxiety, stress and depression have increased in times of economic downturn [19,22-24]. According to Stuckler et al. [25], in this current financial crisis the number of suicides in Europe has increased overall and, in particular, in Greece and Ireland which experienced the greatest increase (17% and 13%, respectively) between 2007 and 2008. Stuckler et al., note that this effect is particularly severe among men in Europe and the United States (US), estimating that a 10% increase in unemployment is associated with a 1.4% increase in male suicide [26-28]. Labour market programs can mitigate the effect of unemployment on suicide rates, and it is estimatied

that a 1% rise in unemployment is associated with a 1.07% rise in suicide rates, whereas if an extra $10USD is invested in labour market programs then this rise is only 0.38% [25]. However, upon analysing OECD countries it is found that during economic downturns there is very little increase in investment in labour market programs [29]. Using data from Spain 2002-2013, Rivera et al. [30] find that a decrease in economic growth and an increase in unemployment negatively affected suicide rates, and it is estimated to cost of over 565 million Euros per year. However, Saurina et al. [31] do not find that the increase in the suicide rate in 2010 is associated with rising unemployment.

Although during financial crises the perception of being able to get a job is low and it is easier to expect deterioration in health during recessions [32], some literature tabled other points of view such as unemployment being considered the "norm" in an economic downturn and therefore the impact on mental health diminishes, while when unemployment is "rare", the sense of isolation and negative feelings may increase [33]. Furthermore, as unemployment leads to times of fewer job opportunities, the unemployed may choose to adopt healthier lifestyles [34] and/or take up other activities that result in better mental health, as well as enjoy a decrease in work-related problems [35]. Astell-Burt and Feng [36] determined that a recession has only a minor effect on mental health, although they attribute this (unexpected) result to the self-reporting question found in the Quarterly Labour Force Survey of the United Kingdom (QLFS) 2006-2010 concerning reporting health problems or disabilities that the participant expects will last for more than a year, thus leading to an under-reporting of mental health problems.

The research using Spanish data agrees with the association made between a financial crisis and mental health problems [24,32,37-40]. Gili et al. [24] broadly analyse how the current financial crisis is associated with mental health outcomes such as anxiety or mood, by using data from patients attending primary care centres in 2006-07 and 2010-11 in Spain. The authors conclude that the proportion of patients suffering from mood, anxiety, somatoform and alcohol disorders increased significantly from 2006 to 2010 (albeit with the exception of eating disorders). Overall, the risk of major depression is attributed to mortgage difficulties and evictions. Using the 2006-07 and 2011-12 Spanish National Health Survey (SNHS), other authors reach the same conclusions as Gili et al. For instance, Urbanos et al. [32] show a positive relationship between unemployment rates and mental health risks (particularly long-term). The authors also insist on the increase of anxiety and stress about the future over the effects of protective policies during the economic recession. Bartoll et al. [40] estimate an increase among men in the likelihood of suffering from poor mental health (attributed to employment status), whereas there is a slight decrease among women. They also warn of an increase in socioeconomic inequalities in mental health, especially among men.

As psychotropic drugs mitigate mental health disorders, it is important to analyse their evolution to determine if there is an increase in mental health problems during the financial crisis. For example, the Nuffield Trust and Health Foundation's QualityWatch research programme [41] examined the evolution of antidepressant prescriptions in the UK during the recent economic recession and concluded that there was an increase in prescriptions being issued for antidepressants when the crisis began compared to the years before it started (i.e. 8.5% increase a year between 2008 and 2012, whereas it was 6.7% increase a year between 1998 and 2008). In 2015 the Spanish Agency of Medicines and Medical Devices (AEMPS) [42], jointly with the Ministry of Health, Social Services and Equity, highlighted a significant increase in prescriptions for antidepressants during 2000-2013. Doses per 1,000 inhabitants per day (DHD) rose from 26.5DHD in 2000 to 79.5DHD in 2013 (an increase of 200%). In Catalonia the dispensing of antidepressants increased in almost all age groups (with the exception of the over 75 year olds) during 2006 and 2011, but dropped between 2011 and 2013 [43]. It is worth mentioning that during the last three decades, the majority psychotropic drugs used in Spain is close to the average European consumption [44].

Using different Spanish data periods, it has been argued that, during the financial crisis, the consumption of psychotropic drugs increased [45,46] overall among the unemployed [1,47] and there was a 35.2% increase in the consumption of antidepressant use for treatment of major depressive disorders [48]. Barceló et al. [1] conclude that the increase in psychotropic drug consumption post 2009, is significantly higher among those most likely to be unemployed and those who were consumers before 2009. Moreover, the use is usually higher for those groups of people whose probabilities of consuming other drugs or alcohol are lower, e.g. women [49]. Interestingly, Colell et al. [50] do not find changes in sporadic use of hypnotics/sedatives between 2005-07 and 2009-11, in spite of the steady increase since the 1990s in Spain [51]. In terms of working status, unemployed men have a higher probability of reporting sporadic use than employed men do, whereas the chance of reporting sporadic use is lower for unemployed women. In terms of heavy use of psychotropics, Colell et al., found that unemployed men are less likely to have increased heavy use in the crisis period compared to employed men. However, an analysis comparing men and women's consumption is needed.

This paper analyses differences in psychotropic drug consumption (antidepressants and tranquilizers, respectively), in the Spanish population between 2006 and 2011-2012 (i.e. before and during the financial crisis) while taking into account both gender and employment situation.

2.- Methods

Data setting

We use microdata from the face-to-face cross-sectional population-based Spanish National Health Survey (SNHS) for two periods: 2006 (prior to the financial crisis) and 2011-2012 (during the financial crisis) [52]. Nowadays, the SNHS is conducted jointly by the Ministry of Health, Social Services and Equity, Spain (MSSSI) and the Spanish National Statistics Institute (INE). It is held every five years, alternating every two-and-a-half years with the European Health Interview Survey (EHIS) [53], of which both surveys share some standardised variables. The SNHS is a stratified tri-stage sample design representative of the Spanish population. Through face-to-face interviews in interviewees' homes, the SNHS-2006 was conducted from June 2006 to June 2007 and the SNHS-2011 from July 2011 to June 2012. We excluded individuals in the Spanish enclaves of Ceuta and Melilla. Finally, our samples included adult individuals (>15 years old) questioned in both the adult and household questionnaires (n=28,954 for 2006 and n=20,509 for 2011-2012).

The response variables are the consumption (or not) of antidepressants or tranquilizers. From here on we will use antidepressants to refer to antidepressant and stimulant drugs and tranquilizers to include sedative/hypnotic and sleeping pills (see Table 1 for more detailed information).

The main explanatory variables included in the analysis are: i) the year of the survey, which includes 2006, before the economic downturn, and 2011-2012, during the financial crisis; ii) mental health problems represented by two variables: a dummy that represents whether the individual has suffered from depression, anxiety or other mental health disorders in the last twelve months, and the mental health index constructed by the SNHS survey based on the Goldberg Health Questionnaire (GHQ-12) [54]; iii) some self-reported health outcome variables, i.e. self-rated health (SRH), chronic diseases, smoking behaviour, sleeping hours, the body mass index (BMI) [55], physical activity in the workplace and medical visits during the last year (see Table 1 for more information).

Covariates are sex, age, the region of residence (autonomous communities), educational level, marital status, social class of the reference person [56] and employment status. In this last case, individuals are classified as either currently working (group of reference), short or long-term unemployed (unemployed for less or more than one year, respectively), retired, studying or a homemaker (see Table 1).

Finally, in order to achieve our goal, some interactions are also added. Alongside our objectives, we include the interaction between the time period and sex, the time period and employment status and, finally, we also include the interaction between sex, time period and employment status.

Statistical methods

We specify random effects logistic regressions. In mixed model terminology, we allow the intercept to be random effect. That is to say, it will be different for the various levels considered, i.e. year, autonomous community and the interaction between year and autonomous community. In fact, we are allowing heterogeneity at the level of autonomous community, capturing (unobserved) variables not already included in the model that could explain the probability of consuming psychotropic drugs. With the interaction with year, we are allowing for this heterogeneity being able to vary along time. Allowing random effects for year is equivalent to including a non-linear trend in the model.

In the case of the random effects at the level of autonomous community, we assume that random effects are identical and independent of Gaussian random variables with constant variance [57,58]. Random effects for year and interaction are modelled by a random walk of order 1 (i.e. independent increments) for the Gaussian random effects vector [59].

Given the complexity of our model, we chose to perform inferences using a Bayesian framework. This approach is considered the most suitable to account for model uncertainty, both in the parameters and in the specification of the models. Moreover, only under the Bayesian approach is it possible to model extra variability with, in some cases, relatively sparse data. Finally, within the Bayesian approach specifying a hierarchical structure on the (observable) data and (unobservable) parameters, which are all considered as random quantities, is straightforward. In particular, we follow the Integrated Nested Laplace Approximation (INLA) approach [60], within a (pure) Bayesian framework. We use penalising complexity (PC) priors. These priors are invariant to reparameterisations and have robustness properties [61].

All analyses are carried out with the free software R (version 3.2.3) [62], through the INLA library [57,60].

3.- Results

Table 2 shows the descriptive characteristics of the two samples (SNHS 2006 and SNHS 2011-2012) according to the consumption of antidepressants and tranquilizers. In the total sample in SNHS 2006 (49.1% men), 5.8% use antidepressants and 10.7% tranquilizers. In SNHS 2011-12 (48.8% men), 4.3% consume antidepressants and 11.1% tranquilizers. There is a significant reduction in the use of antidepressant drugs ($p<0.01$) and a non-significant increase in the consumption of tranquilizers ($p=0.735$) in the period of economic crisis when compared to the period before the crisis. Secondly, it is worth noting that the descriptive results show a significant decrease in the prevalence of depression, anxiety or other mental health problems during the economic crisis ($p<0.01$) [32,40]. This was also established with data from Catalonia [38] and data from the QLFS from the UK [36], albeit this last paper attributing this fact to the under-reporting of mental health problems because of the way the mental health questions were formulated in the QLFS questionnaire. We also find a significant increase in the number of people with a mental health index above 9 ($p<0.01$), meaning that the number of people with high mental health risk increased significantly in 2011-2012. However, these results could be explained by changes in either diagnosis or health care utilisation that lower the number of identification and it does not mean that mental health improves.

Table 3 shows the results of the mixed models of the variables of interest for antidepressants and tranquilizers. We will first comment on the results for the antidepressant consumption model and then we will analyse the results from the tranquilizer consumption model.

Antidepressants consumption

As we have concluded above, in general there was close to a two percentage point reduction in the number of individuals who consumed antidepressants in 2011-2012 when compared to 2006 (Table 2). In the case of men, the reduction was from 3.3% in 2006 to 1.6% in 2011-2012, whereas for women it was from 8.2% in 2006 to 6.7% in 2011-2012 (note that the percentage is much larger for women than for men) (see Table 2).

In Table 3, we can observe that the year of the survey (which indicates the period of the economic downturn) is not significant, indicating that the economic crisis did not significantly change the probability of taking antidepressant drugs (OR=0.56, 95% CI=[0.18-2.53]). Using the results in Table 3, we compute the OR by considering the interactions of the variables of interest (see Graphic 1). Then, we observe that, in general, the probability of consuming antidepressants among men and women decreases, but that this reduction is more marked in men, leading to

a greater difference between men and women, but differing depending on the employment status. For the short-term and long-term unemployed, both men and women reduce their likelihood of consuming drugs between 2006 and 2011-12, but the decrease is sharper for men than for women (above all for short-term unemployed men). For retired individuals we find significant differences because women do not change the risk of consuming drugs between 2006 and 2011, whereas men reduce this risk dramatically. As for students, both groups reduce the risk of consumption equally, thus, we cannot observe any differences among them in 2011. Although in the homemakers group 96.6% are women, this is where the biggest differences can be found between men and women because it is the only group where the risk of consuming antidepressants increases for women while the risk for men is sharply reduced. Additional results from the adjusted model are shown in Table 4.

Tranquilizers consumption

Table 2 shows a slight increase in the consumption of tranquilizers between 2006 and 2011-12. However, the consumption level remains the same for men (6.7%), whereas for women it increases (from 14.5 % to 15.3%). Again, the consumption of tranquilizers is higher for women than for men in both periods.

Table 3 shows that the year of the survey is not statistically significant and that the crisis has not significantly changed the likelihood of taking tranquilizers (OR=1.21, 95% CI=[0.26-5.49]). Using the results in Table 3, we compute the OR by considering the interactions of the variables of interest (see Graphic 2). Again, we observe larger differences between women and men when employment status and 2011-12 are considered. In the case of individuals in short-term unemployment, both men and women show an increase in the risk of using tranquilizers between 2006 and 2011-12, however, this increase is sharper for women than men. Moreover, this group is where we find the biggest increase in the risk for women, along with the only status where there is an increase in risk for men as well. Instead, in the long-term unemployed the differences between both groups widen between 2006 and 2011-12 i.e. women increase their risk of using tranquilizers, whereas men decrease that risk. The trend for retired individuals is similar to the long-term unemployed. Again, the risk of retired women consuming tranquilizers increases dramatically during the financial crisis, whereas there is a reduction in the risk for men, thus leading to more differences between women and men. As for students, both groups reduce the risk of consuming tranquilizers between 2006 and 2011-12 and we do not observe any changes in differences between the two group in 2011. Lastly, in the homemaker category, again we find greater differences between men and women in 2011. When 2006 is compared

to 2011, the risk of women of consuming tranquilizers increases sharply, whereas in men the risk reduces. The results from the mixed logistic estimations of the covariates are shown in Table 4.

4.- Discussion

This is the first study of its kind to analyse changes in the risk of consuming antidepressants and tranquilizers during the economic downturn in Spain using the Spanish National Health Surveys for 2006 and 2011-2012. In general, we are unable to detect any significant changes in the risk of consumption of antidepressants and tranquilizers during the economic crisis compared to the years prior to the crisis. However, we are able to conclude that there are differences between both gender and employment status and these differences have widened during the financial crisis (albeit with some exceptions). In terms of antidepressant drug consumption, in general we can find a reduction in the risk of consumption, although that reduction is lower for women than for men which, in turn, leads to an increase in the differences between both groups. Therefore, (with the exception of the student group where both women and men have similar reductions in risk) there are clear differences in antidepressant drug consumption between sex and employment status for 2011-12. The most vulnerable group is the female homemaker, while the least vulnerable group that of short-term unemployed men. In terms of tranquilizer consumption, the risk of consumption has increased in general, but in particular between women (from all employment categories except for students) and short-term unemployed men. Differences between men and women in tranquilizer drug consumption in 2011 did not increase sharply, and the most significant differences are found in the categories of long-term unemployed, retired or homemakers, where the risk increased among the women but decreased among the men. Therefore, the most vulnerable groups to the crisis are women (in particular those in the short-term unemployed group) and short-term unemployed men, while the least vulnerable group is the male homemaker.

As with our results, Colell et al. [50] do not find out significant changes in the sporadic use of hypnotics/sedatives for men or women (regardless of employment status) between the periods before and during the financial. Furthermore, Nicieza-García et al. [63] do not confirm that the rise in psychotropic consumption in the region of Asturias was a result of the economic crisis. However, our results differ from other similar studies. For example, in the case Pérez-Romero et al. [64], who also use SNHS data, they analyse the consumption of antidepressants and tranquilizers together and only for employees. In contrast to our findings, they establish that for both men and women the consumption of these drugs increased during the financial crisis. Sicras-Mainar et al. [48] conclude in their work that the consumption of antidepressants increased during the economic crisis due to the rise in the number of individuals with major depressive disorder.

Likewise, Barceló et al. [1] show that the use of psychotropic drugs increased in the general population in a semi-urban region in Catalonia during the economic downturn. In addition, after comparing data from before and after the 2008 stock market crash, McInerney et al. [16] reached the conclusion (in spite of not finding changes in the objective measures of depressive illness) that sudden wealth loss leads to mental health deterioration. Using panel data, Chen and Dagher find a significant increase in prescription drug use during the economic recession, even though mental health medical visits decrease in this period [65]. However, these studies have not separated the analysis between antidepressants and tranquilizers which, in turn, leads to confusing results because, as we have proved, the consumption pattern is different for each drug. In fact, it seems to be a shift from antidepressant usage to tranquilizer prescription, that highlights a change in diagnosis practices. However, as it has been reported that the amount of antidepressant units dispensed by the pharmacy has increased during the financial crisis in a higher rate than the tranquilizer units [17] it may be considered as a problem of misreporting or misclassification.

Unlike Colell et al.'s work [50], we added a comparison between men and women by employment status in the psychotropic drug consumption category. We do observe that the differences between women and men have widened during the financial crisis, above all between the retired, the long-term unemployed and homemakers in terms of tranquilizer use. Interestingly, Mellinger et al., study psychotropic drug use patterns and conclude that women's use is often greater due to the lower probability of this group taking other drugs or drinking alcohol. Nevertheless, some literature argues that the deterioration in mental health resulting from unemployment and economic crises is of greater concern for men than for women [25,40,66]. In fact, some authors suggest that licit drug consumption in men is affected more by socio-economic factors, whereas clinical reasons affect women more [67]. However, it has also been discussed that during economic crises women intensify their work to compensate for the losses in household income [68] and that women's mental health deteriorates during crises [30]. Along these lines, Arias et al. [69] conclude that the prevalence of poor mental health in Spain in 2011 is higher for women than men, and they add that socioeconomic variables affect the mental health of women more, whereas paid work issues are more likely to have an impact on the mental health of men.

In this paper we are also able to separate and categorise different lengths of unemployment, thus enabling us to conclude that during the financial crisis the short-term unemployed, for both men and women, increased the risk of consuming tranquilizer drugs. However, in the case of antidepressants, men reduced their risk of consumption drastically, whereas while the risk for women was also reduced it was not as marked. In the long-term unemployed group, men and

women reduce the risk of using drugs in general, but women increase the risk of consuming tranquilizers.

Furthermore, our results show consistence with other related studies investigating the impact of a number of specific factors on the risk of consuming psychotropic drugs. For example, in concordance with Boelman et al. [70], patients with chronic diseases increase their use of antidepressant drugs. Besides this, it is worth mentioning the review of Voyer et al. [71] which analyses an extensive list of empirical studies assessing the relationship between the consumption of psychotropic drugs and certain related factors. For example, they also find that women, those in the poor self-rated health group or those with chronic diseases, show an increase in the probability of consuming psychotropic drugs. In our results, education or social class are positively related to a higher probability of consuming tranquilizers (and education was also positively related to antidepressant use). These results match those from the work of Mellinger et al., because, as they discuss in their paper, the use of psychotropic drugs is more common in better educated and higher income groups, while individuals in low status socio-economic groups are less likely than others to use psychotropic drugs (especially tranquilizers). The authors attribute these results to the fact that the lower social classes may not actually have access to these drugs like the others do.

Our study has some limitations. For instance, despite the fact that we use two large samples of individual-level data (2006-SNHS and 2011-12 SNHS), we use cross-sectional data from different individuals, which does not allow us to conclude direct relationships between the economic crisis and psychotropic drug use. Besides, even though self-reported measures of health are strongly correlated with mortality [72], there could be a reporting bias affecting the self-reported responses of individuals. Parry et al. [73] studied the validity of responses from those using psychotropic drugs and observed that about 29% of males and 18% of females give invalid responses. They attribute the underreported answers among men (compared to the higher rates of consumption by females, especially in the case for tranquilizers) to the negative stigma men associate with these drugs. Moreover, the marginal effect the economic crisis has on mental health problems and psychotropic drug use could be explained by the sensitivity to response these questions as SNHS is a personal interview. It would be interesting to test other interactions with the period and other health factors in future research.

5.- Conclusion

In conclusion, while the current economic crisis has not statistically changed the risk of using psychotropic drugs, our results do indicate that women appear to be at greater risk of consuming

psychotropic drugs than men during a financial crisis. In terms of taking antidepressants and although in most of the activity status groups the risk dropped for both women and men, the differences between the sexes widened during the economic recession, above all in the retired and homemaker groups. Meanwhile, with the exception of the student group, women exhibit an increased risk in the consumption of tranquilizers in all employment status groups in 2011. The differences between men and women are more marked during the financial crisis, particularly in the categories of long-term unemployment, retirees and homemakers. With this work we contribute to knowledge about mental health problems during periods of economic recession and provide evidence of the need to focus future research efforts, along with healthcare and social interventions, on specific subpopulations, especially those among women.

Conflicts of Interest

There are no conflicts of interest for any of the authors. All authors will disclose any actual or potential conflict of interest including any financial, personal or other relationships with other people or organizations within three years of beginning the submitted work that could inappropriately influence or be perceived to influence their work.

Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

We used Health Survey data in all cases. Public and freely accessible at:
http://www.msssi.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2006.htm
http://www.msssi.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2011.htm
(both in Spanish)

Informed Consent
Informed consent was not applicable in our article.

References

1. Barceló M.A., Coll-Negre M., Coll-de-Tuero G., Saez M.: Effects of the Financial Crisis on Psychotropic Drug Consumption in a Cohort from a Semi-Urban Region in Catalonia, Spain. PLoS ONE 11(2), 1-25 (2016)

2. National Statistics Institute (INE). Active Population Survey. Available at http://www.ine.es (2016). Accessed 15 January 2016

3. Eurostat. Available at: http://ec.europa.eu/eurostat (2016). Accessed 30 January 2016

4. Rica, S., Rebollo-Sanz, Y.F.: Gender Differentials in Unemployment Ins and Outs during the Great Recession in Spain (No. 9135) Institute for the study of labor (IZA) (2015)

5. Bentolila, S., Cahuc, P., Dolad, J.J., Le Barbanchon, T.: Two-Tier Labour Markets in the Great Recession: France versus Spain. The Economic journal 122(562), F155-F187 (2012)

6. National Statistics Institute (INE). Foreclosure Statistics. Available at http://www.ine.es (2016). Accessed 15 January 2016

7. Ruhm, C.J.: Are recessions good for your health? Q. J. Econ. 115(2), 617-650 (2000)

8. Bell, R., Marmot, M.: How will the financial crisis affect health? BMJ 338(1), 858-860 (2009)

9. Bezruchka, S.: The effect of economic recession on population health. CMAJ 181(5), 281-285 (2009)

10. Catalano, R., Goldman-Mellor, S., Saxton, K., Margerison-Zilko, C., Subbaraman, M., LeWinn, K., & Anderson, E.: The health effects of economic decline. Annual Review of Public Health 32, 431-450 (2011)

11. Brenner, M.H., Mooney, A.: Unemployment and health in the context of economic change. Soc. Sci. Med. 17(16), 1125-1138 (1983)

12. Goldman-Mellor, S.J., Saxton, K.B., Catalano, R.C.: Economic contraction and mental health: A review of the evidence, 1990–2009. International Journal of Mental Health 39(2), 6–31 (2010)

13. Jenkins, S.P., Brandolini, A., Micklewright, J., Nolan, B. (Eds): The Great Recession and the Distribution of Household Income. Oxford University Press (2012)

14. Uutela, A.: Economic crisis and mental health. Curr Opin Psychiatry 23(2), 127–130 (2010)

15. Zivin, K., Paczkowski, M., Galea, S.: Economic downturns and population mental health: research findings, gaps, challenges and priorities. Psychol Med 41(7), 1343–1348 (2011)

16. McInerney, M., Mellor, J.M., Nicholas, L.H.: Recession depression: Mental health effects of the 2008 stock market crash. J Health Econ 32(6), 1090–104 (2013)

17. Gili, M., García-Campayo, J., Roca, M.: Economic crisis and mental health. SESPAS Report 2014 [in Spanish]. Gac Sanit 28(suppl 1), 104-108 (2014)

18. McKenzie, S.K., Imlach Gunasekara, F., Richardson, K., Carter, K.: Do changes in socioeconomic factors lead to changes in mental health? Findings from three waves of a population based panel study. J Epidemiol Community Health 68(3), 253–260 (2014)

19. Katikireddi, S.V., Niedzwiedz, C.L., Popham, F.: Trends in population mental health before and after the 2008 recession: a repeat cross-sectional analysis of the 1991–2010 Health Surveys of England. BMJ Open 2, 5 (2012)

20. Barr, B., Kinderman, P., Whitehead, M.: Trends in mental health inequalities in England during a period of recession, austerity and welfare reform 2004 to 2013. Soc Sci Med 147, 324-331 (2015)

21. Vandoros, S., Hessel, P., Leone, T., Avendano., M.: Have health trends worsened in Greece as a result of the financial crisis? A quasi-experimental approach. The European Journal of Public Health 23(5), 727 (2013)

22. Avčin, B.A., Kučina, A.U., Šarotar, B.N., Radovanović, M., Plesničar, B.K.: The present global financial and economic crisis poses an additional risk factor for mental health problems on the employees. Psychiatr Danub 23(Suppl 1), 142–148 (2011)

23. Economou, M., Madianos, M., Peppou, L.E., Patelakis, A., Stefanis, C.N.: Major depression in the era of economic crisis: a replication of a cross-sectional study across Greece. J Affect Disorders 145, 308–314 (2013)

24. Gili, M., Roca, M., Basu, S., McKee, M., Stuckler, D.: The mental health crisis of economic crisis in Spain: evidence from primary care centers, 2006 and 2010. Eur J Public Health 23, 103–108 (2013)

25. Stuckler, D., Basu, S., Suhrcke, M., Coutts, A., McKee, M.: Effects of the 2008 recession on health: a first look at European data. Lancet 378, 124–125 (2011)

26. Barr, B., Taylor-Robinson, D., Scott-Samuel, A., McKee, M., Stuckler, D.: Suicides associated with the 2008-10 economic recession in England: time trend analysis. BMJ 345 (2012)

27. Saurina, C., Bragulat, B., Saez, M., López-Casasnovas, G.: A conditional model for estimating the increase in suicides associated with the 2008-2010 economic recession in England. Journal of Epidemiology and Community Health 67(9),779-787 (2013)

28. Reeves, A., Stuckler, D., McKee, M., Gunnell, D., Chang, S.S., Basu, S.: Increase in state suicide rates in the USA during economic recession. Lancet 380, 1813–1814 (2012)

29. OECD. Society at a glance: OECD Social Indicators. OECD Publishing, Paris (2014)

30. Rivera, B., Casal, B., Currais, L.: Crisis, suicide and labour productivity losses in Spain. Eur J Health Econ, 1-14, published online (2016)

31. Saurina, C., Marzo, M., Saez, M.: Inequalities in suicide mortality rates and the economic recession in the municipalities of Catalonia, Spain. Int J Equity Health 14, 75 (2015)

32. Urbanos-Garrido, R.M., Lopez-Valcarcel, B.G.: The influence of the economic crisis on the association between unemployment and health: an empirical analysis for Spain. Eur J Health Econ 16, 175-184 (2015)

33. Corcoran, P., Arensman, E.: Suicide and employment status during Ireland's Celtic Tiger economy. Eur J Public Health 21(2), 209–214 (2010)

34. Laufey, T., Corman, H., Noonan, K., Ólafsdóttir,Þ., Reichman N.E.: Are Recessions Good for Your Health Behaviors? Impacts of the Economic Crisis in Iceland. NBER Working Paper 18233 (2012)

35. Boone, J., van Ours, J.C.: Are recessions good for workplace safety? J Health Econ 25, 1069–1093 (2006)

36. Astell-Burt, T., Feng, X.: Health and the 2008 Economic Recession: Evidence from the United Kingdom. PloS One 8 (2013)

37. Artazcoz, L., Benach, J., Borrell, C., Cortès, I.: Unemployment and Mental Health: Understanding the Interactions Among Gender, Family Roles, and Social Class. American Journal of Public Health 94(1), 82-88 (2004)

38. Pascual, N., Rodríguez, I.: Effects of unemployment on self-assessed health and mental health: empirical evidence for Catalonia (2006–2012). Masters Project. Masters in Health Econom- ics and Policy, Barcelona Graduate School of Economics (2013)

39. Bacigalupe, A., Esnaola, S., Martín, U.: The impact of the Great Recession on mental health and its inequalities: the case of a Southern European region, 1997–2013. Int J Equity Health 15, 17 (2016)

40. Bartoll, X., Palència, L., Malmusi, D., Suhrcke, M., Borrell, C.: The evolution of mental health in Spain during the economic crisis. Eur J Public Health 24(3), 415-418 (2013)

41. Nuffield Trust. Focus on: antidepressant prescribing. Available at: http://www.qualitywatch.org.uk/focus-on/antidepressant-prescribing (2016). Accessed 1 March 2016

42. Agencia Española de Medicamentos y Productos Sanitarios (AEMPS). Available at: http://www.aemps.gob.es/medicamentosUsoHumano/observatorio/docs/antidepresivos-2000-2013.pdf (2016). Accessed 13 April 2016

43. Observatori del sistema de salut de Catalunya. Efectes de la crisi econòmica en la salut de la població de Catalunya. Anàlisi territorial (december 2015)

44. Simó-Miñana, J.: Use of prescription drugs in Spain and Europe. Aten Primaria 44(6), 335–347 (2012)

45. Vicente-Sanchez, M.P., Macias-Saint-Gerons, D., de la Fuente-Honrubia, C., González-Bermejo, D., Montero- Corominas, D., Catalá-López, F.: Trends of use of anxiolytics and hypnotics in Spain from 2000 to 2011. Rev Esp Salud Pública 87(3), 247–255 (2013)

46. Sempere-Verdú, E., Salazar-Fraile, J., Palop-Larrea, V., Vicens-Caldentey, C.: Evolution of the use of antidepressants, anxiolytics and hypnotics in Valencia. Period: 2000–2010. Aten Primaria 46(8), 416–425 (2014)

47. Alameda-Palacios, J., Ruiz-Ramos, M., García-Robredo, B.: Suicide, antipressant prescription and unemployment in Andalucia (Spain). Gac Sanit 28(4), 309–312 (2014)

48. Sicras-Mainar, A., Navarro-Artieda, R.: Use of antidepressants in the treatment of major depressive disorder in primary care during a period of economic crisis. Neuropsychiatr Dis Treat 12, 29-40 (2015)

49. Mellinger, G.D., Balter, M.B., Manheimer, D. I.: Patterns of psychotherapeutic drug use among adults in San Francisco. Arch Gen Psychiatry 25, 385-394 (1971)

50. Colell, E., Sánchez-Niubò, A., Delclos, G.L., Benavides, F.G., Domingo-Salvany, A.: Economic crisis and changes in drug use in the Spanish economically active population. Addiction 110, 1129-1137 (2015)

51. Garcia del Pozo, J., de Abajo Iglesias, F.J., Carvajal Garcia-Pando, A., Montero Corominas, D., Madurga Sanz, M., Garcia del Pozo, V.: The use of anxiolytic and hypnotic drugs in Spain (1995-2002). Rev Esp Salud Publica 78, 379-389 (2004)

52. Ministry of Health, Social Services and Equity: National Health Survey in Spain 2006 and 2011. Householder's questionnaire and adult's questionnaire. Available at: http://www.msssi.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2006.htm. (2013). Accessed 15 September 2013
http://www.msssi.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2011.htm. (2013). Accessed 15 September 2013

53. European Health Interview Survey (EHIS). Available at: http://ec.europa.eu/eurostat/c/portal/layout?p_l_id=203688&p_v_l_s_g_id=0 (2016). Accessed 15 April 2016

54. Goldberg, D.: Mental health priorities in a primary care setting. Ann. N. Y. Acad. Sci. 310, 65–68 (1978)

55. Body Mass Classification. World Health Organization. Available at: http://apps.who.int/bmi/index.jsp?introPage=intro_3.html (2016). Accessed 15 April 2016

56. Chilet-Rosell, E., Álvarez-Dardet, C., Domingo-Salvany, A.: Use of Spanish proposals for measuring social class in health sciences. GacSanit, 26, 566–569 (2012). Retrieved from http://scielo.isciii.es/pdf/gs/v26n6/original_breve1.pdf

57. R-INLA project. Available at: http://www.r-inla.org/ (2016). Accessed 25 May 2016

58. R INLA project. Independent random noise model. Available at: http://www.math.ntnu.no/inla/r-inla.org/doc/latent/rw1.pdf (2016). Accessed 25 May 2016

59. R INLA project. Random walk model of order 1 (RW1). Available at: http://www.math.ntnu.no/inla/r-inla.org/doc/latent/rw1.pdf (2016). Accessed 25 May 2016

60. Rue H., Martino S., Chopin N.: Approximate Bayesian inference for latent Gaussian models by using integrated nested Laplace approximations (with discussion). Journal of the Royal Statistical Society, Series B 2009; 71:319-392. Available at: http://www.math.ntnu.no/~hrue/r-inla.org/papers/inla-rss.pdf (2009). Accessed 25 May 2016

61. Simpson D.P., Rue H., Martins T.G., Riebler A., Sørbye S.H.: Penalising model component complexity: A principled, practical approach to constructing priors. arxiv:1403.4630, 2015. Available at: http://arxiv.org/abs/1403.4630 (2015). Accessed 25 May 2016

62. R Core Team.: R: A language and environment for statistical computing. R Vienna, Austria: Foundation for Statistical Computing, 2015. Available at: http://www.R-project.org/ (2015). Accessed 25 May 2016

63. Nicieza-García, M.L., Alonso-Lorenzo, J.C., Suárez-Gil, P., Rilla-Villar, N.: Efecto de la crisis económica sobre el consumo de psicofármacos en Asturias. Gac Sanit. (2016 in press)

64. Pérez-Romero S., Gascón-Cánovas J.J., de la Cruz-Sánchez E., Sánchez-Ruiz J.F., Parra-Hidalgo P., Monteagudo-Piqueras O.: Recesión económica (2006-2012) y cambios en el estado de salud de la población española. Salud Publica Mex 58,41-48 (2016)

65. Chen, J., Dagher, R.: Gender and race/ethnicity differences in mental health care use before and during the Great Recession. Journal of Behavioral Health Services & Research (2014 in press)

66. Lopez Bernal, J.A., Gasparrini, A., Artundo, C.L., McKee, M.: The effect of the late 2000s financial crisis on suicides in Spain: an interrupted time-series analysis. Eur J Public Health 23, 732–736 (2013)

67. Empereur, F., Baumann, M., Alla, F., Briancon, S.: Factors associated with the consumption of psychotropic drugs in a cohort of men and women aged 50 and over. J ClinPharmTher 28, 61–68 (2003)

68. Floro, M. S.: Economic restructuring, gender and the allocation of time. World Dev 23, 1913–1929 (1995)

69. Arias-de la Torre, J., Artazcoz, L., Molina, J.A., Fernández-Villa, T., Martín, V.: Inequalities in mental health in the working population of Spain: A National Health Survey-based study. Gac Sanit. (2016 in press)

70. Boelman Lia, Smeets Hugo M., Knol Mirjam J., Braam Arjan W., Geerlings Mirjam I., Wit Niek J. de.: Psychotropic drug use in patients with various chronic somatic diseases. Eur J Psychiat. 2012 Dic; 26(4): 236-247

71. Voyer, P., Cohen, D., Lauzon, S., Collin, J.: Factors associated with psychotropic drug use among community-dwelling older persons: A review of empirical studies. BMC Nursing (2004) 3:3.

72. Kaplan, G.A., Camacho, T.: Perceived Health and Mortality: a nine-year follow-up of the human population laboratory cohort. American Journal of Epidemiology 117(3), 292-304 (1983)

73. Parry, H., Balter, M., Cisin, I.: Primary levels of underreporting psychotropic drug use. Public Opinion Quarterly 34(4), 582-592 (1970)

Table 1. Variables used in the analysis

Variable Role	Definition and comments
Dependent Variables	Consumption of antidepressant drugs: individuals who have consumed or have been prescribed antidepressant or stimulant drugs in the last two weeks. This takes the value one if the individual declares that he/she has consumed or has been prescribed the drug during the last two weeks. Consumption of tranquilizer drugs: individuals who have consumed or have been prescribed tranquilizers, sedative/hypnotic or sleeping pills in the last two weeks. It takes the value one if the individual declares that he/she has consumed or has been prescribed the drug during the last two weeks.
Independent Variables	Year of the survey: represented by a dummy variable that indicates 0='2006 survey' (reference period) and 1='2011-2012 survey'. Depression, anxiety or other mental health disorders: a dummy variable in which 1 indicates individuals who declared that they were suffering from these illnesses during the last twelve months. Mental health index using the Goldberg Health Questionnaire (GHQ-12) [49]. The GHQ-12 questionnaire includes 12 questions aimed to detect symptoms of anxiety or depression and it moves on a 12-point scale (0 to 12) i.e. from better to worse mental health. In order to observe the worst cases, we recoded the mental health index as zero if the index is below or equal to 8 points and one if the index is between 9 and 12 points. Question on self-rated health (SRH) status in the last 12 months. Asked in SNHS as 'how would you rate your health during the last twelve months?', and categorized as very good (reference category), good, fair, bad, very bad. Chronic illness: a dummy variable equal to one if the individual declares that he/she has ever had at least three of the following chronic diseases: upper back pain, lower back pain, frequent headaches, malignant tumours, diabetes, hypertension, high cholesterol, stomach ulcers, chronic constipation, chronic bronchial disease, asthma, cardiac disorder, heart attack, chronic skin problems, chronic allergies, anaemia, varicose leg veins, haemorrhoids, stroke, depression, anxiety or other mental problems, cataracts, arthritis or rheumatism, osteoporosis, urinary incontinence, prostate disorder (men), thyroid diseases, menopausal period problems (women), other chronic diseases. Smoking: we include a categorized variable recoded as zero if the individual does not smoke, one if he/she currently smokes and two if the person used to smoke in the past. Hours of sleep: a dummy variable recoded as one if the individual sleeps more than 7 hours and zero otherwise. Body Mass Index (BMI) categorized as [50]: low weight (BMI<18kg/m2) (reference category); normal weight (18kg/m2≤BMI≤25kg/m2); overweight (25kg/m2<BMI≤30 kg/m2); obese (BMI>30 kg/m2). Both height and weight were reported by the individual. Physical activity in the workplace: sitting (reference category), standing, walking and carrying things, and doing heavy tasks. Medical visits: categorized as a dummy that equals one if the individual visited the doctor during the last year, and zero otherwise. Sex (male groups of reference) and age (age groups: 15-35 years (group of reference); 36-45; 46-55; 56-65; 66-75; +75). Demographic and economic characteristics: the region of residence, marital status (single (group of reference), married, widowed, separated and divorced), social class [51], educational level (no education (reference category), primary education, secondary education and tertiary education), and employment status (currently working (group of reference), short-term unemployed (unemployed less than a year), long-term unemployed (unemployed more than a year), retired, studying and homemaker.

Table 2. Descriptive statistics[a]

	Period 2006			Period 2011-2012		
VARIABLES	Total (%)[b] (n=28,954)	Use of antidepressants (%)[c] (n=2,089)	Use of tranquilizers (%)[c] (n=3,904)	Total (%)[b] (n=20,509)	Use of antidepressants (%)[c] (n=1,099)	Use of tranquilizers (%)[c] (n=2,787)
Total	100	5.8[d]	10.7[e]	100	4.3[d]	11.1[e]
Sociodemographic variables						
Sex						
Male	49.1	3.3	6.7	48.8	1.6	6.7
Female	50.9	8.2	14.5	51.2	6.7	15.3
Current activity						
Working	48.2	3.1	6	44.2	1.9	5.2
Unemployed short-term	3.7	6.1	6.5	6.1	2.6	6.3
Unemployed long-term	2	11.2	15.6	6.7	5	11.4
Retired	24	11.7	23.9	23.1	8	23.1
Studying	4.6	0.9	2.3	6.3	0.3	1.5
Homemaker	17.4	10.2	18.9	13.5	9.3	21.1
Age (years old)						
15-35	34.5	2	3.5	31	1	3.1
36-45	19.2	4.6	8	19.8	2.7	7.6
46-55	15.6	7.5	11.6	17	4.8	11
56-65	12.3	10.2	16.1	12.9	7.8	16.1
66-75	10.2	10.3	21.5	10	8.2	20.5
>75	8.1	9.1	24.1	9.3	8.3	28.2
Region						
Andalusia	17.5	6.1	10.5	17.8	4	11.9
Aragon	2.9	5.1	8.4	2.9	4.5	14.8
Asturias	2.5	10.7	16.4	2.4	8.9	19.4
Balearic Islands	2.3	6.6	12.3	2.4	3.1	8.4
Canary Islands	4.4	9.6	15.4	4.6	5.3	12.6
Cantabria	1.3	3.9	9.6	1.3	2.2	4.9
Castile-Leon	5.8	4.4	7.9	5.5	4.1	12.1
Castile-La Mancha	4.3	5	9.6	4.5	2.8	5.6
Catalonia	16	5.2	9.7	15.7	4.2	8.3
Region of Valencia	10.7	4.6	11.7	10.9	5.1	13.5
Extremadura	2.4	6.3	8.8	2.4	5	13.2
Galicia	6.4	7.9	13.9	6.2	6.4	13.5
Madrid	13.6	5.1	9.7	13.7	2.6	9.4
Murcia	3	5	8.8	3.1	4.9	8.5
Navarre	1.3	6.4	13.2	1.3	5.9	11.4
Basque Country	4.9	5.9	11.3	4.7	3.6	13.3
La Rioja	0.7	2.4	4.8	0.7	3	9.7
Education (ed)						
No ed	12.9	12	24.5	13	9.3	24.6
Primary ed	43.3	8.1	14.7	43.1	5.6	14.1
Secondary ed	19.7	4.5	8.3	20.9	3.1	8.2
Tertiary ed	24.1	3.8	7.2	23	2.2	6
Marital Status						
Single	27.9	3.9	7.6	31.7	1.9	5.5

Married	54.9	6.5	11.8	56.1	4.2	11.1
Widowed	11.8	13.3	28.2	7.4	12	30.3
Separated	3.1	9.9	16.5	1.8	6	16.8
Divorced	2.4	12.3	17.2	2.9	9.4	18.2
Social class						
Class I	10.5	4.1	8.4	11.4	3.26	9.69
Class II	10.1	5.2	11.1	7.8	4.5	10.99
Class III	24.5	6.5	12.1	19.1	4.76	11.72
Class IV	27.8	6.9	13.2	15.2	4.8	12.91
Class V	13.2	8.3	14.1	32	5.69	14.26
Class VI	13.9	8.9	15.2	14.4	7	17.13
Health variables						
Depression						
No	86.3	0.9	5.1	89.2	0.8	6.2
Yes	13.7[d]	36.5	46	10.8[d]	32.7	52
Mental health						
<=8	96.6	4.6	9.4	95.8	3.1	9
>=9	3.4[d]	38.4	47.5	4.2[d]	28.1	51.9
SAH						
Very good	17.9	0.8	2.1	21.1	0.3	1.8
Good	48.6	2.1	5	50.8	1.7	5.9
Fair	24.8	10.5	19.3	20.2	8.7	22.3
Bad	6.4	22	35.2	6.3	18.9	39.6
Very bad	2.3	26.8	38.7	1.5	22.4	47.2
Chronic diseases						
<3	57.4	1.3	3.1	63.9	0.8	3.5
>=3	42.6	11.8	21	36.1	10.4	24.6
Smoking						
No	50	6.4	12	53.4	4.9	12.1
Yes	29.5	5.3	8.7	27	3.8	8.8
In the past	20.5	4.9	10.4	19.6	3.1	11.4
Sleeping						
<=7	52.1	6.2	12.2	49.8	4.5	13
>7	47.9	5.3	9.1	50.2	4	9.2
BMI						
underweight	1.3	4.3	7.4	1.7	0.6	6.7
normal weight	47.2	4.3	8.3	46	2.8	8.3
overweight	36.5	5.8	11	35.7	4	10.7
obesity	15	9.3	14.6	16.6	7.4	15.8
Physical activity						
Sitting	35.1	6.5	12.6	40.3	5.7	14
Standing up	47.7	6.2	10.8	44.8	3.7	10.3
Walking and carrying	13.1	3.6	7.3	12.1	2.2	5.6
Heavy tasks	4.1	2.4	5.4	2.7	1.1	6.7
Medical visits						
No	68.7	3.1	6.5	71.7	2.6	7.2
Yes	31.3	11.5	19.7	28.3	8.4	20.9

a Weighted distribution of the sample

b For the categorical variables, data are % in the category

c For the categorical variables, data are % of individuals using drugs for each case

d P<0.01

e P=0.735

Table 3. Mixed logistic estimations of the use of antidepressants and tranquilizers [a]

	Antidepressants		Tranquilizers	
	Exp (beta) (95% CI)	P-value	Exp (beta) (95% CI)	P-value
year (2006)				
2011	0.56 (0.18-2.53)	P=0.205	1.21 (0.26-5.49)	P=0.393
Sex (male)				
Female	1.38 (1.19-1.61)	P<0.01	1.48 (1.33-1.65)	P<0.01
Current activity (working)				
Unemployed short term	1.14 (0.81-1.60)	P=0.222	0.71 (0.53-0.96)	P=0.134
Unemployed long term	1.58 (1.09-2.28)	P<0.01	1.25 (0.92-1.70)	P=0.074
Retired	1.44 (1.21-1.71)	P<0.01	1.43 (1.25-1.63)	P<0.01
Studying	0.45 (0.23-0.89)	P=0.010	0.59 (0.38-0.90)	P<0.01
Homemaker	1.16 (0.98-1.37)	P=0.041	1.35 (1.19-1.53)	P<0.01
Interactions				
sex*year	1.76 (1.25-2.47)	P<0.01	1.03 (0.84-1.27)	P=0.385
activity*year (1)	0.43 (0.15-1.19)	P=0.052	0.91 (0.51-1.62)	P=0.376
activity*year (2)	0.48 (0.24-0.95)	P=0.017	0.72 (0.45-1.15)	P=0.084
activity*year (3)	0.63 (0.43-0.95)	P=0.013	0.78 (0.63-0.97)	P=0.011
activity*year (4)	0.82 (0.10-6.83)	P=0.427	0.76 (0.29-1.95)	P=0.283
activity*year (5)	0.47 (0.10-2.09)	P=0.159	0.57 (0.28-1.17)	P=0.064
activity*year*sex (1)	1.64 (0.55-4.90)	P=0.186	1.34 (0.72-2.50)	P=0.179
activity*year*sex (2)	1.30 (0.65-2.60)	P=0.229	1.46 (0.93-2.29)	P=0.052
activity*year*sex (3)	1.56(1.01-2.42)	P=0.023	1.27 (0.99-1.63)	P=0.029
activity*year*sex (4)	0.67 (0.06-7.94)	P=0.377	1.02 (0.36-2.93)	P=0.483
activity*year*sex (5)	2.43 (0.54-10.96)	P=0.124	1.83 (0.88-3.78)	P=0.052

a Global statistical results of variables of interest from the model

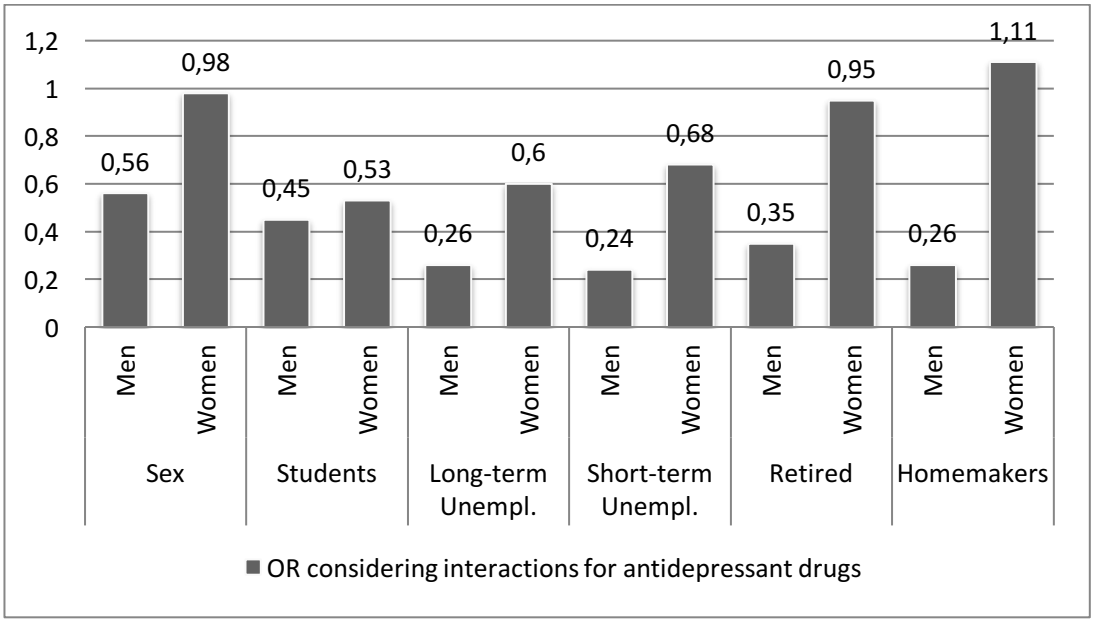
Table 4. Mixed logistic estimations of covariates of the use of antidepressants and tranquilizers [a]

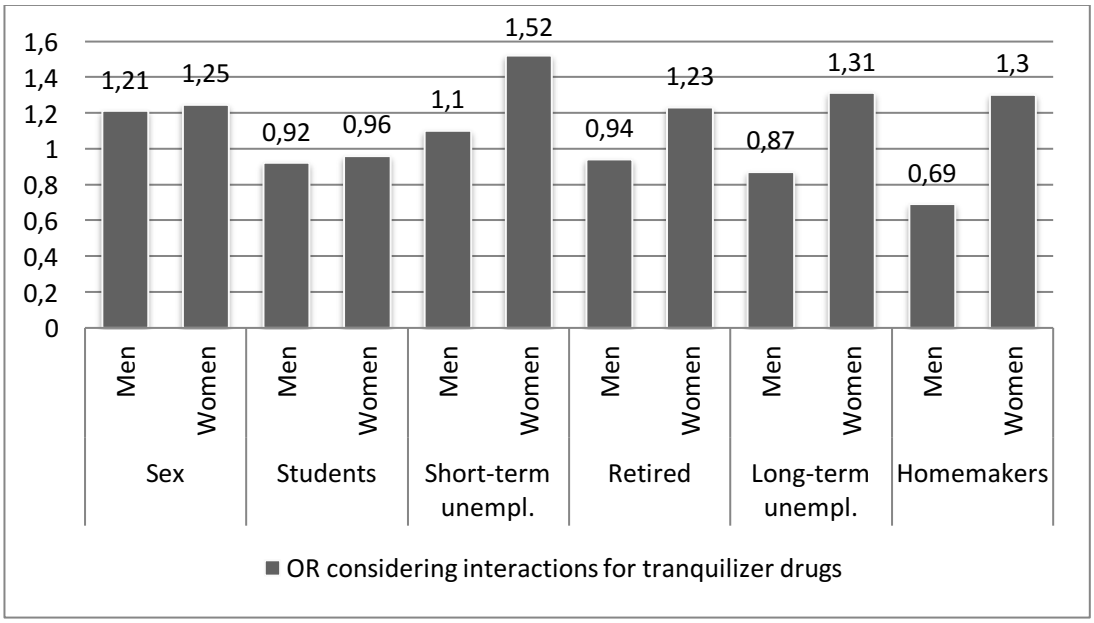
	Antidepressants		Tranquilizers	
	Exp (beta) (95% CI)	P-value	Exp (beta) (95% CI)	P-value
Intercept	0.0014 (6.20e^{-4}-0.0033)	P<0.01	0.008 (0.0037-0.0183)	P<0.01
Sociodemographic variables				
Age (15-35 years old)				
36-45 years old	1.48 (1.21-1.81)	P<0.01	1.51 (1.31-1.74)	P<0.01
46-55 years old	1.83 (1.49-2.24)	P<0.01	1.77 (1.54-2.05)	P<0.01
56-65 years old	2.15 (1.73-2.66)	P<0.01	2.10 (1.80-2.44)	P<0.01
66-75 years old	1.77 (1.40-2.25)	P<0.01	2.50 (2.10-2.96)	P<0.01
>75 years old	1.28 (0.99-1.66)	P=0.028	2.82 (2.35-3.37)	P<0.01
Education (None)				
Primary	1.22 (1.08-1.38)	P<0.01	1.19 (1.09-1.30)	P<0.01
Secondary	1.33 (1.11-1.59)	P<0.01	1.31 (1.15-1.48)	P<0.01
Tertiary	1.46 (1.21-1.77)	P<0.01	1.16 (1.02-1.33)	P=0.014
Marital Status (single)				
Married	0.99 (0.86-1.14)	P=0.455	0.90 (0.82-0.99)	P=0.017
Widowed	0.97 (0.82-1.16)	P=0.377	1.05 (0.93-1.19)	P=0.201
Separated	1.02 (0.79-1.32)	P=0.435	1.12 (0.92-1.35)	P=0.132
Divorced	1.29 (1.01-1.65)	P=0.020	1.08 (0.90-1.30)	P=0.206
Social Class (class I)				
Class II	0.93 (0.75-1.16)	P=0.256	0.99 (0.86-1.15)	P=0.466
Class III	1.03 (0.86-1.23)	P=0.368	0.87 (0.77-0.98)	P<0.01
Class IV	0.99 (0.83-1.18)	P=0.456	0.92 (0.82-1.04)	P=0.099
Class V	1.06 (0.89-1.27)	P=0.252	0.90 (0.80-1.02)	P=0.045
Class VI	0.95 (0.79-1.15)	P=0.307	0.86 (0.75-0.98)	P=0.011
Health variables				
Depression	28.71 (25.53-32.28)	P<0.01	7.60 (6.61-7.61)	P<0.01
Mental health	1.89 (1.66-2.15)	P<0.01	1.97 (1.75-2.21)	P<0.01
SAH (very good)				
Good	1.61 (1.22-2.11)	P<0.01	1.58 (1.35-1.85)	P<0.01
Fair	2.44 (1.85-3.21)	P<0.01	2.55 (2.17-2.99)	P<0.01
Bad	3.10 (2.32-4.13)	P<0.01	3.36 (2.81-4.00)	P<0.01
Very bad	3.04 (2.21-4.18)	P<0.01	3.65 (2.96-4.52)	P<0.01
Chronic diseases	1.45 (1.26-1.68)	P<0.01	1.88 (1.73-2.05)	P<0.01
Smoker (No)				
Yes (current)	1.15 (1.01-1.31)	P=0.016	1.17 (1.07-1.29)	P<0.01
Yes (past)	0.88 (0.77-1.01)	P=0.036	1.07 (0.98-1.17)	P=0.069
Sleep (<=7)	1.26 (1.15-1.38)	P<0.01	0.81 (0.76-0.87)	P<0.01
BMI (underweight)				
Normal weight	1.02 (0.88-1.18)	P=0.412	1.08 (0.97-1.20)	P=0.073
Overweight	1.24 (1.07-1.43)	P<0.01	1.07 (0.96-1.18)	P=0.110
Obese	1.19 (1.02-1.39)	P=0.011	0.95 (0.85-1.06)	P=0.178
Physical activity (sitting)				
Standing	0.89 (0.81-0.99)	P=0.022	0.81 (0.76-0.87)	P<0.01
Walking and carrying	0.83 (0.69-0.99)	P=0.019	0.77 (0.68-0.87)	P<0.01
Heavy tasks	0.66 (0.45-0.98)	P=0.020	0.83 (0.64-1.07)	P=0.071
Medical visits	1.44 (1.31-1.58)	P<0.01	1.57 (1.47-1.68)	P<0.01

a Global statistical results from the model of the covariates

Figure 1. The risk of consuming antidepressant drugs in 2011-12 compared to 2006

Figure 2. The risk of consuming tranquilizer drugs in 2011-12 compared to 2006





5.3
Influence of the maternal background on children's mental health

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Influence of the maternal background on children's mental health

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ABSTRACT

Background

In this paper we aim to discern how a mother's health and her socioeconomic determinants, may influence her children's mental health. In addition to this, we also evaluate the influence of other household characteristics and whether or not the economic downturn has heightened the effect a parent's social gradient has on their children's mental health.

Methods

We use samples comprised of 4-14 year-old minors from the 2006 Spanish National Health Survey (SNHS), which was undertaken prior to the crisis, and the 2011 SNHS carried out during the crisis. The participating children's mental health is assessed using the Strengths and Difficulties Questionnaire (SDQ). Mixed models are used to evaluate the influence a mother's health and her socioeconomic status may have on her children's mental health. We also add interactions to observe the effect specific socioeconomic determinants may have during the economic downturn.

Results

The risk of a child suffering from mental health disorders increases when their mother has mental health problems. Socioeconomic determinants also play a role as a low socioeconomic status (SES) increases the risk of a child exhibiting behavioural problems, being hyperactive or antisocial, whereas when a mother has attained a high level of education, this significantly reduces the probability of a child having mental health problems. 'Homemaker' is the activity status most positively related to children's mental health. The findings show that the Spanish economic downturn has not significantly changed children's mental health problems and the negative effects of low maternal SES are no greater than before the crisis. The main difference in 2011, with respect to 2006, is that the risk of children suffering from mental health problems is higher when their parents are (long or short-term) unemployed.

Conclusions

In conclusion, both a mother's health and her socioeconomic status, as well as other household characteristics, are found to be related to her children's mental health. Although the crisis has not significantly changed mental health disorders in children or the social gradient of parents in general, children who are vulnerable are the most negatively affected in the Spanish economic downturn.

Keywords: maternal factors, children, mental health, SDQ, Spain.

1. Introduction

According to the World Health Organization (WHO) 10-20 percent of children and adolescents around the world suffer from mental health problems, and their healthy development and productive lives in the future is of special concern (WHO, 2001; 2016). However, when only the most severe cases are considered, children and adolescents suffering from mental health problems is about 4-6 percent (WHO, 2005). Half of all mental health problems begin during childhood (Kessler et al., 2005) and in the US alone, child and adolescent mental health problems cost US $247 billion annually (National Research Council and Institute of Medicine, 2009) and, more importantly, an improvement in the mental health of only one child can save US $140.000 over the lifetime of that child (Smith and Smith, 2010). In Spain, one million children and adolescents suffered from mental health disorders in 2015 (ESCAP, 2015). The main results from the Health Survey of Catalonia using the Strengths and Difficulties Questionnaire (SDQ) (Catalan Health Department, 2014), shows that the likelihood of reporting a mental health problem is about 3.8% in 4-15 year-olds, whereas in 2006 it was about 6.8%. However, over the last five years the number of children and adolescents attending a Children and Young People's Mental Healthcare Center (CSMIJ) with a severe mental health problem has increased by 53% (Coscolla et al., 2016).

As such, parental circumstances are key in children's growth and development (UNICEF, 2009) and in specific, since studies have argued that maternal factors are the strongest predictor of negative outcomes for children (Olson et al., 2002; Christensen, 2004; Goodman, 2007; Cabrera et al., 2011), it is absolutely essential to study the role a mother plays in the mental health of her child. However, despite this need very little literature has focused on how maternal health and/or health behaviour are associated with her children's mental health (Kahn et al., 2004; Hardie and Landale, 2013). In the specific case of Spain, few studies have analysed the influence of maternal socioeconomic determinants (SES) on a child's mental health (Sonego et al., 2013).

In general, maternal health disorders are associated with the worst health outcomes of the children (Hardie and Landale, 2013). Most of the literature initially discusses the effects maternal mental health during pregnancy or postpartum has on children (Murray and Cooper, 1991; O'Connor et al., 2014) and then, given the importance of the mother's role as her child's caregiver (e.g. providing food and protection), further attention is placed on how maternal mental health affects children's mental health (Cummings and Davies, 1994; Psychosocial Paediatrics Committee, 2004). Thus, a child whose mother suffers from depression will have higher rates of disruptive behaviours in preschool (Spieker et al., 1999) and, more particularly, a higher ratio of emotional symptoms, problems with personal conduct and with their peers

(Field et al., 1988; van der Waerden et al., 2015). Using data from longitudinal studies, Cents et al. (2013) report that children whose mothers have higher trajectories of depressive symptoms have significantly more behavioural problems.

Furthermore, a family's low SES is also considered to pose a risk to a child's health. In particular, the literature agrees that families from low socioeconomic communities are considered a risk factor for the mental health of the child (Wille et al., 2008; Ravens-Sieberer et al., 2008), and studies using Spanish data also reach the same conclusion (Barriuso-Lapresa et al., 2012; Fajardo et al., 2015). Moreover, maternal SES is of particular interest as mothers tend to be more efficient at taking care of their children (Feinstein et al., 2008). As Feinstein et al. (2008) claim, more highly educated mothers are able to be more effective in providing the social support required to cope with the effect a mother's mental health disorders have on her children's health. Kalff et al. (2001) observe that low levels of parental education and occupation have an impact on children's behavioural problems. In Spain, Sonego et al. (2013) show a strong association between parental education and a child's mental health, especially when maternal education is analysed. In line with Sonego's results, it children whose mothers have lower levels of education have been demonstrated as tending to have poorer mental health (Barriuso-Lapresa et al., 2012). However, the focus should be on how both maternal health and a mother's socioeconomic status can affect specific mental health outcomes in children.

The Strengths and Difficulties Questionnaire (SDQ) has allowed researchers to elucidate factors related to children's mental health (Goodman, 1997; SDQ, 2016). In Spain in particular, the SDQ was validated by Rodríguez (2012) and since 2006 has been included in the Spanish National Health Survey (SNHS). Nevertheless, most of the research done to date is focused on the Total Difficulties Score (TDS-SDQ) (Barriuso-Lapresa et al. 2012; Rajmil et al., 2013; Fajardo et al., 2015; Rajmil et al., 2015), and few studies use the desegregated information from the five scales of mental health that the SDQ provides (Fonseca-Pedrero et al., 2011; Ministry of Health, Social Services and Equity, 2014; Cachadiña et al., 2015).

This paper aims to clarify how conditions, such as a mother's health and her socioeconomic determinants, are associated with the mental health of her child. We are specifically interested in the mental health and the socioeconomic status of mothers. In addition to this, we assess the influence other household characteristics may or may not have.

2. Methods

2.1 Data setting

We use individual-level data from the face-to-face cross-sectional population-based Spanish National Health Survey (SNHS) for two periods: 2006 (prior to the economic downturn) and 2011 (in the middle of the economic crisis). Every five years the SNHS is conducted jointly between the Ministry of Health, Social Services and Equity (MSSSI) and the National Statistics Institute (INE) and is a stratified tri-stage sample (MSSSI, 2006 and 2011). The first stage is the census tract and the second unit is the main family residence. The survey consists of three questionnaires: one for households, another for adults and a third for minors (aged 0 to 15 in SNHS-2006 and aged 0 to 14 in SNHS-2011). One adult is selected from each household to fill out the Adult's Questionnaire and, should there be any minors, one is (randomly) selected to fill out the Minor's Questionnaire. The survey is independent and representative of each Spanish region (Autonomous Communities). SNHS-2006 was conducted from June 2006 to June 2007 and the sample included 9,122 interviews concerning children and answered by either their mother, father or guardian. SNHS-2011 was carried out from July 2011 to June 2012, with 5,495 children interviews.

As the questionnaire's SDQ is aimed at 4 to 16-year-olds, we decide to take only those children aged between 4 and 14 (ages included in both periods, SNHS-2006 and SNHS-2011). In order to collect information about the household and the adult we take into account all three questionnaires. This, coupled with the fact that SDQ is more reliable with paternal responses, is why we only include those minors whose mother or father is the main respondent to the Adult's Questionnaire. For the analysis, however, we only take into account being related to the mother, which represents 72% of the sample. This resulted in 2,761 minors in 2006 and 1,339 in 2011.

In terms of the response variables, we use an SDQ questionnaire. SDQ is aimed at assessing the mental health of children, in our case based on the parents' responses, and is widely used in research (MSSSI, 2014). The questionnaire includes 25 statements about the child which are divided into five scales: four negative scales (emotional symptoms, behavioural problems, hyperactivity and problems with peers) and one positive scale (prosocial behaviour). Each scale has five questions, each of which is valued as 0, 1 or 2, for "not true", "somewhat true" and "certainly true" (3-point Likert-type scale). Therefore, the sum of each scale is valued 0 to 10, from good to bad mental health (and for the positive scale it is from bad to good mental health). In order to analyse all five scales to assess the mental health problems of the child, first we categorise each scale as a binary variable (where 1 indicates "probable cases" and 0 "no cases"), in accordance with Goodman, (1997), the Ministry of Health, Social Services and

Equity (2014), and COPMI, (2016), albeit bearing in mind we are interested in the antisocial behaviour rather than the prosocial behaviour as it is defined in SDQ. More detailed information is provided in Table 1.

The main explanatory variables are the maternal and household characteristics that can be divided into maternal health variables, maternal socioeconomic determinants and household characteristics. For maternal health variables, we include self-rated health (SRH), diagnosed depression, prescription for tranquilizers or antidepressants, (divided separately), the Goldberg's GHQ-12 mental health index (a counting variable, ranging 0-12 Goldberg, 1978), smoking behaviour, hours of sleep, physical activity in the workplace, Body Mass Index (BMI) (WHO, 2016) and self-perception weight (more information in Table 1).

Maternal socioeconomic determinants include age group, nationality, marital status, social class of the household reference person (Chilet-Rosell et al., 2012; Ministry of Health, Social Services and Equity, 2014), level of education, current activity status, and whether the mother is the household reference person. Finally, household characteristics are the number of children living and the number of adults living in the household (when it equals to 1 it is considered a single-parent family).

The covariates included in the analysis are related to child health outcomes and health behaviour variables e.g. self-rated health (SRH) as reported by the main respondent, reported chronic conditions, restriction of activities in the previous two weeks, hours of sleep, physical activity, breakfast habits, fresh fruit eating habits, fast food eating habits, mean hours of TV viewing per week or weekend, (separately), mean hours of playing video games per week or weekend, (separately), whether the child has been hospitalised in the previous year, number of GP visits, number of specialist visits and the quintiles for the Body Mass Index (BMI) (Costa-Font and Gil, 2013). We also include the sociodemographic variables of the child such as the region of residence (autonomous communities), sex, age and age groups (Ministry of Health, Social Services and Equity, 2014). Finally, we also include the year of the survey (2006, before the financial crisis, or 2011, during the economic downturn).

2.2 Statistical analysis

We estimated mixed logistic regressions, in order to estimate the probability of the corresponding response variable, emotional symptoms, behavioural problems, hyperactivity, problems with peers and antisocial behaviour occurring,

$$\mu_i = \text{Prob}(y_i = 1 \mid \text{X}_i, \beta)$$
$$\log\left(\frac{\mu_{1i}}{1-\mu_{1i}}\right) = \text{X}'_i\beta$$
$$Var\left(y_i \mid \text{X}_i, \beta\right) = \phi\mu_i\left(1-\mu_i\right)$$

where y denotes the variable response, X a matrix of explanatory variables (containing the intercept, and interaction terms between the period and some SES variables e.g. the social class of the household reference person, mother's education and mother's current activity), β the associated vector of unknown parameters, ϕ is a dispersion parameter, since the real variance of the response often differs from the theoretical, and the subindex i denotes the individual.

The logistic regressions are 'mixed', because we include random effects in all models in order to capture the individual heterogeneity. We assume they are identical and independent Gaussian random variables with constant variance, i.e. $\upsilon_{jt} \sim N\left(0, \sigma_\upsilon^2\right)$.

Because of the relative complexity of our models, inferences are performed using a Bayesian framework. This approach is considered the most suitable for accounting for model uncertainty (Maynou-Pujolràs et al., 2015), particularly that associated with the existence of individual heterogeneity. Furthermore, within the Bayesian approach, it is easy to specify a hierarchical structure on the (observable) data and (unobservable) parameters, all considered random quantities. It is important to note this fact because it implies that even when the random effects and regressors were correlated, estimators are consistent (Hsiao et al., 1999). Within the (pure) Bayesian framework, we follow the Integrated Nested Laplace Approximation (INLA) approach (Rue et al., 2009; Blangiardo et al., 2013).

We use penalising complexity (PC) priors. These priors are invariant to reparameterisations and have robustness properties (Simpson et al., 2015).

All analyses are made with the free software R (version 3.2.3) (R Core Team, 2016), available through the INLA library (Rue et al., 2009; R INLA project, 2016).

3. Results

Table 2 shows the descriptive statistics for the sample of children aged 4-14 for all variables used for each of the five mental health disorders analysed. It is worth mentioning that the most common mental health problem is hyperactivity (33.3% of the sample), followed by behavioural problems (31.1%), emotional symptoms (19.3%), problems with peers (16.8%) and, finally, antisocial behaviour (7.7%). In 2011, all percentages are lower than those of 2006. Children with fair, bad or very bad SRH also show higher percentages of mental health disorders compared to those who rate their health as very good or good, and the greatest differences can be found in hyperactivity. When the child is suffering from any of the health diseases analysed or has had any limitation during the last two weeks, in all cases the percentages of having mental health disorders are greater than with those children who are not suffering from any of these diseases (with the exception of antisocial behaviour due to the small sample size). Furthermore, children who sleep less than eight hours (compared to those who sleep more than eight hours), do not do physical activities, do not have breakfast (with the exception of problems with peers and antisocial behaviour), do not eat fruit regularly and usually eat fast food, present higher rates of mental health disorders. In general, the more hours spent watching TV or playing with video games, the higher the rates of presenting mental health problems are; albeit with the exception of during the weekends, where zero hours seem to have higher rates of problems than less than three hours does. In regard to healthcare use, if the child has been hospitalised, they present higher rates of mental health disorders and the mean of number of GP visits is close to one visit in all five cases, and close to 0.5 visits regarding the number of specialist visits. As for BMI, it does not seem that the fifth quintile presents higher rates compared to the others, but in general the lowest percentages can be found in the third quintile. Boys present higher percentages in all disorders, with the exception of emotional symptoms, when sociodemographic variables are taken into account. The age mean of all five disorders is close to 9 (with similar SD around 3), and the problems are more less equally distributed among the age groups, with the exception of hyperactivity which is more common in 4-7 year-olds. In terms of regions, the highest percentage of emotional symptoms is found in the Balearic Islands, behavioural problems and hyperactivity are highest in Murcia, problems with peers in the Canary Islands and, finally, antisocial behaviours are highest in Cantabria.

The second part of Table 2 shows the characteristics from the sample of the mothers. In this case, when the mother self-rates her health as fair, bad and very bad, suffers from depression, has prescriptions for tranquilizers or antidepressants and/or a higher mental health index (the mean is above 2), the percentage of her children to suffer from any of the five mental health disorders is greater. Besides, with the exception of antisocial behaviour, if the mother smokes

(often or occasionally) or used to smoke in the past (in this last case with the exception of problems with peers), sleeps more than eight hours, her daily working physical activity is walking and carrying things or doing heavy tasks, is obese and/or perceives her weight as being below or above normal, the children show higher percentages of suffering mental health disorders. With the SES variables, in general there is some diversity in the results, overall in the age of the mother, her nationality and marital status. The percentages of children that have mental health disorders are greater when the social class of the family is low or the mother has low levels of education. The current activity of the mother exhibits an unclear pattern and in this case, on the whole, unemployment status (long or short-term), compared to the working status (with the exception of antisocial behaviour), presents greater rates of children with any of the mental health problems analysed. As for household characteristics, the percentages are also higher when there are more than three minors in the household (with the exception of antisocial behaviour) and it is a single-parent family (with the exception of peer problems and antisocial behaviour).

The models are estimated with separately for each behaviour. Table 3 shows the results of the models of the variables of interest (maternal health variables, socioeconomic determinants and household characteristics). The results show that the determinants of the five conditions are not completely identical. A mother's depression negatively affects the emotional symptoms (OR=1.20, 95% IC=[0.92-1.57]) and the behavioural problems (OR=1.25, 95% IC=[0.99-1.59]) of the child, but reduces antisocial behaviour (OR=0.63, 95% IC=[0.39-1.04]). The risk of the child suffering mental health disorders increases when the mental health index of the mother is higher (which indicates poorer mental health), again with the exception of antisocial behaviour. In terms is smoking behaviour, results show that occasionally smoking reduces the risk of hyperactivity, smoking in the past reduces behavioural problems, hyperactivity and emotional problems, and mothers who are non-smokers reduce the probability of children having emotional symptoms, behavioural problems, being hyperactive or having peer problems in all cases when compared to mothers who are regular smokers. Our results also show that when the mother sleeps less than eight hours, the risk of antisocial behaviours is reduced. In terms of physical activity in the mother's workplace, when the results are compared to 'sitting the whole or part of the day', 'standing' worsens the emotional symptoms of the child, whereas, 'walking and carrying things' does the same with peer and emotional problems, and 'doing heavy tasks' worsens the behavioural and peer problems of the child. Overweight or obese mothers (using the BMI) lead to a significant reduction in the risk of the child of having behavioural problems and hyperactivity when compared to under and normal weight. However, the weight perception of the mother as normal (compared to much more than normal) reduces the risk of suffering the same mental health problems and also the emotional symptoms. Nevertheless, it does increase the risk of

antisocial behaviour (as does the less-than-normal perception). In regard to socioeconomic status, the risk of being hyperactive is reduced when the mother is 36-45 or 46-55 years old, compared to 15-35. On the one hand, foreign nationality increases the risk of having peer problems by 70% (OR=1.70, 95% IC=[1.25-2.32]), but on the other hand, reduces the risk of hyperactivity and having behavioural problems (in the latter case, being Spanish or having foreign nationality have the same significant association). Marital status has an unclear pattern as being divorced increases the probability of antisocial behaviour, but reduces the emotional symptoms of the child. However, being widowed reduces the risk of the child being hyperactive, as does being married, which also reduces the risk of peer and behavioural problems. Besides, the social class of the family shows that lower socioeconomic status significantly increases the risk of the child being hyperactive, having behavioural problems, and antisocial behaviour (with the exception of class III compared to class I-II where the risk of the child of suffering peer problems is improved). On the other hand, children whose mothers have a high level of education are less at risk from suffering from hyperactivity, emotional symptoms, having behavioural problems, or peer problems, compared to children with uneducated mothers. The risk of the child suffering from hyperactivity, behavioural problems and emotional symptoms is significantly reduced when the mother is a homemaker (OR=0.76, 95% IC=[0.61-0.95]; OR=0.75, 95% IC=[0.60-0.94]; OR=0.76, 95% IC=[0.58-0.99], respectively). However, retired mothers reduce the risk of suffering from peer and emotional problems, and the risk of behavioural problems is reduced with long-term unemployed mothers. Mothers who are studying increase the risk of hyperactivity (OR=2.27, 95% IC=[0.84-6.15]). In terms of household characteristics, three minors in the household negatively affect the risk of antisocial behaviour and more than three the behavioural problems, whereas one single mother positively affects the risk of having antisocial behaviour and peer problems, but between three or four adults at home worsens the risk of hyperactivity and antisocial behaviour. Finally, when the interactions between the period of the survey and some SES are added, the results show that in 2011 the risk of the child suffering from hyperactivity or emotional symptoms increases when the mother is a homemaker or retired (respectively) compared to 2006. In terms of the mother's unemployment, short-term unemployment increases the risk of suffering from peer problems and antisocial behaviour compared to 2006, and long-term unemployment also increases the risk of suffering from behavioural problems and hyperactivity. Finally, it seems that in 2011 the risk of suffering from an antisocial behaviour mental health disorder is reduced for low social classes and all mother levels studied compared to 2006. The risk of the hyperactivity and emotional problems in the class IV, V, VI, is also reduced when compared to 2006.

Table 4 shows the results of the covariates used to control the analysis. According to our results, the year of the survey is not statistically significant in the majority of the mental health disorders

analysed. However, the results indicate that the risk of antisocial behaviour has been reduced in 2011 compared to 2006 (OR=0.49, 95% IC=[0.54-43]). Boys are at greater risk than girls for all the mental disorders, except emotional symptoms. The likelihood of suffering from emotional symptoms, hyperactivity, behavioural and/or peer problems increases when the SRH of the child is fair, bad and very bad. Also, when the child suffers from epilepsy this increases the risk of suffering from all the mental health disorders studied (with the exception of antisocial behaviour), but while other not-specified illnesses reduce behavioural problems and antisocial behaviour they increase emotional symptoms and peer problems. Hours of sleep is also an important factor as sleeping less than eight hours significantly increases the risk of suffering emotional symptoms, problems with peers and behavioural problems, whereas sleeping more than ten hours reduces the risk of peer problems and antisocial behaviour. Another important aspect is that physical activity, when compared to not doing sports at all, significantly reduces the likelihood of having any mental health problem in general. Eating fresh fruit reduces the likelihood of hyperactivity, having emotional symptoms and behavioural problems, and although eating fast food improves antisocial behaviour it heightens the risk of being hyperactive. With the number of hours watching TV, it seems that while spending more hours during the week increases the risk of a child having behavioural problems or being hyperactive, during the weekend less than three hours can improve behavioural problems and antisocial behaviour, but more than three hours significantly worsens problems with peers. On the other hand, playing video games less than three hours per week significantly worsens the risk of having peer problems although playing between three and seven hours improves emotional symptoms and behavioural problems. Playing video games during the weekend only increases the risk of suffering from peer problems, because hyperactivity, emotional problems and antisocial behaviour are negatively affected. In terms of healthcare use, hospitalisation during the last year increments the risk of suffering from antisocial behaviour and, while the number of GP visits is related to the risk of having emotional symptoms and peer problems, the number of specialist visits is not related to mental health problems. Finally, the fifth quintile is associated with poor emotional symptoms, but the fourth quintile slightly improves behavioural problems.

4. Discussion

This paper's main contribution to the literature is identifying that SES and maternal health (specifically mental health) are mutually associated with children's health. Previous research has treated these two areas separately when determining that low SES or paternal mental health problems deteriorate the mental health of the child, but the mutual association (i.e. considering both elements for the mother) is important in clarifying the main factors related to a child's mental health, as the subsequent consequences may be far-reaching and even have an impact

on their adulthood. Furthermore, the need for more research into this topic is easily justified by the economic costs associated with mental health problems in adolescents and children (Buka et al., 2002). Moreover, we are able to discern differences in the effects of the maternal SES on child mental health during the period of the financial crisis. In all this, it is worth mentioning that, although children's mental health in general has not deteriorated, the focus should be placed on the most vulnerable children.

Firstly, it is important to highlight the main differences between boys and girls and the specific mental health problems. As Fonseca-Pedrero et al. (2011) conclude in their work, in general we find that the risk of suffering from hyperactivity, peer problems and behavioural problems is higher for boys than for girls, whereas emotional symptoms and prosocial behaviours are found more commonly among girls (Garner et al., 1997; Ministry of Health, Social Services and Equity, 2014).

Unlike the work in the Monographic Report carried out by the MSSSI (2014), in our study the number of specialist visits, BMI, hospitalisations during the previous year, not having breakfast, as well as the limitations of the child during the last two weeks, are weakly or not associated with the mental health of the child. Moreover, neither do we find strong associations with the age of the children (Prior et al., 2005).

As Hardie and Landale (2013) also conclude, we find that socioeconomic and maternal health factors are associated with children's health outcomes. More specifically, maternal health, such as depression, is associated with higher risks of emotional symptoms and behavioural problems, and the mental health index is also associated with hyperactivity and peer problems (Field et al., 1988; Spieker et al., 1999; Cents et al., 2013; van der Waerden et al., 2015).

Alongside this, SES is associated with children's mental health. In particular, the relationship between the social class of the breadwinner and the general mental health of the child has been demonstrated using the SDQ-TDS (Barriuso-Lapresa et al., 2012, Ministry of Health, Social Services and Equity, 2014). As our results show, the lowest socioeconomic group compared to the highest socioeconomic group indicates that the risk of having behavioural problems and hyperactivity increase for children from lower socioeconomic backgrounds. In terms of the level of a mother's education, we find that a low education level is positively strongly associated with all mental health disorders of the child (Barriuso-Lapresa et al., 2012; Di Cesare et al., 2013; Sonego et al., 2013), albeit with the exception of antisocial behaviour. Thus, our results are also consistent with Barriuso-Lapresa et al. (2012) who draw attention to the importance of the social gradient in terms of a mother's maternal education and her family's socioeconomic

circumstances as well. In regard to the mother's current status, the role maternal employment plays in a child's mental health has scarcely been studied. Our results are in line with one of the few studies available, that of Mukherjee and Fink (2008), because we also conclude that children whose mothers spend more time at home are less likely to suffer from mental health problems. As we have observed, mothers who are retired and/or homemakers improve some mental health disorders, along with long-term unemployed mothers who slightly improve the risk of suffering from behavioural problems.

As Golberstein et al. (2016) point out, the literature about the effects of economic conditions on children's mental health is scarce. However, the concern about economic conditions and children's health is well established (Fernández-Rivas and González-Torres, 2013; Kolaitis and Giannakopoulos, 2015). In this paper, we suggest that during the Spanish economic downturn the mental health problems of children have not significantly changed (in contrast to Golberstein et al.'s work), with the exception of antisocial behaviour which actually improved in 2011 compared to 2006. We also conclude that during the economic downturn the negative effects of low maternal SES do not appear to be greater compared to before the crisis. This would mean that during the financial crisis the differences between social classes, maternal levels of education and maternal current activity status have not widened. Specifically, the gradient of maternal level of education has not widened but rather has persisted (Rajmil et al., 2013), and in regard to the gradient of social class, children from lower social class families have experienced reductions in the risk of suffering from some mental health conditions although those children have a relatively higher baseline probability of experiencing these mental health illnesses. In fact, the main difference in 2011, with respect to 2006, is that the risk of children whose parents are unemployed (long or short-term) from suffering from mental health problems is higher; as Rajmil et al. (2015) also conclude but in their case for the unemployment of all family members. In any case, it seems that during the economic downturn children of families suffering from unemployment are more vulnerable than children of lower social class families.

This study faces some limitations that must be taken into consideration. First of all, it is worth mentioning that although SDQ highly correlates with outcomes such as mental health services and special education services (Pastor et al., 2012), and it increases the ability to detect any psychiatric disorders a child may be suffering from as well as improves access to effective treatments (Goodman et al., 2000), the questionnaire has some limitations that have already taken into consideration by its authors (Goodman, 1997). In addition, as the MSSSI report (2014) also clarifies, the desegregated mental health problems and the categorization of the mental health disorders slightly reduces the performance of the SDQ tool. Secondly, as Goodman et al. (2000) contemplate, the SDQ works better with the responses from caregivers and teachers.

This is the reason for only taking into account parents and taking out any other relationship between the adult and the child. However, in doing so, the sample size has been considerably reduced and suffers from the disadvantages that causes. Thirdly, although some research is concerned about the influence of parents' mental health disorders on the parent-reported mental health of the child, it has been proved that there is no relationship (Dadds et al., 1995; Lewis et al., 2012; Golberstein et al., 2016). Besides, the correlations considered between SES and maternal health are controlled by the range of outcomes we introduced in the analysis. Finally, it is important to mention that the cross-sectional design of the SNHS has its limitations when assessing relationships and does not allow us to conclude direct relationships between maternal factors and children's mental health.

5. Conclusions

Both maternal health and SES, (along with other household characteristics) are found to be related to children's mental health. Consequently, greater attention has to be paid to children whose mothers have weak health and low SES. In conclusion, although in general the financial crisis has not significantly changed the mental health disorders of children and the social gradient of parents, the most negatively affected during the Spanish economic downturn are children who are vulnerable because of their family situation. This, and given the long-term consequences that poor mental health in childhood has in adulthood, means better public health policies and programs addressing this specific subgroup need to be formulated to protect them from the negative impacts of poor economic conditions.

Conflict of Interest

There are no conflicts of interest for any of the authors. All authors will disclose any actual or potential conflict of interest including any financial, personal or other relationships with other people or organizations within three years of beginning the submitted work that could inappropriately influence or be perceived to influence their work.

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References

1.- World Health Organization (WHO). The World Health Report 2001. Mental Health: New Understanding, New Hope. Available at: http://www.who.int/whr/2001/en, last access: 11.08.2016.

2.- World Health Organization (WHO). 10 facts on mental health. Fact File 2016. [Online] http://www.who.int/features/factfiles/mental_health/mental_health_facts/en, last access: 17.08.2016.

3.- World Health Organization (WHO). (2005) Atlas: child and adolescent mental health resources: global concerns, implications for the future. WHO Library Cataloguing-in-Publication Data.

4.- Kessler, R.C., Berglund, P., Demler, O., Jin, R., Merikangas, K.R., Walters, E.E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry, 62(6), 593-602.

5.- National Research Council and Institute of Medicine. (2009). Preventing Mental, Emotional, and Behavioral Disorders among Young People: Progress and Possibilities. The National Academies Press, Washington, D.C.

6.- Smith, J.P., Smith, G.C. (2010). Long-Term Economic Costs of Psychological Problems During Childhood. Social Science & Medicine, 71(1), 110-115.

7.- ESCAP. (2015). Abstracts of the 16th International Congress of ESCAP European Society for Child and Adolescent Psychiatry. 20-24 June 2015, Madrid, Spain. Eur Child Adolesc Psychiatry, 24(S1), 1-303.

8.- Catalan Health Department. (2014). Health Survey of Catalonia. Main results report [in Catalan]. Barcelona: Government of Catalonia.

9.- Coscolla, R., Martínez, S., Poll, M. (2016). Attention to the children and adolescent mental health in Catalonia [in Catalan]. Fundació Pere Tarrés and Federació Salut Mental de Catalunya.

10.- UNICEF. (2009). Social and economic policy working paper 2009. Aggregate shocks, poor households and children: transmission channels and policy responses. Availabe at: http://www.unicef.org/socialpolicy/files/Postscript_Formatted_AGGREGATE_SHOCKS_AND_CHILDREN_3.04.09(1).pdf, last access: 10.08.2016.

11.- Olson, S.L., Ceballo, R., Park, C. (2002). Early Problem Behavior Among Children from Low-Income, Mother-Headed Families: A Multiple Risk Perspective. Journal of Clinical Child & Adolescent Psychology, 31(4), 419-430.

12.- Christensen, P. (2004). The health-promoting family: A conceptual framework for future research. Social Science & Medicine, 59, 377–387.

13.- Goodman, S.H. (2007). Depression in mothers. Annual Review of Clinical Psychology, 3, 107–135.

14.- Cabrera, N., Fagan, J., Wight, V., Schadler, C. (2011). The influence of mother, father, and child risk on parenting and children's cognitive and social behaviors. Child Dev., 82(6), 1985–2005.

15.- Kahn, R.S., Brandt, D., Whitaker, R.C. (2004). Combined Effect of Mothers' and Fathers' Mental Health Symptoms on Children's Behavioral and Emotional Well-being. Arch Pediatr Adolesc Med., 158(8), 721-729.

16.- Hardie, J.H., Landale, N.S. (2013). Profiles of Risk: Maternal Health, Socioeconomic Status, and Child Health. Journal of marriage and the family, 75(3), 651-666.

17.- Sonego, M., Llácer, A., Galán, I., & Simón, F. (2013). The influence of parental education on child mental health in Spain. Qual Life Res, 22, 203.

18.- Murray, L., & Cooper, P. (1991). Postnatal depression and infant development. BMJ, 302, 978-979.

19.- O'Connor, T.G., Monk, C., & Fitelson, E.M. (2004). Practitioner Review: maternal mood in pregnancy and child development—implications for child psychology and psychiatry. J Child Psychol Psychiatry, 55, 99-111.

20.- Cummings, M., & Davies, M. (1994). Maternal Depression and Child Development. J Child Psychol Psychiatry, 35(1), 73–122.

21.- Psychosocial Paediatrics Committee. (2004). Maternal depression and child development. Paediatr Child Health, 9(8), 575.

22.- Spieker, S.J., Larson, N.C., Lewis, S.M., Keller, T.E., & Gilchrist, L. (1999). Developmental trajectories of disruptive behavior problems in preschool children of adolescent mothers. Child Dev., 70(2), 443-58.

23.- Field, T., Masi, W., Goldstein, S., & Perry, S. (1988). Infant day care facilitates preschool social behavior. Early Childhood Research Quarterly, 3, 341–359.

24.- Van der Waerden, J., Galéra, C., Larroque, B., Saurel-Cubizolles, M.J., Sutter-Dallay, A.L., & Melchior, M. (2015). Maternal Depression Trajectories and Children's Behavior at Age 5 Years. J Pediatr, 166, 1440-8.

25.- Cents, R.A., Diamantopoulou, S., Hudziak, J.J., Jaddoe, V.W., Hofman, A., Verhulst, F.C., Lambregtse-van den Berg, M.P., & Tiemeier, H. (2013). Trajectories of maternal depressive symptoms predict child problem behaviour: The Generation R Study. Psychological Medicine, 43(1), 13-25.

26.- Wille, N., Bettge, S., Ravens-Sieberer, U., & the BELLA Study Group. (2008). Risk and protective factors for children's and adolescents' mental health: results of the BELLA study. European Child & Adolescent Psychiatry, 17(1).

27.- Ravens-Sieberer, U., Erhart, M., Gosch, A., Wille, N., & European KIDSCREEN Group. (2008). Mental health of children and adolescents in 12 European countries-results from the European KIDSCREEN study. Clin Psychol Psychother, 15(3), 154-63.

28.- Barriuso-Lapresa, L., Hernando-Arizaleta, L., & Rajmil, L. (2012). Social Inequalities in Mental Health and Health-Related Quality of Life in Children in Spain. Pediatrics, 130, 528.

29.- Fajardo Bullón, F., León del Barco, B., Castaño, E.F., Polo del Río, M.I., & Ribeiro Dos Santos, E.J. (2015). Mental health in Spanish minors. Socioeducational variables [in Spanish]. Salud Mental, 38(5), 329-335.

30.- Feinstein, L., Duckworth, K., & Sabates, R. (2008). Education and the family. Passing success across the generations. London: Routledge.

31.- Kalff, A.C., Kroes, M., Vles, J.S., Bosma, H., Feron, F.J., Hendriksen, J.G., Steyaert, J., van Zeben, T.M., Crolla, I.F., & Jolles, J. (2001). Factors affecting the relation between parental education as well as occupation and problem behaviour in Dutch 5- to 6-year-old children. Social Psychiatry and Psychiatric Epidemiolog., 36(7), 324–331.

32.- Goodman, R. (1997). The Strengths and Difficulties Questionnaire: a research note. J Child Psychol Psychiatry, 38, 581–6.

33.- SDQ. Information for researchers and professionals about the Strengths and Difficulties Questionnaires. Available at: http://www.sdqinfo.com, last access: 11.08.2016.

34.- Rodríguez-Hernández, P.J., Betancort, M., Ramírez-Santana, G.M., García, R., Sanz-Álvarez, E., & de las Cuevas-Castresana, C. (2012). Psychometric properties of the parent and teacher versions of the strengths and difficulties questionnaires (SDQ) in a Spanish sample. Int J Clin Health Psychol., 12, 265-279.

35.- Rajmil, L., Medina-Bustos, A., Fernández de Sanmamed, M.J., & Mompart-Penina, A. Impact of the economic crisis on children's health in Catalonia: a before-after approach. BMJ Open, 3(8).

36.- Rajmil, L., Siddiqi, A., Taylor-Robinson, D., & Spencer, N. (2015). Understanding the impact of the economic crisis on child health: the case of Spain. International Journal for Equity in Health, 15, 19:95.

37.- Fonseca-Pedrero, E., Paino, M., Lemos-Giráldez, S., & Muñiz, J. (2011). Prevalence of emotional and behavioral symptoms in Spanish adolescents through the Strengths and Difficulties Questionnaire (SDQ) [in Spanish]. Revista de Psicopatología y Psicología Clínica, 16, 15-25.

38.- Ministry of Health, Social Services and Equity. (2014). Spanish National Health Survey Report 2011/12. Mental health and quality of life in the child population [in Spanish]. Informes monográficos nº 2. Madrid.

39.- Cachadiña Doménech, F., Ajram Maksound, J., Lostal Gracia, M.I., Esteve Cornejo, C., & Santamaría Orleans, A. (2015). Impact of behavioral problems in children under 12 and their families: the EPOCA study [in Spanish]. Acta Pediatr Esp, 73(9), 219-228.

40.- Ministry of Health, Social Services and Equity. National Health Survey in Spain 2006 and 2011. Householder's questionnaire and adult's questionnaire [in Spanish]: http://www.msssi.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2006.htm, last access: 20.07.2016 http://www.msssi.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2011.htm, last access: 20.07.2016.

41.- Children of parents with a mental illness (COPMI). Scoring the Informant-Rated Strengths and Difficulties Questionnaire. Available at: http://www.copmi.net.au/images/pdf/Research/sdq-english-uk-pt-scoring.pdf, last access: 11.08.2016.

42.- Goldberg, D. (1978). Mental health priorities in a primary care setting. Ann. N. Y. Acad. Sci., 310, 65–68.

43.- World Health Organization (WHO). Body Mass Classification, 2016. Available at: http://apps.who.int/bmi/index.jsp?introPage=intro_3.html, last access: 15.04.2016.

44.- Chilet-Rosell, E., Álvarez-Dardet, C., & Domingo-Salvany, A. (2012). Use of Spanish proposals for measuring social class in health sciences. Gac Sanit., 26, 566–569.

45.- Costa-Font, J., & Gil, J. (2013). Intergenerational and socioeconomic gradients of child obesity. Social Science and Medicine, 93, 29-37.

46.- Maynou-Pujolràs, L., Saez, M., Bacaria, J., & López-Casasnovas, G. (2015). Health inequalities in the European Union: An empirical analysis of the dynamics of regional differences. European Journal of Health Economics, 16(5), 543-559.

47.- Hsiao, C., Pesaran, M.H., & Tahmiscioglu, A.K. (1999). Bayes estimation of short-run coefficients in dynamic panel data models. In Hsiao, C., Lee, L.F., Lahiri, K., & Pesaran, M.H. (eds). Analysis of Panels and Limited Dependent Variables Models. Cambridge: Cambridge University Press, pp. 268-206.

48.- Rue, H., Martino, S., & Chopin, N. (2009). Approximate Bayesian inference for latent Gaussian models by using integrated nested Laplace approximations (with discussion). Journal of the Royal Statistical Society, Series B, 71(2), 319-392. Available at: https://www.math.ntnu.no/~hrue/r-inla.org/papers/inla-rss.pdf, last access: 20.08.2016.

49.- Blangiardo, M., Cameletti, M., Baio, G., & Rue, H. (2013). Spatial and spatio-temporal models with R-INLA. Spatial and Spatio-temporal Epidemiology, 4, 33-49.

50.- Simpson, D.P., Rue, H., Martins, T.G., Riebler, A., & Sørbye, S.H. (2015). Penalising model component complexity: A principled, practical approach to constructing priors. arxiv: 1403.4630. Available at: http://arxiv.org/abs/1403.4630, last access: 9.03.2016.

51.- R Core Team. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL. Available at: https://www.R-project.org/, last access: 9.03.2016.

52.- R INLA project. Available at: http://www.r-inla.org/home, last access: 9.03.2016.

53.- Buka, S.L., Monuteaux, M., & Earls, F. (2002). The Epidemiology of Child and Adolescent Mental Disorders. En M. T. Tsuang & M. Tohen (Eds.), Textbook in psychiatry epidemiology. New York: Willey-Liss, 629-656.

54.- Garner, P.W., Robertson, S., & Smith, G. (1997). Preschool children's emotional expressions with peers: The roles of gender and emotion socialization. Sex Roles, 36(11/12), 675–691.

55.- Prior, M., Virasinghe, S., & Smart, D. (2005). Behavioural problems in Sri Lankan schoolchildren. Social Psychiatry and Psychiatric Epidemiology, 40, 654-662.

56.- Di Cesare, M., Sabates, R., & Lewin, K.M. (2013). A double prevention: how maternal education can affect maternal mental health, child health and child cognitive development. Longitudinal and Life Course Studies, 4(3), 166 –179.

57.- Mukherjee, S., & Fink, G. (2008). The Impact of Maternal Employment on Child's Mental Health: Evidence from the NLSY-Child. Presented: Chicago, IL, Southern Economic Association Annual Meetings.

58.- Golberstein, E., Gonzales, G., & Meara, E. (2016). Economic conditions and children's mental health. NBER Working paper series 22459.

59.- Fernández-Rivas, A., & González-Torres, M.A. (2013).. Communications of the European Society for Child and Adolescent Psychiatry. Eur Child Adolesc Psychiatry, 22, 583–586.

60.- Kolaitis, G., & Giannakopoulos, G. (2015). Greek financial crisis and child mental health. The Lancet, 386, 335.

61.- Pastor, P.N., Reuben, C.A., & Duran, C.R. (2012). Identifying emotional and behavioral problems in children aged 4-17 years: United States, 2001-2007. Natl Health Stat Report, 24(48), 1-17.

62.- Goodman, R., Ford, T., Simmons, H., Gatward, R., & Meltzer, H. (2000). Using the Strengths and Difficulties Questionnaire (SDQ) to screen for child psychiatric disorders in a community sample. The British Journal of Psychiatry, 177(6), 534–539.

63.- Dadds, M.R., Stein, R.E., & Silver, E.J. (1995). The Role of Maternal Psychological Adjustment in the Measurement of Children's Functional Status. Journal of Pediatric Psychology., 20(4), 527-44.

64.- Lewis, K.J.S., Mars, B., Lewis, G., Rice, F., Sellers, R., Thapar, A.K., Craddock, N., Collishaw, S., & Thapar, A. (2012). Do parents know best? Parent-reported vs. child-reported depression symptoms as predictors of future child mood disorder in a high-risk sample. J Affect Disord., 141, 233-6

Tables

Table 1. Variables used in the analysis

Variable Role	Definition and comments
Binary Dependent Variables	Emotional symptoms. The five questions are: "Often complains of headaches, stomach-ache or sickness"; "Many worries, often seems worried"; "Often unhappy, down-hearted or tearful"; "Nervous or clingy in new situations, easily loses confidence"; and "Many fears, easily scared". Valued as one if the points is four or more.
	Behaviour problems. The five questions are: "Often has temper tantrums or hot tempers"; "Generally obedient, usually does what adults request"; "Often fights with other children or bullies them"; "Often lies or cheats"; and "Steals from home, school or elsewhere". Valued as one if the punctuation is three or more.
	Hyperactivity. The five questions are: "Restless, overactive, cannot stay still for long"; "Constantly fidgeting or squirming"; "Easily distracted, concentration wanders"; "Thinks things out before acting"; and "Sees tasks through to the end, good attention span". Takes the value of one if the punctuation is six or more.
	Peer problems. The five questions are: "Rather solitary, tends to play alone"; "Has at least one good friend"; "Generally liked by other children"; "Picked on or bullied by other children"; and "Gets on better with adults than with other children". Takes the value one if the punctuation is three or more.
	Prosocial behaviour. The five questions are: "Considerate of other people's feelings"; "Shares readily with other children (treats, toys, pencils, etc.)"; "Helpful if someone is hurt, upset or feeling ill"; "Kind to younger children"; and "Often volunteers to help others (parents, teachers, other children)". As we analyse the antisocial behaviour, the variable takes the value of one if the punctuation is below six.
Main independent variables	Maternal health variables: question on self-rated health (SRH) status in the last twelve months; depression, anxiety or other mental health disorders during the last twelve months; prescription for tranquilizers in the last two weeks; prescription for antidepressants during the last two weeks; Mental health index using the Goldberg Health Questionnaire (GHQ-12) (Goldberg, 1978); smoking behaviour categorised as smoker (reference category), occasional smoker, ex-smoker and non-smoker; hours of sleep; physical activity in the workplace categorised as sitting (reference category), standing up, walking and carrying things, or doing heavy tasks; BMI (WHO, 2016) categorized as: low and normal weight (BMI≤25kg/m2) (reference category), overweight (25kg/m2<BMI≤30 kg/m2), obesity (BMI>30 kg/m2) [30]. Both size and weight were reported by the individual; self-perception weight categorized as much more than normal (reference category), more than normal, normal and less than normal.
	Maternal socioeconomic determinants: age groups (15-35 years (reference category); 36-45; 45-55; 56-65; 66-75; +75); nationality categorised as Spanish (reference category), foreign and Spanish, and foreign; marital status categorised as single (reference category), married, widowed, separated and divorced; social class of the household reference person categorised as three groups: I-II class (reference category), III class and IV-V-VI class (Chilet-Rosell et al., 2012; Ministry of Health, Social Services and Equity, 2014); educational level categorised into four groups: no studies (reference category), primary school, secondary school, and tertiary education; current activity categorised as employed (reference category), retired, studying, homemaker, short-term unemployed and long-term unemployed; whether the mother is the household reference person.
	Household characteristics: number of children living in the household categorised as less than three (reference category), three or more than three; number of adults in the household (single parent, between three or four, more than four).
Covariates of the child	Child health variables: question on SRH reported by the main respondent in the last twelve months; reported chronic conditions e.g. allergy, asthma, diabetes, tumour, epilepsy or other illness; restriction of activities in the previous two weeks; hours of sleep categorised as between eight and ten hours (reference category), less than eight, more than ten; physical activity habits categorised as no activity (reference category), occasionally, several times per month and several times per week; not having breakfast, eating fresh fruit more than three times per week; eating fast food more than three times per week; the mean of TV viewing hours watching or playing video games (separately) during the week and during the weekend (separately) categorised as none (reference category), less than three hours, between three and less than seven hours, seven hours or more; whether the child has been hospitalised in the previous year; number of GP visits during the last four weeks; number of specialist visits during the last four weeks; and BMI calculated dividing the weight in kilograms by the height in squared meters, and then using quintiles to better compare them (Costa-Font and Gil, 2013).
	Sociodemographic characteristics: region of residence (17 autonomous communities); sex; age; and age groups (4-7 years, 8-10, 11-14).

Table 2. Analysis of the sample

	Emotional symptoms	Behavioural problems	Hyper-activity	Peer problems	Antisocial behaviour
Total	19.3%	31.1%	33.3%	16.8%	7.7%
Survey period (2006)	19.5%	32.2%	35.6%	18.0%	9.7%
2011	18.9%	28.8%	28.6%	14.3%	3.8%
CHILDREN VARIABLES					
Health variables					
SRH (Very good and good)	17.1%	29.8%	31.7%	15.5%	7.7%
Fair, Bad and very bad SRH	39.2%	43.4%	48.4%	28.5%	8.1%
Allergy (No)	18.2%	30.9%	32.5%	16.3%	8.0%
Yes	25.8%	32.3%	38.0%	19.3%	6.2%
Asthma (No)	18.7%	30.7%	32.7%	16.4%	7.9%
Yes	25.7%	35.4%	39.8%	20.5%	5.9%
Diabetes (No)	19.3%	31.1%	33.3%	16.8%	7.7%
Yes	28.6%	42.9%	42.9%	14.3%	0.0%
Tumour (No)	19.3%	31.2%	33.3%	16.8%	7.7%
Yes	20.0%	0.0%	60.0%	20.0%	0.0%
Epilepsy (No)	19.1%	31.0%	33.1%	16.5%	7.7%
Yes	41.2%	50.0%	62.5%	45.5%	16.1%
Other illness (No)	18.3%	31.3%	32.8%	16.1%	8.0%
Yes	27.6%	29.8%	37.8%	22.0%	5.4%
Limitation last two weeks (No)	18.1%	30.5%	32.7%	15.9%	8.1%
Yes	28.4%	35.7%	38.1%	23.0%	4.9%
Sleep (>=8 and <=10)	18.7%	30.1%	32.4%	16.8%	8.1%
<8 hours	36.8%	44.3%	42.6%	28.1%	6.2%
>10 hours	19.5%	35.3%	38.1%	14.1%	5.6%
Physical activity (No)	29.1%	39.2%	38.3%	27.6%	12.2%
Occasionally	19.5%	32.5%	35.0%	18.8%	10.1%
Several times per month	17.1%	29.5%	32.2%	13.5%	6.4%
Several times per week	17.1%	26.6%	29.5%	11.8%	3.1%
No breakfast	28.3%	42.3%	41.5%	15.1%	7.5%
Yes	19.2%	31.0%	33.3%	16.8%	7.8%
Fresh fruit (no)	23.5%	38.6%	39.3%	19.7%	8.1%
Yes	18.4%	29.5%	32.0%	16.2%	7.7%
Fast food (no)	19.2%	30.5%	32.6%	16.5%	8.0%
Yes	20.3%	35.3%	38.2%	18.7%	6.2%

	Emotional symptoms	Behavioural problems	Hyper-activity	Peer problems	Antisocial behaviour
Hours of TV, week (none)	17.0%	24.7%	29.6%	15.1%	8.9%
>0 and <3 hours	19.3%	32.8%	33.4%	16.4%	6.7%
>=3 and <7 hours	25.6%	41.9%	42.5%	22.5%	9.1%
>=7 hours	17.6%	35.3%	52.9%	29.4%	11.8%
Hours of TV, weekend (none)	17.8%	30.1%	33.2%	15.5%	8.7%
>0 and <3 hours	17.3%	29.2%	29.8%	16.1%	8.6%
>=3 and <7 hours	22.3%	33.6%	37.0%	17.5%	6.2%
>=7 hours	30.1%	42.4%	42.4%	37.6%	4.7%
Hours of video games, week (none)	18.1%	30.5%	32.6%	15.6%	7.9%
>0 and <3 hours	23.6%	34.0%	36.6%	21.9%	7.5%
>=3 and <7 hours	23.6%	31.5%	34.5%	18.9%	8.2%
>=7 hours	25.0%	50.0%	25.0%	25.0%	0.0%
H. of video games, weekend (none)	18.5%	31.7%	33.8%	16.6%	7.9%
>0 and <3 hours	18.3%	29.8%	30.8%	15.3%	7.6%
>=3 and <7 hours	25.7%	32.1%	36.9%	22.2%	7.5%
>=7 hours	37.5%	41.2%	52.9%	11.8%	0.0%
Hospitalisation (no)	19.0%	30.9%	33.0%	16.4%	7.6%
Yes	27.8%	35.6%	40.4%	24.4%	11.2%
Num. of GP visits (mean(SD))	1.1 (0.8)	1.0 (0.7)	1.0 (0.7)	1.1 (0.7)	0.9 (0.6)
Num. of Specialist visits (mean (SD))	0.5 (1.2)	0.5 (1.1)	0.4 (0.9)	0.5 (0.9)	0.5 (0.7)
BMI					
First quintile	17.3%	29.6%	31.5%	13.6%	6.7%
Second quintile	18.6%	31.6%	36.0%	17.0%	6.6%
Third quintile	18.3%	31.2%	23.9%	14.2%	8.1%
Fourth quintile	18.3%	26.6%	32.4%	15.5%	7.4%
Fifth quintile	23.2%	31.6%	31.6%	19.6%	7.0%
Sociodemographic variables					
Sex (Male)	18.8%	33.3%	39.5%	19.3%	8.1%
Female	19.9%	29.0%	27.5%	14.3%	7.4%
Age (mean (SD))	9.3 (3.1)	8.8 (3.2)	8.7 (3.2)	9.2 (3.1)	8.9 (3.5)
Age groups (4-7 years old)	17.7%	34.5%	38.8%	16.1%	8.9%
8-10 years old	20.4%	31.5%	31.2%	17.8%	6.1%
11-14 years old	20.1%	27.7%	29.8%	16.6%	7.8%

Table 2. Analysis of the sample (Contin.)

	Emotional symptoms	Behavioural problems	Hyper-activity	Peer problems	Antisocial behaviour		Emotional symptoms	Behavioural problems	Hyper-activity	Peer problems	Antisocial behaviour
Regions (Andalusia)	19.4%	32.2%	32.4%	15.5%	4.3%	Physical activity (sitting)	16.2%	27.8%	28.6%	13.9%	6.9%
Aragon	19.8%	27.6%	34.8%	10.4%	4.8%	Standing	19.9%	31.8%	34.4%	16.3%	8.4%
Asturias	15.0%	33.0%	33.6%	14.2%	3.6%	Walking and carrying	22.2%	32.3%	36.8%	23.0%	6.8%
Balearic Islands	29.0%	33.3%	38.1%	22.3%	8.1%	Heavy tasks	23.9%	43.7%	35.2%	25.4%	2.8%
Canary Islands	16.7%	25.5%	38.4%	27.4%	13.8%	BMI (under and normal weight)	18.0%	30.9%	33.7%	15.2%	7.5%
Cantabria	7.7%	25.6%	30.4%	16.7%	23.4%	Overweight	22.1%	30.8%	32.0%	16.9%	7.1%
Castile-Leon	19.5%	35.4%	29.3%	13.4%	1.8%	Obese	21.9%	32.0%	35.8%	21.8%	8.1%
Castile-La Mancha	20.6%	32.2%	33.9%	17.0%	5.8%	Weight perception (much more than normal)	25.6%	36.0%	38.9%	21.2%	6.1%
Catalonia	21.3%	25.4%	34.0%	18.5%	7.3%	More than normal	21.5%	32.5%	34.9%	17.3%	7.0%
Region of Valencia	19.4%	30.4%	33.1%	14.8%	2.7%	Normal	16.8%	28.9%	30.6%	15.4%	8.4%
Extremadura	16.8%	29.8%	33.9%	15.5%	5.5%	Less than normal	20.5%	35.7%	41.5%	18.8%	8.1%
Galicia	16.3%	28.2%	38.2%	16.0%	11.2%	*Socioeconomic status*					
Madrid	16.6%	33.5%	28.8%	16.1%	9.6%	Age (15-35 years old)	21.8%	36.5%	44.0%	20.6%	7.9%
Murcia	26.3%	44.0%	40.4%	20.6%	12.6%	36-45 years old	18.5%	30.8%	31.1%	15.5%	8.1%
Navarra	20.3%	29.5%	28.5%	13.5%	3.4%	46-55 years old	19.3%	25.6%	28.8%	16.5%	6.2%
Basque Country	16.9%	27.7%	22.3%	12.2%	4.1%	56-65 years old	22.2%	22.2%	11.1%	22.2%	11.1%
La Rioja	14.1%	29.4%	23.5%	12.9%	8.2%	66-75 years old	0.0%	0.0%	0.0%	0.0%	33.3%
MATERNAL AND HOUSEHOLD VARIABLES						>75 years old	0.0%	0.0%	0.0%	0.0%	0.0%
Health Variables						Nationality (Spanish)	19.1%	31.2%	33.2%	15.6%	7.8%
SRH (very good and good)	17.1%	29.3%	31.0%	14.9%	8.1%	Foreign	20.8%	31.7%	35.5%	28.4%	7.4%
Fair, Bad and very bad SRH	25.9%	36.5%	40.2%	22.4%	6.7%	Foreign and Spanish	26.2%	23.3%	31.1%	21.3%	8.3%
Depression	17.1%	29.2%	31.8%	15.2%	8.2%	Marital Status (single)	25.4%	38.2%	43.6%	25.4%	5.8%
Yes	31.3%	41.3%	41.7%	25.0%	5.4%	Married	18.1%	29.6%	31.8%	15.3%	8.1%
Tranquilizer prescription	18.2%	30.5%	32.9%	16.0%	7.8%	Widowed	25.0%	33.3%	20.5%	20.5%	4.5%
Yes	31.2%	37.1%	37.4%	23.7%	7.4%	Separated	24.6%	35.4%	38.0%	20.8%	6.8%
Antidepressant prescription	18.4%	30.6%	32.9%	16.0%	7.8%	Divorced	20.4%	36.0%	39.4%	19.0%	7.9%
Yes	35.0%	40.2%	40.5%	28.4%	6.6%	Social Class (Class I, II)	14.4%	24.7%	25.8%	13.7%	6.4%
Mental health index (mean (SD))	2.7 (3.2)	2.1 (2.9)	2.1 (2.8)	2.4 (3.1)	1.3 (2.5)	Class III	17.5%	28.6%	31.0%	13.7%	8.5%
Smoker (yes)	22.7%	37.9%	39.0%	18.5%	7.5%	Class IV, V, VI	21.9%	34.9%	37.7%	19.3%	7.9%
Yes, occasionally	21.5%	31.0%	26.2%	21.5%	7.0%	Education (none)	34.5%	46.4%	45.5%	28.8%	13.6%
In the past	17.5%	29.4%	31.1%	15.0%	6.9%	Primary	21.2%	36.5%	37.8%	18.5%	7.6%
No	17.4%	26.6%	30.5%	15.8%	8.3%	Secondary	19.8%	30.1%	32.0%	16.5%	7.6%
Sleep (<=8 hours)	19.2%	30.9%	33.2%	16.6%	8.0%	Tertiary	14.8%	22.9%	26.7%	13.2%	7.5%
>8 hours	21.1%	34.0%	35.1%	18.6%	4.5%						

Table 2. Analysis of the sample (Cont.)

	Emotional symptoms	Behavioural problems	Hyper-activity	Peer problems	Antisocial behaviour		Emotional symptoms	Behavioural problems	Hyper-activity	Peer problems	Antisocial behaviour
Current Activity (working)	18.7%	30.4%	32.1%	15.8%	7.6%	*Household characteristics*					
Retired	18.2%	36.4%	29.5%	9.1%	2.3%	Number of minors in the household					
Studying	22.7%	27.3%	63.6%	19.0%	0.0%	(<3)	19.4%	30.8%	33.2%	16.7%	7.5%
Homemaker	18.6%	30.9%	32.8%	16.4%	9.2%	Three	17.6%	34.0%	33.5%	17.5%	11.0%
Unemployed short-term	22.4%	31.4%	39.6%	21.0%	7.2%	More than three	23.1%	43.6%	46.2%	20.5%	5.3%
Unemployed long-term	20.7%	33.8%	37.0%	20.0%	6.0%	Number of adults in the household					
Person of reference	18.3%	30.7%	33.1%	15.7%	8.3%	Single parent	23.4%	35.1%	36.4%	18.7%	4.0%
Yes	21.7%	32.1%	33.9%	19.2%	6.5%	Between 3 and 4	20.2%	31.0%	34.6%	18.6%	9.4%
						More than 4	19.7%	29.9%	34.3%	22.7%	9.1%

Table 3. Mixed logistic estimations of children's mental health

	Emotional symptoms	Behavioural problems	Hyperactivity	Peer problems	Antisocial behaviour
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Health Variables					
SRH (very good and good)					
Fair, Bad and very bad SRH	0.92 (0.74-1.14)	0.94 (0.79-1.14)	1.10 (0.92-1.32)	1.07 (0.86-1.34)	0.83 (0.59-1.16)
Depression	1.20* (0.92-1.57)	1.25* (0.99-1.59)	1.14 (0.90-1.45)	1.18 (0.88-1.57)	0.63* (0.39-1.04)
Tranquilizer prescription	1.18 (0.86-1.62)	0.95 (0.72-1.27)	0.88 (0.66-1.17)	1.04 (0.75-1.46)	1.25 (0.75-2.10)
Antidepressant prescription	1.23 (0.83-1.82)	0.99 (0.69-1.42)	0.99 (0.69-1.42)	1.41* (0.93-2.12)	1.28 (0.63-2.60)
Mental health index	1.16** (1.12-1.20)	1.09** (1.06-1.13)	1.07** (1.04-1.11)	1.08** (1.04-1.12)	0.96 (0.90-1.03)
Smoker (yes)					
Yes, occasionally	1.10 (0.68-1.79)	0.90 (0.59-1.37)	0.56** (0.36-0.88)	1.25 (0.76-2.05)	0.83 (0.38-1.80)
In the past	0.83* (0.65-1.07)	0.80** (0.65-0.99)	0.85* (0.69-1.04)	0.96 (0.74-1.26)	1.02 (0.70-1.50)
No	0.79** (0.64-0.96)	0.65** (0.55-0.77)	0.75** (0.64-0.89)	0.83* (0.67-1.03)	1.11 (0.83-1.50)
Sleep (<=8 hours)	1.11 (0.81-1.51)	1.08 (0.83-1.40)	0.99 (0.76-1.29)	1.04 (0.75-1.45)	0.51** (0.29-0.91)
Physical activity (sitting)					
Standing	1.33** (1.05-1.68)	0.98 (0.81-1.20)	1.13 (0.93-1.36)	0.99 (0.78-1.28)	1.13 (0.80-1.60)
Walking and carrying	1.26* (0.92-1.73)	0.95 (0.73-1.24)	1.16 (0.89-1.51)	1.41** (1.02-1.94)	1.05 (0.65-1.71)
Heavy tasks	1.51 (0.80-2.87)	1.79** (1.04-3.07)	0.99 (0.56-1.73)	1.68* (0.89-3.18)	0.49 (0.11-2.16)
BMI (under and normal weight)					
Overweight	1.05 (0.83-1.33)	0.81** (0.66-0.99)	0.73** (0.60-0.89)	0.95 (0.74-1.22)	1.08 (0.76-1.55)
Obese	0.83 (0.60-1.18)	0.71** (0.53-0.95)	0.75* (0.56-1.00)	1.11 (0.78-1.57)	1.41 (0.84-2.38)
Weight perception (much more than normal)					
More than normal	0.90 (0.64-1.27)	0.85 (0.63-1.14)	0.91 (0.68-1.21)	0.90 (0.63-1.29)	1.22 (0.69-2.15)
Normal	0.72* (0.50-1.04)	0.69** (0.50-0.95)	0.69** (0.50-0.95)	0.86 (0.58-1.26)	1.52* (0.83-2.79)
Less than normal	0.75 (0.44-1.27)	0.79 (0.50-1.25)	0.97 (0.62-1.52)	0.99 (0.57-1.73)	1.95* (0.84-4.50)
Socioeconomic determinants					
Age (15-35 years old)					
36-45 years old	0.91 (0.72-1.15)	1.01 (0.83-1.23)	0.76** (0.63-0.93)	0.89 (0.70-1.13)	1.15 (0.81-1.63)
46-55 years old	0.93 (0.67-1.29)	0.87 (0.66-1.15)	0.79* (0.60-1.03)	0.98 (0.70-1.38)	0.88 (0.53-1.46)
56-65 years old	1.31 (0.20-8.69)	0.85 (0.16-4.62)	0.30 (0.03-2.53)	2.46 (0.44-1.38)	1.12 (0.11-15.81)
66-75 years old	0.03 (2.4e-6-436)	0.02 (2.5e-6-183)	0.03 (2.4e-6-482)	0.16 (1.2e-6-2.1e4)	39.98 (0.01-118530)
>75 years old	0.19 (9.9e-7-3.65e4)	0.11 (1.7e-6-7129)	0.17 (1.2e-6-2.3e4)	0.19 (1.0e-7-3.3e4)	0.92 (5.9e-9-1.4e08)
Nationality (Spanish)					
Foreign	0.84 (0.60-1.17)	0.82* (0.62-1.09)	0.81* (0.61-1.07)	1.70** (1.25-2.32)	0.80 (0.48-1.33)
Foreign and Spanish	1.00 (0.51-1.96)	0.57* (0.30-1.10)	0.81 (0.44-1.49)	1.01 (0.50-2.04)	1.20 (0.43-3.37)
Marital Status (single)					

Table 3. Mixed logistic estimations of children's mental health (Cont.)

Married	0.81 (0.59-1.12)	0.83* (0.63-1.09)	0.79* (0.60-1.04)	0.69** (0.50-0.95)	0.98 (0.57-1.68)
Widowed	0.69 (0.33-1.43)	0.74 (0.39-1.41)	0.37** (0.18-0.75)	0.93 (0.45-1.91)	0.80 (0.16-3.94)
Separated	0.84 (0.52-1.33)	0.88 (0.59-1.32)	0.87 (0.58-1.31)	0.81 (0.50-1.31)	1.21 (0.54-2.70)
Divorced	0.68* (0.42-1.08)	0.95 (0.64-1.41)	1.02 (0.69-1.51)	0.82 (0.52-1.31)	2.21** (1.04-4.72)
Social Class (Class I, II)					
Class III	1.02 (0.73-1.42)	1.09 (0.83-1.43)	1.24* (0.95-1.62)	0.75* (0.53-1.05)	1.78** (1.15-2.74)
Class IV, V, VI	1.24 (0.91-1.69)	1.29** (1.00-1.66)	1.58** (1.23-2.02)	1.01 (0.74-1.37)	1.73** (1.13-2.63)
Education (none)					
Primary	0.62* (0.38-1.02)	0.77 (0.49-1.20)	0.69* (0.44-1.07)	0.69* (0.42-1.14)	0.66 (0.33-1.31)
Secondary	0.67* (0.39-1.13)	0.62* (0.40-1.03)	0.67* (0.42-1.06)	0.69* (0.40-1.17)	0.87 (0.42-1.80)
Tertiary	0.59* (0.34-1.03)	0.53** (0.32-0.86)	0.58** (0.36-0.95)	0.75 (0.43-1.31)	1.02 (0.48-2.17)
Current Activity (working)					
Retired	0.38* (0.13-1.12)	1.10 (0.50-2.44)	0.98 (0.42-2.24)	0.39* (0.12-1.27)	0.02 (1.4e-5-22.64)
Studying	1.17 (0.38-3.63)	0.73 (0.26-2.05)	2.27* (0.84-6.15)	0.70 (0.22-2.31)	0.02 (2.8e-6-161.3)
Homemaker	0.76** (0.58-0.99)	0.75** (0.60-0.94)	0.76** (0.61-0.95)	1.04 (0.79-1.36)	1.11 (0.78-1.57)
Unemployed short-term	0.95 (0.60-1.48)	0.88 (0.59-1.30)	1.27 (0.87-1.85)	0.94 (0.58-1.52)	0.99 (0.51-1.93)
Unemployed long-term	0.91 (0.54-1.53)	0.69* (0.44-1.09)	0.78 (0.51-1.20)	0.89 (0.52-1.52)	0.77 (0.36-1.65)
Person of reference	1.26* (0.99-1.60)	1.08 (0.88-1.33)	1.15* (0.94-1.41)	1.37** (1.07-1.76)	0.95 (0.66-1.36)
Household characteristics					
Number of minors in the household (<3)					
Three	0.83 (0.57-1.22)	1.16 (0.86-1.57)	0.98 (0.72-1.34)	0.94 (0.64-1.37)	1.64** (1.02-2.63)
More than three	1.21 (0.52-2.80)	1.58* (0.79-3.19)	1.51 (0.75-3.02)	1.00 (0.42-2.38)	0.60 (0.13-2.75)
Number of adults in the household					
Single parent	0.99 (0.69-1.42)	1.04 (0.76-1.42)	0.93 (0.68-1.27)	0.70* (0.48-1.01)	0.51** (0.27-0.98)
Between 3 and 4	0.99 (0.80-1.24)	1.00 (0.83-1.21)	1.13* (0.94-1.36)	1.11 (0.88-1.39)	1.42** (1.04-1.94)
More than 4	0.90 (0.44-1.84)	1.02 (0.57-1.83)	1.09 (0.61-1.93)	1.16 (0.60-2.24)	1.03 (0.40-2.67)
Interactions					
period*retired	4.94* (0.61-39.97)	0.99 (0.16-6.14)	1.20 (0.17-8.57)	0.03 (2.5e-6-258)	43.59 (0.01-1.3e5)
period*studying	0.07 (2.2e-6-2.4e3)	0.05 (2.4e-6-877)	1.28 (0.06-25.99)	0.23 (7.8e-7-6.6e4)	0.99 (3.2e-9-3e8)
period*homemaker	1.36 (0.85-2.12)	1.25 (0.84-1.86)	2.03** (1.37-3.00)	0.90 (0.53-1.52)	1.26 (0.55-2.89)
period*unempl short-term	1.11 (0.56-2.18)	0.95 (0.53-1.73)	0.84 (0.47-1.49)	2.00** (1.00-4.00)	2.23* (0.72-6.91)
period*unempl long-term	0.91 (0.44-1.88)	1.74* (0.95-3.19)	1.67* (0.92-3.01)	1.64* (0.78-3.44)	2.27* (0.69-7.53)
period*Class III	0.89 (0.49-1.62)	0.83 (0.50-1.38)	0.82 (0.50-1.34)	1.26 (0.65-2.43)	0.43* (0.15-1.22)
period*Class IV, V, VI	0.70* (0.41-1.20)	0.79 (0.50-1.24)	0.68* (0.44-1.06)	0.87 (0.48-1.56)	0.31** (0.12-0.79)
period*primary	1.23 (0.38-3.97)	0.85 (0.30-2.35)	1.51 (0.51-4.46)	0.73 (0.22-2.36)	0.20** (0.04-0.91)
period*secondary	1.15 (0.35-3.84)	0.81 (0.29-2.31)	1.28 (0.43-3.87)	0.76 (0.23-2.56)	0.09** (0.02-0.48)
period*tertiary	0.98 (0.28-3.40)	0.62 (0.21-1.83)	1.48 (0.48-4.56)	0.44 (0.13-1.57)	0.07** (0.01-0.40)

** p<0.1, ** p<0.05, *** p<0.01*

Table 4. Mixed logistic estimations of covariates of the children's mental health

	Emotional symptoms	Behavioural problems	Hyperactivity	Peer problems	Antisocial behaviour
	OR (95% CI)	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Intercept	0.23** (0.06-0.87)	2.37* (0.68-8.21)	2.58* (0.75-8.89)	0.30* (0.08-1.15)	0.09** (0.02-0.46)
Period (2006)	1.00 (0.16-6.29)	1.27 (0.22-7.15)	0.58 (0.09-3.41)	1.06 (0.17-6.78)	0.49* (0.54-43.00)
Health variables					
SRH (very good and good)					
Fair, Bad and very bad SRH	2.09** (1.58-2.76)	1.46** (1.15-1.94)	1.36** (1.05-1.75)	1.28* (0.95-1.73)	1.10 (0.68-1.76)
Allergy	1.23* (0.96-1.58)	0.94 (0.75-1.18)	1.15 (0.93-1.43)	0.97 (0.74-1.27)	0.84 (0.55-1.26)
Asthma	1.00 (0.73-1.38)	1.06 (0.80-1.40)	1.08 (0.82-1.42)	1.08 (0.77-1.51)	0.82 (0.47-1.42)
Diabetes	0.85 (0.14-5.10)	1.52 (0.31-7.49)	1.58 (0.32-7.88)	0.48 (0.05-4.42)	0.03 (02.7e-6-322)
Tumour	0.27 (0.02-3.24)	0.01 (1.9e-6-21.11)	3.46 (0.50-2.38)	0.41 (0.03-5.14)	0.06 (2.3e-6-1515)
Epilepsy	1.68* (0.76-3.72)	1.78* (0.83-3.80)	2.44** (1.09-5.46)	2.53** (1.14-5.63)	1.84 (0.57-5.97)
Other illness	1.23* (0.95-1.59)	0.73** (0.58-0.93)	1.05 (0.83-1.32)	1.24* (0.94-1.64)	0.72* (0.45-1.15)
Limitation last two weeks	1.12 (0.87-1.46)	1.05 (0.83-1.32)	0.99 (0.78-1.25)	1.12 (0.85-1.47)	0.55** (0.34-0.90)
Sleep (>=8 and <=10)					
<8 hours	1.91** (1.23-2.98)	1.59** (1.05-2.39)	1.27 (0.84-1.92)	1.55* (0.97-2.47)	0.67 (0.29-1.54)
>10 hours	1.08 (0.82-1.43)	1.13 (0.90-1.42)	1.05 (0.84-1.32)	0.81* (0.59-1.10)	0.59** (0.38-0.93)
Physical activity (No)					
Occasionally	0.73** (0.56-0.96)	0.77** (0.61-0.97)	0.93 (0.73-1.18)	0.72** (0.55-0.95)	0.73* (0.51-1.05)
Several times per month	0.62** (0.46-0.83)	0.76** (0.59-0.98)	0.92 (0.71-1.18)	0.49** (0.36-0.66)	0.48** (0.31-0.72)
Several times per week	0.60** (0.44-0.82)	0.66** (0.50-0.86)	0.78* (0.60-1.03)	0.36** (0.26-0.50)	0.21** (0.12-0.35)
No breakfast	1.18 (0.59-2.35)	1.37 (0.73-2.54)	1.45 (0.79-2.68)	0.62 (0.26-1.48)	0.77 (0.24-2.41)
Fresh fruit	0.86* (0.69-1.07)	0.76** (0.63-0.91)	0.82** (0.68-0.99)	0.94 (0.74-1.18)	0.95 (0.68-1.32)
Fast food	0.90 (0.69-1.17)	1.05 (0.84-1.31)	1.18* (0.95-1.47)	1.03 (0.78-1.35)	0.65** (0.42-0.99)
Hours of TV, week (none)					
>0 and <3 hours	0.98 (0.78-1.23)	1.62** (1.33-1.96)	1.15* (0.95-1.39)	0.92 (0.72-1.18)	0.84 (0.60-1.18)
>=3 and <7 hours	1.03 (0.74-1.43)	2.04** (1.54-2.70)	1.38** (1.05-1.82)	0.94 (0.66-1.33)	1.41* (0.86-2.30)
>=7 hours	0.36 (0.08-1.68)	1.14 (0.35-3.71)	2.05 (0.67-6.26)	0.76 (0.21-2.72)	1.72 (0.30-9.89)
Hours of TV, weekend (none)					
>0 and <3 hours	1.03 (0.80-1.33)	0.81* (0.66-1.00)	0.84* (0.69-1.04)	1.26* (0.96-1.64)	1.13 (0.79-1.61)
>=3 and <7 hours	1.14 (0.86-1.51)	0.80* (0.63-1.01)	1.00 (0.80-1.27)	1.11 (0.82-1.50)	0.65** (0.42-0.99)
>=7 hours	1.46 (0.80-2.70)	0.97 (0.56-1.66)	0.95 (0.55-1.63)	2.23** (1.23-4.06)	0.37* (0.12-1.22)
Hours of video games, week (none)					
>0 and <3 hours	1.10 (0.84-1.43)	1.10 (0.87-1.38)	1.10 (0.88-1.38)	1.49** (1.13-1.97)	0.99 (0.66-1.51)
>=3 and <7 hours	0.58* (0.32-1.05)	0.71* (0.43-1.19)	0.62 (0.37-1.03)	0.78 (0.42-1.45)	1.23 (0.50-3.01)
>=7 hours	0.42 (0.02-7.26)	1.31 (0.12-14.18)	0.27 (0.02-3.81)	2.15 (0.11-42.07)	0.41 (2.1e-7-7.9e5)

Table 4. Mixed logistic estimations of covariates of the children's mental health (Cont.)

Hours of video games, weekend (none)					
>0 and <3 hours	0.97 (0.76-1.24)	0.98 (0.80-1.21)	0.93 (0.75-1.14)	0.78* (0.60-1.02)	1.29* (0.89-1.86)
>=3 and <7 hours	1.45** (1.04-2.03)	1.06 (0.79-1.43)	1.17 (0.87-1.56)	1.13 (0.79-1.61)	1.30 (0.76-2.21)
>=7 hours	3.29* (0.95-1.14)	1.86 (0.57-6.02)	4.08** (1.24-13.38)	0.31 (0.04-2.46)	0.03 (2.5e-6-452)
Hospitalisation	1.14 (0.76-1.73)	0.97 (0.67-1.42)	0.99 (0.69-1.44)	1.14 (0.74-1.75)	1.48* (0.82-2.68)
Number of GP visits	1.17** (1.01-1.35)	0.96 (0.84-1.09)	1.04 (0.91-1.18)	1.24** (1.07-1.44)	1.01 (0.79-1.29)
Number of Specialist visits	1.02 (0.88-1.18)	1.09 (0.95-1.26)	0.95 (0.83-1.09)	1.06 (0.91-1.22)	1.10 (0.90-1.34)
BMI					
First quintile	1.08 (0.79-1.48)	0.88 (0.68-1.14)	0.90 (0.70-1.15)	0.87 (0.62-1.20)	0.87 (0.56-1.36)
Second quintile	1.09 (0.81-1.47)	1.01 (0.79-1.29)	1.15 (0.90-1.47)	1.06 (0.78-1.44)	0.83 (0.53-1.29)
Third quintile	1.13 (0.84-1.52)	1.05 (0.82-1.34)	0.87 (0.69-1.13)	0.88 (0.64-1.20)	1.11 (0.74-1.67)
Fourth quintile	1.00 (0.75-1.35)	0.83* (0.65-1.06)	1.05 (0.83-1.33)	0.90 (0.67-1.22)	0.94 (0.62-1.42)
Fifth quintile	1.29* (0.96-1.72)	0.99 (0.77-1.26)	0.93 (0.73-1.19)	1.00 (0.74-1.35)	0.80 (0.52-1.23)
Sociodemographic variables					
Sex (Male)	1.13 (0.94-1.35)	0.81** (0.70-0.95)	0.57** (0.49-0.61)	0.66** (0.54-0.80)	0.82* (0.63-1.07)
Age	1.05 (0.96-1.14)	0.96 (0.89-1.03)	0.96 (0.89-1.03)	1.11** (1.01-1.21)	0.98 (0.87-1.11)
Age groups (4-7 years old)					
8-10 years old	1.09 (0.75-1.57)	1.01 (0.74-1.37)	0.83 (0.61-1.13)	0.87 (0.59-1.29)	0.79 (0.45-1.37)
11-14 years old	0.82 (0.44-1.52)	0.93 (0.55-1.59)	0.85 (0.51-1.42)	0.51** (0.26-0.98)	0.97 (0.39-2.42)
Regions (Andalusia)					
Aragon	1.44 (0.50-4.10)	0.98 (0.35-2.75)	1.38 (0.49-3.83)	0.86 (0.29-2.49)	1.43 (0.42-4.70)
Asturias	0.75 (0.24-2.30)	1.13 (0.39-3.29)	1.04 (0.36-3.00)	0.93 (0.30-2.83)	0.96 (0.23-4.04)
Balearic Islands	1.76 (0.62-5.01)	0.99 (0.36-2.79)	1.14 (0.41-3.17)	1.51 (0.53-4.24)	2.67* (0.84-8.26)
Canary Islands	0.71 (0.25-2.04)	0.69 (0.25-1.94)	1.26 (0.45-3.50)	1.94* (0.69-5.43)	3.97** (1.27-11.98)
Cantabria	0.42* (0.14-1.32)	0.87 (0.30-2.49)	1.05 (0.37-2.95)	1.22 (0.42-3.52)	5.52** (1.77-16.67)
Castile-Leon	1.33 (0.45-3.89)	1.76 (0.62-5.00)	1.17 (0.41-3.33)	1.29 (0.43-3.79)	0.61 (0.13-2.85)
Castile-La Mancha	1.38 (0.47-4.03)	1.03 (0.36-2.91)	1.03 (0.37-2.90)	1.19 (0.41-3.44)	1.42 (0.41-4.78.)
Catalonia	1.25 (0.44-3.54)	0.79 (0.28-2.21)	1.15 (0.42-3.19)	1.34 (0.47-3.77)	2.37* (0.74-7.33)
Region of Valencia	1.04 (0.36-2.95)	0.93 (0.33-2.59)	1.00 (0.36-2.77)	0.98 (0.34-2.76)	0.85 (0.24-2.96)
Extremadura	0.88 (0.29-2.69)	0.89 (0.30-2.58)	1.09 (0.38-3.13)	1.17 (0.38-3.55)	1.64 (0.42-6.15)
Galicia	0.89 (0.31-2.54)	1.00 (0.36-2.81)	1.43 (0.52-3.97)	1.11 (0.39-3.13)	3.27** (1.05-9.88)
Madrid	0.99 (0.35-2.83)	1.41 (0.51-3.91)	0.98 (0.35-2.69)	1.18 (0.42-3.30)	2.99* (0.96-8.99)
Murcia	1.68 (0.59-4.72)	1.62 (0.58-4.48)	1.28 (0.46-3.54)	1.35 (0.48-3.75)	3.00* (0.98-8.95)
Navarra	1.28 (0.44-3.69)	1.14 (0.40-3.22)	0.86 (0.31-2.43)	1.01 (0.34-2.92)	1.12 (0.30-4.02)
Basque Country	1.09 (0.37-3.18)	1.11 (0.39-3.16)	0.77 (0.27-2.20)	0.93 (0.31-2.75)	1.52 (0.41-5.50)
La Rioja	1.06 (0.33-3.37)	1.31 (0.44-3.88)	0.77 (0.26-2.32)	1.14 (0.35-3.64)	2.83* (0.74-1.05)

** p<0.1, ** p<0.05, *** p<0.01*

5.4
Parental unemployment and children's health, health care use and health behaviours

4. Arroyo-Borrell, E., García-Gómez, P. (2016) 'Parental unemployment and children's health, health care use and health behaviours' *European Journal of Epidemiology* (under revision).

Parental unemployment and children's health, health care use and health behaviours

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Conflict of Interest

None.

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ABSTRACT

Children are one of the most vulnerable groups to economic conditions. In this paper, we analyse the association between parental unemployment and a set of outcomes for children's health, health care use and health behaviours in both nuclear and lone-parent families. We use individual panel data from the Families and Children Study (FACS) over the period 2001-2008. FACS includes not only information on children's health reported by the main care-giver, but since 2003 a self-completion questionnaire for children aged 11 to 15 as well. Our results show that parental unemployment is negatively associated with children's reported health status in both single-parent and nuclear families, and the magnitude of this association is greater for children in single-parent families. We find that self-rated health reported by the adolescents seems to be unrelated to their parents' unemployment. However, this is not driven by heterogeneous age effects, as the main care-giver reports the health status of the adolescent as also being worse when one of the parents is unemployed. In terms of health care use, we find that the probability of going to the dentist is lower when one of the parents is unemployed in both types of families. The results for the type of care differ depending on the person who is unemployed. Children in a single-parent family are more likely to visit the emergency room and the GP if their parent is unemployed, whereas children in a nuclear family, although they are more likely to visit the emergency room, are less likely to visit the GP if their mother is unemployed, and the sign is reversed when their father is unemployed. Finally, we also find a negative association among adolescents between parental unemployment and physical activity. Our results suggest the need for further research to better understand the link between a family's economic condition and their children's health.

Keywords

Parental unemployment, children, adolescents, health, health care use, health behaviour

Research highlights

- In general, parental unemployment is negatively associated to children's health.
- This association is larger for single-parent families.
- Conclusions depend on whether it is the adolescent or their care-giver who responds.
- Health care use depends on which parent becomes unemployed.
- Unemployed mothers may postpone the health care of their children.

6. Conclusions

This section summarises all the findings that have been made in this dissertation. First of all, we describe the specific conclusions for each paper. Then, with regard to the main aim of this thesis, we reach a general conclusion. Finally, we describe the major limitations of the thesis and define the focus for future research.

In the findings of the first paper, we are able to conclude that the financial crisis did not alter the likelihood of reporting poor self-rated health in 2011. Therefore, there are no differences between our perceived health in either 2006 or in 2011. In this sense, the increase in the number of people who rate their health good or very good in 2011 compared to 2006 is, in fact, because during negative economic conditions people tend to overestimate their health due to the complicated situation around them. This would seem to be why they rate their health as better than prior to the recession, when in fact they should rate their health equally; as our results show.

Antidepressant and tranquilizer drug consumption are a signal of mental health disorders within a population. In the second paper, the results show that the risk of consuming psychotropic drugs have not statistically changed during the economic downturn. In this sense, even though it has been proved that mental disorders worsen during financial difficulties, reported consumption of these drugs in the general population seems not to have been altered by the economic crisis. However, we are able to detect specific sub groups that need to be addressed such as women, (especially homemakers, unemployed or retired), and unemployed men.

In an effort to move the focus away from only the health of adults, we focus the research on the consequences of adverse economic conditions on children's health; a group which could be considered the most vulnerable to external shocks. In this sense, the results show that the mental health of children is negatively associated with the mental health disorders of the mother. This paper also concludes that the maternal socioeconomic status is associated with the mental disorders of the child, above all the maternal level of education and social class. We also find that, although in general the economic crisis has not deteriorated the relationship between maternal socioeconomic status and the mental health of the children, in 2011, unlike 2006, the probability of a child suffering from mental disorders increases when the mother is unemployed.

In the fourth and final paper, our results show that parental unemployment is negatively associated with children's reported health status in both single-parent and nuclear families,

and the magnitude of this association is greater for children in single-parent families. We find that self-rated health reported by the adolescents seems to be unrelated to their parents' unemployment. However, this is not driven by heterogeneous age effects, as the main care-giver reports the health status of the adolescent as also being worse when one of the parents is unemployed. In terms of health care use, we find that the probability of going to the dentist is lower when one of the parents is unemployed in both types of families. The results for the type of care differ depending on the person who is unemployed. Children in a single-parent family are more likely to visit the emergency room and the GP if their parent is unemployed, whereas children in a nuclear family, although they are more likely to visit the emergency room, are less likely to visit the GP if their mother is unemployed, and the sign is reversed when their father is unemployed. Finally, we also find a negative association among adolescents between parental unemployment and physical activity. Our results suggest the need for further research to better understand the link between a family's economic condition and their children's health.

If this dissertation has one general message, it is that the effects of adverse economic conditions are negative or not dependent on the specific characteristics of an individual. In general, while it does not seem that negative economic conditions are strongly negatively associated with individuals' health, the most vulnerable groups certainly are affected. This is the case for women, the unemployed and children. More specifically, children seem, on the whole, to suffer from paternal unemployment, maternal socioeconomic status and their mother's mental health and these consequences may have a crossover effect into adulthood and future generations.

All in all, this thesis is not exempt from limitations. One of the main restrictions is the available data we use in the analyses. In three out of the four papers, we use the Spanish National Health Survey, a cross-sectional representative survey, for 2006 and 2011-12 (previous and during the financial crisis). As it is well established, cross-sectional data has its limitations when attempting to assess associations, limitations that we have sometimes solved using methodological techniques such as matching. In this respect, it is also important to add that sometimes the analyses are subject to the data and variables available, (or even changes in the surveys themselves), which frequently limits the extension of the analysis (this is also relevant for the fourth paper which uses FACS database). Moreover, as we are still immersed in the economic downturn and the effects on the population's health are not immediate, we acknowledge the importance of continuing this research in the coming years. Furthermore, it is worth mentioning the self-reported measures of health we used. On one hand, the probability of recalling bias increases due to the subjectivity of the questions, but on the other hand, it has been proved that these measures highly correlate with the objective variables and they are often considered

a complement to objective measures. Last but not least, sometimes the sub groups we want to analyse reduce the size of the sample and then we are unable to find associations, causing us to underestimate some of our results.

This thesis contributes to knowledge about changes in individuals' subjective health during negative economic conditions and provides evidence of the need to focus future research efforts, along with healthcare and social interventions, on specific subpopulations, particularly those among women and children. On the whole, we do not detect large changes in the population's health, but given that the financial crisis has not yet finished, greater efforts have to be made to follow up on individuals' health, especially in the case of women and children.