

The Moderating Role of Subjective Socioeconomic Status on the Relationship between
Objective SES and Mental Health Problems in Dutch Adolescents in Times of Economic Crisis
(2009-2013).

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Abstract

Although health in children has improved significantly over the last decades, health in adolescence has only slightly improved. Adolescence is an important period in developing mental health problems. A predictor for adolescent mental health problems that is often studied is parental income (objective socioeconomic status), but objective socioeconomic status (SES) appears to be weakly and inconsistently related to mental health problems. Less is known about subjective perceptions of SES and their influence on mental health problems. We examined mental health differences in 14790 Dutch adolescents using measures of objective SES and subjective socioeconomic status (SSS) as measured in the Health Behaviour in School-aged Children-studies (HBSC-studies) of 2009 and 2013 to examine the influence of the economic crisis on income and subsequently on mental health problems. We carried out a hierarchical regression analysis. Results showed that SSS was a significant moderator in the relation between objective SES and mental health problems. No significant differences were found when adding a 3-way interaction between objective SES, SSS and HBSC-year. In this study, the difference in mental health problems was not explained by the Great Recession. Economic crisis effects are possibly to be found when comparing other HBSC data collections.

Keywords: mental health problems; objective SES; subjective socioeconomic status; subjective social status; economic crisis

Samenvatting

Hoewel de gezondheid van kinderen de afgelopen decennia aanzienlijk is verbeterd, is de adolescentie gezondheid slechts licht verbeterd. De adolescentie is een belangrijke periode in de ontwikkeling van psychische problemen. Een veel bestudeerde voorspeller voor adolescentie psychische gezondheidsproblemen is het inkomen van ouders (objectieve sociaaleconomische status), maar objectieve sociaaleconomische status (SES) blijkt zwak en inconsistent gerelateerd te zijn aan psychische problemen. Er is minder bekend over subjectieve percepties van SES en hun invloed op psychische problemen. We onderzochten de verschillen in geestelijke gezondheid bij 14790 Nederlandse adolescenten met behulp van metingen van objectieve SES en subjectieve sociaaleconomische status (SSS) zoals gemeten in de Health Behaviour in School-aged Children-studies (HBSC-studies) van 2009 en 2013 om de invloed van de economische crisis op inkomen en psychische problemen te onderzoeken. We hebben daartoe een hiërarchische regressieanalyse uitgevoerd. De resultaten toonden aan dat SSS een belangrijke moderator was in de relatie tussen objectieve SES en psychische gezondheidsproblemen. Er werden geen significante verschillen gevonden bij het toevoegen van een 3-weginteractie tussen objectieve SES, SSS en HBSC-jaar. In deze studie verklaarde de Great Recession niet het verschil in psychische problemen. Effecten van de economische crisis zijn mogelijk te vinden bij vergelijking van andere HBSC-dataverzamelingen.

Trefwoorden: psychische problemen; objectieve SES; subjectieve socioeconomische status; subjectieve sociale status; economische crisis

The moderating role of subjective socioeconomic status on the relationship between objective socioeconomic status and mental health problems in Dutch adolescents in times of economic crisis.

Although physical health has increased in Dutch adolescents in the recent years there is a growing concern about the increase in mental health problems in adolescents (Mackenbach, 2012; OECD; Pickett & Wilkinson, 2010; Sawyer et al., 2012; Yoshikawa, Aber, & Beardslee, 2012). Mental health problems include depression, anxiety and other forms of psychological distress according to Hutton, Nyholm, Nygren and Svedberg (2014). Mental health in children has improved over the last decades, as shown in a longitudinal study of fifty low-, middle- and high-income countries (e.g., child mortality rates have declined by 80% in the last fifty years) (Sawyer, 2012). However, health in adolescence has only slightly improved (Sawyer, 2012).

Mental health problems are widely spread. The World Health Organization (WHO) has investigated mental disorder prevalence in 18 to 45-year-old adults in the Netherlands and discovered that over forty percent of the population experienced one or more mental disorders at some point in their lifetime (WHO, 2000). Mental disorder prevalence has been studied in children and adults but has been studied to a lesser extent in adolescents (Demakakos, Nazroo, Breeze & Marmot, 2008). However, adolescence is an important period in the development of mental health problems (Viner et al., 2012). Inequalities in adolescent health shape adult mental health and are therefore an important health policy focus (Elgar et al., 2015_b; Gore et al., 2011). In order to improve health and health behaviours in adults, more attention is needed to adolescents' mental health specifically, as adolescent health predicts nationwide health and economic development of nations (Viner et al., 2012). The high prevalence of mental health problems in adults raises questions concerning the origins of mental health problems.

Parental socioeconomic status (further referred to as objective SES) is related to mental health in offspring. More specifically, SES is the economic and social position of an individual, based on education, occupation, and income. However, objective SES and mental health are only weakly and inconsistently related among adolescents and adults (Euteneuer, 2014; Jeon, Ha & Choi, 2013; Karvonen & Rahkonen, 2011; Koivusilta, Rimpelä & Kautiainen, 2006; Sweeting & Hunt, 2014). One reason for this weak relationship may be the fact that the link between objective SES and mental health may be amplified by subjective SES (Karvonen & Rahkonen,

2011; Koivusilta, Rimpelä & Kautiainen, 2006). Specifically, adolescents who subjectively perceive themselves to be more disadvantaged may show a stronger link between objective SES and mental health than adolescents who perceive themselves to be more advantaged (Euteneuer, 2014). These relationships may be more pronounced in times of economic crisis, as economic pressure, unemployment rates and nonstandard job conditions have increased in European countries. These unemployment rates and job conditions were associated with an increase in mental health problems (Buffel, Van de Velde & Bracke, 2015). The year 2009 marks the beginning of the Great Recession of 2008–2009, which was the worst economic collapse since the Great Depression. The year 2013 marks the ending of the Great Recession. These two years are important events in the recent history of economic crisis (Hausman & Johnston, 2014). Therefore, this study measures the moderating role of subjective socioeconomic status on the relationship between objective SES and mental health in adolescents and compares the years 2009 and 2013.

Mental health and objective SES

The relationship between objective SES and mental health is often examined (Euteneuer, 2014; Holstein et al., 2009; McLaughlin, Costello, Leblanc, Sampson, & Kessler, 2012; Reiss, 2013; Yoshikawa, Aber, & Beardslee, 2012). Findings from Reiss' systematic review study showed that a parents' low financial status negatively affected children's and adolescents' mental health in 11 cross-sectional and five longitudinal studies (2013). Holstein et al. (2009) measured objective SES and health complaints and found a significant association between low family affluence (FAS) and a high level of health complaints in thirty of thirty-seven countries that participated in the Health Behaviour in School-aged Children-study (HBSC) in the year 2005/2006.

Unfortunately, while income, life expectancy and safety increased in welfare states, socioeconomic health inequalities persist. Specifically, welfare states were not able to reduce ill-health behaviours due to inequalities in availability of resources (Mackenbach, 2012). In adolescence, objective SES predicts access to resources, which in turn may influence health status (Mackenbach, 2012). Low objective SES is related to a higher prevalence of mental health problems (Euteneuer, 2014; Holstein et al., 2009; Reiss, 2013; Yoshikawa, Aber, & Beardslee, 2012). For example, according to Yoshikawa, Aber and Beardslee (2012) a low objective SES is

related to the onset of depression at the age of 14. Adolescents from low-income families are at a higher risk of developing mental health problems (McLaughlin et al., 2012; Odgers, 2015; Pickett & Wilkinson, 2010). An increase in family income is linked to better health outcomes and more equal health outcomes. Although there is evidence that consistently yields a link between objective SES and mental health, the link is weak and inconsistent (Euteneuer, 2014; Jeon, Ha & Choi, 2013; Karvonen & Rahkonen, 2011; Koivusilta, Rimpelä & Kautiainen, 2006; McLaughlin et al., 2012; Sweeting & Hunt, 2014).

Subjective SES as a moderator

Absolute measures of income are not exclusively important predictors of health outcomes. Perceptions of status and inequality significantly affect health outcomes as well (Euteneuer, 2014; McLaughlin et al., 2012). As an example, McLaughlin et al. (2012) found that subjective socioeconomic status (SSS) is related to mental health outcomes, next to other aspects of SES such as parental income and education, relative deprivation and community level income variation. Similarly, research on mental health and subjective socioeconomic status in secondary schools in Helsinki showed strong significant correlations between SSS and health measures (Karvonen & Rahkonen, 2011).

Interestingly, subjective socioeconomic status (SSS) “predicts health outcomes above and beyond traditional objective measures of social status” (Euteneuer, 2014, p. 337). Subjective socioeconomic status is “an individual’s perception of his or her place in the socioeconomic structure” (Elgar et al., 2015_a, p. 1171). A subjective socioeconomic status measure might be more relevant to adolescents’ mental health than objective SES measures of parental income because it includes adolescents’ perception of the objective social status, which encompasses their feelings and subjective experiences (McLaughlin et al., 2012). Similarly, according to a longitudinal study of Goodman, Huang, Schafer-Kalkhoff and Adler (2007), subjective evaluation of the income of parents predicts adolescents’ mental health ratings. According to McLaughlin et al. (2012), more research is needed to discover how subjective socioeconomic status moderates the relationship between mental health and objective SES in adolescence.

Objective SES divides individuals into classes, however, individuals use other non-economic criteria to assign themselves to these classes (Demakakos et al., 2008). To illustrate, Koivusilta et al. (2006) found that mental health is only weakly related to traditional measures of

familial SES, but is strongly associated with adolescents' personal subjective social position. Therefore, this personal position should be included in mental health studies (Koivusilta et al., 2006). Euteneuer (2014) describes that perceived differences in status are accompanied by 'psychological pain' that affects health. Therefore, measures of subjective socioeconomic status should be taken into account (Demakakos et al., 2008; Elgar, Karvonen & Rahkonen, 2011; Elgar, McKinnon, Torsheim, Schnohr Mazur, Cavallo & Currie, 2015_a; Plenty & Mood, 2016; Quon & McGrath, 2015; Sweeting & Hunt, 2014).

A theoretical explanation for the role of subjective socioeconomic status might be the *Social Comparison Theory* of Festinger (1954), which states that people define their personal and social worth by comparing themselves with others. Two mechanisms of social comparison play a role in self-evaluation, (1) upward comparison and (2) downward comparison. Upward comparison takes place when an adolescent compares himself to peers who are better off than himself, while downward comparison reveals itself when an adolescent compares him or herself to peers who are worse off. An adolescent might feel better when he compares him or herself to peers who are worse off, while, reversely, he might feel worse when comparing to peers who are better off (Festinger, 1954). The *Social Comparison Theory* in relation to subjective socioeconomic status has been studied by Roy, Godfrey and Rarick (2016), who state that downward comparison functions as evaluation and upward comparison functions as affiliation with better off peers. Therefore, a higher SSS may be a protective factor in adolescent mental health (Roy, Godfrey & Rarick, 2016). However, the link between objective SES and mental health might be stronger in cases of upward comparison than in cases of downward comparison (Euteneuer, 2014). Specifically, adolescents who perceive themselves as disadvantaged possibly show a stronger link between objective SES and mental health.

Economic crisis

The Great Recession of the years 2008/2009 might have amplified the importance of subjective SES as a predictor of mental health. In their study, Hausman and Johnston (2014) describe that questionable housing loans and over-investment in financial markets created financial bubbles. Due to a high unemployment rate, individual wealth declined which caused consumers to stop spending. High unemployment rates are associated with mental health problems (Buffel, Van de Velde & Bracke, 2015). As a result of consumers spending less,

companies made less of a profit. In addition, investments became complex and risky. As an effect, governments implemented spending programs that did reduce unemployment but did not convince consumers to increase their spending.

In the current study, objective SES, operationalized as parental income is a predictor of adolescent mental health. A number of studies examined the association between economic crisis and mental health outcomes (Buffel, Van de Velde & Bracke, 2015; Christodoulou & Christodoulou, 2013; Fernández-Rivas & González-Torres, 2013; Lee et al., 2010). Firstly, according to Fernández-Rivas and González-Torres (2013) the economic crisis of the year 2008/2009 had no immediate effect on health in Spanish children and adolescents, however, the combination of unemployment, inequality and poverty is proposed to have long-term negative effects. Secondly, mental depression is positively related to unemployment rates in a cross-national comparison of the European Social Surveys' Round 3 (2006) and Round 6 (2012) (Buffel, Van de Velde & Bracke, 2015). Thirdly, according to Christodoulou and Christodoulou (2013), financial crises have direct socioeconomic consequences and long-term consequences, for example a poorer quality of education, and in turn these consequences can lead to poor mental health. Mental health promotion in times of economic crisis is, therefore, important in reducing negative consequences (Christodoulou & Christodoulou, 2013). Lastly, Lee et al. (2010) found that depression associated with economic hardship can be a way of coping with the economic crises. Summarizing these findings, unemployment due to economic crises has short-term and long-term consequences for mental health. During the recession, overall parental income decreased and unemployment rates increased, which is why the present study will explore the proposed relations in the year 2009, the beginning of the Great Recession of 2008-2009, and the year 2013, the ending of the Great Recession (Buffel, Van de Velde & Bracke, 2015).

Although SSS has not been taken into account in studies about economic crisis and mental health, we expected that SSS, objective SES and mental health will have a stronger association after the economic crisis than before. Our proposed explanation for the moderating role of SSS in the relationship between objective SES and mental health problems is that perceptions of financial uncertainty, unemployment rates and loss of income (non-objective measures) are associated with lower ratings of mental health (Lahad, Cohen, Fanaras, Leykin & Apostolopoulou, 2016).

Current study

The aim of this study is to examine the moderating role of SSS on the relationship between objective SES and mental health in Dutch adolescents. Specifically, the goal of this study is to examine if the correlations between SSS, objective SES and mental health became stronger after the Great Recession of 2008/2009. We investigated the link between objective SES and mental health and we examined the influence of SSS measures on this relationship. We included gender, school level and age to assess possible confounding effects (Viner et al., 2012; Wickrama, Noh and Elder, 2010).

The following central research question has been formulated based on empirical and theoretical findings: Is subjective socioeconomic status (SSS) a moderator on the relationship between objective socioeconomic status (SES) and mental health and is this relationship more pronounced in times of economic crisis? Objective SES, mental health and SSS measures were extracted from the HSBC-study findings from the year 2009 and the year 2013 in Dutch adolescents. Figure 1 is a visual representation of the model for assessing mental health in Dutch adolescents.

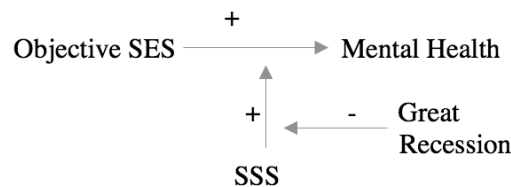


Figure 1. Model for the moderating role of subjective socioeconomic status on the relationship between parental objective SES and adolescent mental health in times of economic crisis

Hypotheses

In the current study, three hypotheses are examined. Objective SES and mental health are expected to be weakly related to each other, given the inconsistent findings from the aforementioned studies. Subjective socioeconomic status is hypothesized to change the relationship between objective SES and mental health in a way that the link between objective SES and mental health outcomes is amplified by SSS, explained by the *Social Comparison Theory* (Festinger, 1954). This relationship is expected to be more pronounced in the year 2013 after the economic crisis than before, because financial uncertainty is related to higher rates of depression in the existing literature (Buffel, Van de Velde & Bracke, 2015).

Method

Participants

The Health Behaviour in School-Aged Children (HBSC) studies of the year 2009/10 and the year 2013/14 were used to gather information about mental health problems, objective and subjective socioeconomic status of Dutch adolescents. Samples of 11-, 13- and 15-year-old adolescents from the Netherlands were recruited in primary and secondary schools through cluster sampling. In classrooms, data was collected under supervision of teachers or trained interviewers (Roberts et al., 2009). These HBSC-questionnaires consisted of questions to indicate health and health behaviour, risk behaviour, demographic factors, social background and context. Parental information was collected by email. Taking part in the HBSC-study was voluntary and participants gave informed consent. In the year 2009 the sample consisted of 7511 individuals (48.9% boys, 51.1 % girls) and in the year 2013 the sample consisted of 7279 individuals (49.7% boys, 50.3% girls). In the total sample, the major group consisted of 3595 adolescents in the VMBO-t/HAVO level (24.3%), followed by 2831 adolescents in the HAVO/VWO level (19.1%) and 2536 adolescents in the VWO level (17.1%). The smallest group was the VMBO-p/t level with 2439 adolescents (16.5%). The mean age in the total sample was 13.8 ($SD = 1.6$). The age range in the year 2009 was between 10 and 18 years of age, and the age range in the year 2013 was between 9 and 18 years of age. Participants with missing values were omitted from the results through listwise deletion.

Measures

Mental health problems. The score on mental health problems was computed by using different items measuring psychosomatic symptoms. Mental Health Problems (MH problems) were assessed by 14 items from the Psychosomatic Frequency Scale (Kelly, Molcho, Doyle & Gabhainn, 2010), the Strengths and Difficulties Questionnaire (SDQ) emotional problems variable, the SDQ behavioural problems variable and two items from the HBSC-questionnaire about difficulties with emotions, concentration, behaviour and contact with others (Muris, Meesters & Van den Berg, 2003). Most items were measured on a 5-point Likert scale (1 = *rarely or never*, 2 = *almost every month*, 3 = *almost every week*, 4 = *more than once a week* and 5 = *almost every day*), the SDQ variables were measured on a 4-point Likert scale (1 = *no*, 2 = *yes, small difficulties*, 3 = *yes, obvious difficulties* and 4 = *yes, severe difficulties*) and four items

were measured on a 3-item Likert scale (1 = *not true*, 2 = *a bit true* and 3 = *absolutely true*). Mental Health Problems had a high reliability in the year 2009 ($\alpha = .843$) as well as in the year 2013 ($\alpha = .868$). Additionally, the Mental Health Problems Scale had a good internal consistency of $\alpha = .858$ in the total sample.

Objective Socioeconomic Status (objective SES). Parental income was measured using the HBSC Family Affluence Scale (FAS), which is a six-item scale that measures family conditions and assets indicating wealth (Currie et al. 2014): “Does your family have a car or a van? (0 = *no*, 1 = *yes, one* and 2 = *yes, two or more*); Do you have a bedroom to yourself? (0 = *no* and 1 = *yes*); How often did you travel abroad for holiday/vacation last year? (0 = *not at all*, 1 = *once*, 2 = *twice* and 3 = *more often than twice*); How many computers does your family own? (0 = *none*, 1 = *one*, 2 = *two* and 3 = *more than two*); Do you have a dishwasher at home? (0 = *no* and 1 = *yes*); How many bathrooms (room with a bath) are in your home (0 = *none*, 1 = *one*, 2 = *two* and 3 = *more than two*).” The scores on the FAS were divided in three groups (1 = *low*, 2 = *average* and 3 = *high*) accordant with the classification of the international HBSC-report (Codebook HBSC 2009/10, 2016; Codebook HBSC 2013/14, 2016). Previous studies indicated good criterion validity on the FAS-scale (Boyce et al., 2006; Currie et al., 2008).

Subjective socioeconomic status. Subjective socioeconomic status (SSS) was indicated by using the following item: “How well off do you think your family is? (1= *very well off*, 2 = *quite well off*, 3 = *average*, 4= *not so well off* and 5 = *not at all*)” to measure adolescents’ perception of the income of their parents (Goodman et al., 2001).

HBSC data collection year. Every participant received a score on the HBSC-year variable (1 = *2009* and 2 = *2013*) after combining the datasets of the year 2009 and the year 2013.

Covariates. In order to rule out alternative explanations, covariates that were possibly related to mental health problems were controlled for. We controlled for gender (1 = *boy*, 2 = *girl*), age (in years) and school level (1 = *VMBO-p/t*, 2 = *VMBO-t/HAVO*, 3 = *HAVO/VWO*, 4 = *VWO*) (Hutton et al., 2014).

Strategy of data analysis

Firstly, descriptive statistics (N, %, means, SDs, confidence intervals) (see Table 1) were calculated. Correlation analyses (see Table 2) were calculated for the entire sample.

Secondly, after computing the new HBSC-year variable, both datasets were merged into one dataset with target variables. We subsequently conducted a factor analysis on the Mental Health Problems Scale to assess the internal consistency of the scale ($\alpha = .858$). For all variables, z -scores were calculated and dummy variables for gender and HBSC-year were computed.

Thirdly, by using a hierarchical linear regression analysis, we could see if objective SES, SSS and HBSC-year and their interactions explain a statistically significant amount of variance in mental health problems accounting for all other variables. In the first step, demographic variables were entered (gender, age and school level). Only main effects were considered. After adding demographic variables, objective SES, SSS and HBSC-year were entered, and their 2-way interactions. In the last step, we added the 3-way interaction of objective SES, SSS, and HBSC-year. Because all scores we used were z -scores, centering was not required.

Results

Descriptive statistics

Means and standard deviations for the independent and dependent variables are presented in Table 1. Girls scored higher on mental health problems than boys in the total sample. In the year 2013, adolescents experienced a higher amount of mental health problems than in the year 2009 as shown in an analysis of variance (ANOVA), $F(1, 13658) = 136,92, p < .001$. Objective SES decreased in the year 2013 compared to the year 2009, $F(1, 14788) = 1573,35, p < .001$, which was the same for SSS, $F(1, 13963) = 49,97, p < .001$.

Table 1

Sex differences in mental health and socioeconomic variables (objective SES and SSS) of the total sample and for boys and girls separately

	Boys			Girls		
	<i>N (%)</i>	<i>M</i>	<i>SD</i>	<i>N (%)</i>	<i>M</i>	<i>SD</i>
<i>Covariates</i>						
Age	7294	13.26	1.63	7496	13.19	1.61
School level	5645	2.48	1.06	5756	2.48	1.06
<i>Variables</i>						
Mental health problems	6672	1.62	.55	6988	1.89	.70
Objective SES	7294	2.43	.63	7496	2.35	.65
SSS	6840	3.26	.74	7125	3.11	.74
<i>Difference (gender)</i>						
	<i>F</i>	<i>df</i>	<i>p</i>			
<i>Covariates</i>						
Age	7.29	14788	<.01			
School level	.00	11399	.99			
<i>Variables</i>						
Mental health problems	610.34	13658	<.001			
Objective SES	63.77	14788	<.001			
SSS	76.30	13963	<.001			
HBSC year	.743	14788	.39			

Bivariate correlations were calculated for all variables (see Table 2). Mental health problems, objective SES and SSS were significantly associated with each other and with all covariates. Objective and subjective SES were negatively related to mental health problems as expected. For mental health problems, we found significant associations with gender, age and school level. A higher age was correlated with higher rates of mental health problems in contrast to what we expected. Therefore, we included gender, age and school level as covariates in our

analyses. Mental health problems increased significantly and objective and subjective SES decreased significantly between the years 2009 and 2013. Gender, age and school level were not significantly related to HBSC-year.

Table 2

Pearson and Spearman correlations between the variables in the total sample.

	1.	2.	3.	4.	5.	6.	7.
1. Gender	-						
2. Age in Years	-.02 ^{*a}	-					
3. School level	-.01 ^a	-.12 ^{**}	-				
4. MH problems	.24 ^{**a}	.07 ^{**}	-.09 ^{**}	-			
5. Objective SES	-.06 ^{**a}	-.05 ^{**}	.22 ^{**}	-.11 ^{**}	-		
6. SSS	-.11 ^{**a}	-.05 ^{**}	.14 ^{**}	-.15 ^{**}	.37 ^{**}	-	
7. HBSC-year	-.01 ^a	.00 ^a	-.01 ^{**a}	.10 ^{**a}	-.32 ^{**a}	-.05 ^{**a}	-

Note. * $p < .05$, ** $p < .01$.

^a Spearman's Rho.

Testing the hypotheses

A hierarchical linear regression analysis was conducted to predict mental health problems in adolescents based on demographic factors (gender, age and school level), income of parents, subjective socioeconomic status and year of data gathering.

The first step in the model was significant, $R^2 = .072$, $F(3, 10148) = 260.646$, $p < .001$, with female sex ($\beta = .22$, $p < .001$), higher age ($\beta = .06$, $p < .001$) and lower school level ($\beta = -.08$, $p < .001$) associated with more mental health problems.

The change in the proportion of variance in mental health problems explained by the second step was significant, $R^2 = .085$, $\Delta R^2 = .008$, $F(5, 10146) = 189.318$, $p < .001$, with lower objective income of parents ($\beta = -.04$, $p < .001$) and lower subjective SES ($\beta = .10$, $p < .001$) associated with more mental health problems.

The third step in the model, adding the interaction ($\beta = .07$, $p < .001$) between objective SES and SSS, explained a significant change in variance as well, $R^2 = .090$, $\Delta R^2 = .005$, $F(6,$

10145) = 167.140, $p < .001$, which means that subjective socioeconomic status changed the relationship between objective socioeconomic status and mental health problems (see figure 2). We decomposed the relationship between high objective SES and mental health problems by performing simple slopes analyses for three different z -scores of SSS, -1 SD , the mean (0) and $+1$ SD . For low SSS, every unit increase in objective SES (z -scores) resulted in a significant decrease in mental health problems, $b = -.06$, $t(13218) = -7.66$, $p < .001$. For average SSS, every unit increase in objective SES (z -scores) resulted in a significant decrease in mental health problems as well, $b = -.03$, $t(13218) = -4.31$, $p < .001$. However, for high SSS, every unit increase in objective SES (z -scores) did not result in a significant change in mental health problems, $b = -.01$, $t(13218) = -.99$, $p = .332$. The Johnson-Neyman technique showed that the relationship between objective SES and mental health problems was significant when SSS was less than $.37$ standard deviations above the mean but not significant with higher values of SSS, $t(13218) = -1.96$, $p = .05$, $b = -.02$.

The final step in the model represented a significant increase in the explained variance in mental health problems, $R^2 = .099$, $\Delta R^2 = .000$, $F(10, 10141) = 111.543$, $p = .000$; however, the 3-way interaction between objective SES, SSS, and HBSC-year was not significant ($\beta = -.00$, $p = .808$) (see Table 3).

No main effect for objective socioeconomic status was found, but we did find a main effect for subjective socioeconomic status on mental health and HBSC-year on mental health. This meant that SSS and data collection year significantly influenced mental health problems. Moreover, we found an interaction effect for objective and subjective socioeconomic status, which was in line with our expectation. Figure 2 is a graphical representation of the interaction between objective SES and SSS. This graph shows that adolescents from low income families who estimated themselves as being very well off had lower rates of mental health problems compared to the same low-income adolescents who experienced themselves as being not well off at all. A high SSS might function as a buffer in developing mental health problems, especially for adolescents from low income families. Against our expectation, the Great Recession did not moderate the association between objective SES, SSS and mental health problems.

Table 3
Steps of the Hierarchical Linear Model of Associations with Mental Health Problems

	Step 1		Step 2		Step 3		Step 4	
	<i>b</i>	β	<i>b</i>	β	<i>b</i>	β	<i>b</i>	β
<i>Control variables</i>								
1. Gender	.32	.24***	.31	.23***	.31	.23***	.31	.23***
2. Age (years)	.03	.06***	.03	.06***	.03	.06***	.03	.06***
3. School level	-.05	-.08***	-.04	-.07***	-.04	-.07***	-.04	-.07***
<i>Main effects (centered)</i>								
4. Objective SES	-	-	-.01	-.01	-.01	-.01	-.01	-.01
5. SSS	-	-	-.07	-.10***	-.06	-.08***	-.06	-.09***
6. HBSC year	-	-	.13	.10***	.13	.10***	.13	.10***
<i>2-way interactions</i>								
7. Objective SES and SSS	-	-	-	-	.04	.06***	.04	.07***
8. Objective SES and HBSC year	-	-	-	-	.02	.02	.02	.02
9. SSS and HBSC year	-	-	-	-	-.02	-.02	-.02	-.02
<i>3-way interaction</i>								
10. Objective SES, SSS and HBSC year	-	-	-	-	-	-	-.00	-.00

Note. Dependent Variable: Mental Health Problems, * $p < .05$, ** $p < .01$, *** $p < .001$

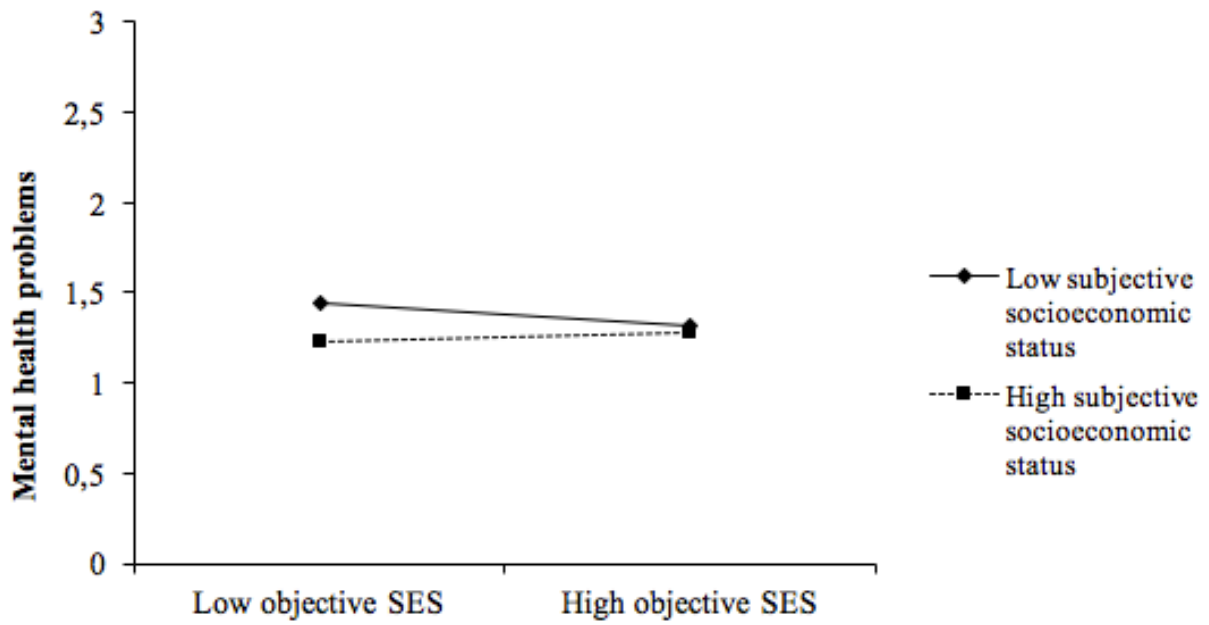


Figure 2. Graphical representation of the interaction of objective SES and SSS in relation to mental health problems.

Discussion

The aim of this study was to provide an insight in the correlations between mental health problems, income of parents (objective SES) and subjective socioeconomic status (SSS) in adolescence. In this study, three hypotheses were tested. Firstly, we predicted the objective SES to be associated with mental health problems. Secondly, we expected SSS to change the relationship between objective SES and mental health problems. Lastly, we hypothesised the Great Recession to fulfil an amplifying role in the correlation between objective SES, SSS and mental health problems. Consistent with previous studies, SSS was found to be a significant moderator in the relationship between objective SES and mental health problems (Roy, Godfrey & Rarick, 2016). A high SSS functions as a buffer against mental health problems in adolescents from lower income families. In high income families, SSS does not change the relationship between objective SES and mental health problems. Furthermore, two HBSC data collections of the year 2009 and the year 2013 were compared to examine the possible amplifying role of the Great Recession. We found a main effect for HBSC data collection year on mental health. However, no significant interaction effect between objective SES, SSS and the year of data gathering was found, which means that objective and subjective socioeconomic status did not differ significantly in the two datasets. Therefore, we were unable to find support for our hypothesis stating that the relations between objective SES and mental health problems are more pronounced in times of economic crisis. Objective SES and SSS did not explain the difference in mental health problems between the year 2009 and the year 2013.

Mental health and objective SES

The first hypothesis stating that objective SES and mental health were expected to be positively related to each other appeared to be consistent with the findings in the current study when SSS was not taken into account. Findings of studies on this association were inconsistent in existing literature (Euteneuer, 2014; Holstein et al., 2009; McLaughlin, Costello, Leblanc, Sampson, & Kessler, 2012; Reiss, 2013; Yoshikawa, Aber, & Beardslee, 2012). In our study, adolescents with lower objective socioeconomic status had higher rates of mental health problems compared to adolescents with a higher socioeconomic status. Specifically, adolescents from low income families are a vulnerable group in developing mental health problems, possibly through less access to resources (Mackenbach, 2012). Girls and lowly educated adolescents had,

on average, higher levels of mental health problems than boys and highly educated adolescents, both in the year 2009 and the year 2013. However, when SSS was added as a predictor, the effects were no longer significant.

Subjective SES as a moderator

The second hypothesis stating that subjective socioeconomic status would moderate the association between objective socioeconomic status and mental health was tested and the results of this study appeared to be consistent with this hypothesis. When taking subjective socioeconomic status into account, the relationship between objective SES and mental health problems weakened. Adolescents who viewed themselves as being well off although their objective socioeconomic status was below average had fewer mental health problems than adolescents who viewed themselves as poor combined with an objective socioeconomic status that was below average. Differences in mental health problems appeared to be greater in adolescents from low-income families than in adolescents from high-income families. The findings of the current study were consistent with former research stating that mental health is better explained when measures of objective SES as well as subjective perceptions of SES are taken into account (Demakakos et al., 2008; Elgar, Karvonen & Rahkonen, 2011; Elgar, McKinnon, Torsheim, Schnohr Mazur, Cavallo & Currie, 2015_a; Plenty & Mood, 2016; Quon & McGrath, 2015; Sweeting & Hunt, 2014). The results of a cross-sectional study from Roy, Godfrey and Rarick (2016) based on the *Social Comparison Theory* (Festinger, 1954) were in line with findings of the current study. Therefore, the *Social Comparison Theory* was supported by our findings.

Economic crisis

The third hypothesis stating that this relationship is more pronounced in the year 2013 compared to the year 2009 was not supported. The findings of former research about mental depression and economic crises were not supported by the current study (Lahad et al., 2016; Lee et al., 2010). There were no significant differences in the relation between objective SES, SSS and mental health problems between the year 2009 and the year 2013. This means that the interaction between the year of data gathering, objective SES and SSS does not explain the difference in mental health problems between the year 2009 and the year 2013. We were unable

to find clues about the influence of the economic crisis on mental health problem rates as no significant differences in the interaction between objective SES, SSS and year of data gathering were found. It might be the case that effects of the financial crisis are only visible after a decade or longer, for instance because people were unable to save up money to finance their studies or houses, which may influence their mental health in a later stadium (Buffel, Van de Velde & Bracke, 2015; Fernández-Rivas & González-Torres, 2013; Christodoulou & Christodoulou, 2013). However, on the other hand, if the Great Recession of the year 2008 had only short-term effects, the year 2009 sample was not representative because adolescents would have already had mental health problems as an effect of the economic crisis (Christodoulou & Christodoulou, 2013).

Strengths, limitations and future directions

Our study had several notable strengths: the two datasets that were used to compare socioeconomic measures and mental health problems in the year 2009 and 2013 enabled us to test and compare interactions and discover significant differences between boys and girls and highly and lowly educated adolescents. The datasets consisted of a large and representative number of adolescents, which allowed us to describe reliable statements about the association between objective and subjective socioeconomic status and mental health problems. Moreover, effects of age, school level and gender were controlled for and, thereby, we were able to discover that adolescents from low income families take advantage of a high subjective socioeconomic status.

Despite the strengths, the current study was limited by several factors that describe directions for further research. Firstly, the cross-sectional design of the current study did not allow examination of causal relationships. Adolescents with higher mental health problem levels might perceive themselves as poor, however, longitudinal research on this relationship is limited (Macleod, Smith, Metcalfe & Hart, 2005). Causal relationships between subjective socioeconomic status and mental health problems could be examined longitudinally in further research in order to examine plausibility and control for reverse causation. Secondly, HBSC data of the year 2009 and the year 2013 were used. Because the economic crisis already started in the year 2008, the timing of these two data collections may not have been optimal to examine the effect of the economic crisis on mental health problems. In future research, other HBSC data

collections (before the year 2008 and after the Great Recession) could be included to compare before and after economic crisis measures to gain a better understanding of the correlations between the economic crisis and mental health problems over a longer time period. A third limitation addresses the fact that there might be other pathways to explain mental health problems. This raises questions towards other predictors of mental health problems and the influence of the Great Recession on these predictors. For example, although the current study controlled for gender, school level and age, other factors like parental warmth may play a role in developing mental health problems and these factors could possibly be included in further studies (Derenne & Tai, 1975; Lee et al., 2012).

Concluding remarks

In the current study, replicating earlier studies, objective SES and mental health problems were found to be associated in adolescence. Subjective socioeconomic status changed the relationship between objective SES and mental health problems significantly, but there were no significant differences between the year 2009 and the year 2013 in the relationship between objective SES, SSS and mental health problems. Furthermore, SSS functions as a buffer in adolescents from low-income families. This study did not find support for the influence of the economic crisis in mental health problems, but hopefully further studies will examine the long-term effects of the Great Recession. As said before, mental health problems in adolescence are a predictor for adult mental health problems. Therefore, studies about potential predictors of mental health problems are important in developing mental health policies and increasing SSS should be an important focus in developing mental health policies (especially in adolescents from low income families).

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