

## Adolescents' psychological health complaints and the economic recession in late 2007: a multilevel study in 31 countries

Timo-Kolja Pfoertner<sup>1</sup>, Katharina Rathmann<sup>1</sup>, Frank J. Elgar<sup>2</sup>, Margaretha de Looze<sup>3</sup>, Felix Hofmann<sup>4</sup>, Veronika Ottova-Jordan<sup>5</sup>, Ulrike Ravens-Sieberer<sup>5</sup>, Lucia Bosakova<sup>6,7</sup>, Candace Currie<sup>8</sup>, Matthias Richter<sup>1</sup>

1 Institute of Medical Sociology, Martin Luther University Halle-Wittenberg, Halle (Saale), Germany

2 Institute for Health and Social Policy and Douglas Mental Health University Institute, McGill University, Montreal, Quebec, Canada

3 Department of Interdisciplinary Social Sciences, Faculty of Social and Behavioral Sciences, Utrecht University, Utrecht, The Netherlands

4 Ludwig Boltzmann Institute – Health Promotion Research, Vienna, Austria

5 Department of Child and Adolescent Psychiatry, Psychotherapy, and Psychosomatics, Research Unit Child Public Health, University Medical Center Hamburg-Eppendorf, University of Hamburg, Hamburg, Germany

6 Department of Health Psychology, Institute of Public Health, Faculty of Medicine, Pavol Jozef Safarik University Kosice, Kosice, Slovakia

7 Department of Business Informatics and Mathematics, Faculty of Business Economy, University of Economics in Bratislava, Kosice, Slovakia

8 Child and Adolescent Health Research Unit, School of Medicine, University of St. Andrews, St. Andrews, UK

**Correspondence:** Timo-Kolja Pfoertner, Institute of Medical Sociology (IMS), Martin Luther University Halle-Wittenberg, Magdeburger Str. 8 - 06112 Halle (Saale), Germany, Tel: +49 345 557 1331, Fax: +49 345 557 1165, e-mail: timo-kolja.pfoertner@medizin.uni-halle.de

**Background:** The recent economic recession, which began in 2007, has had a detrimental effect on the health of the adult population, but no study yet has investigated the impact of this downturn on adolescent health. This article uniquely examines the effect of the crisis on adolescents' psychological health complaints in a cross-national comparison. **Methods:** Data came from the World Health Organization collaborative 'Health Behaviour in School-aged Children' study in 2005–06 and 2009–10. We measured change in psychological health complaints from before to during the recession in the context of changing adult and adolescent unemployment rates. Furthermore, we used logistic multilevel regression to model the impact of absolute unemployment in 2010 and its change rate between 2005–06 and 2009–10 on adolescents' psychological health complaints in 2010. **Results:** Descriptive results showed that although youth and adult unemployment has increased during the economic crisis, rates of psychological health complaints among adolescents were unaffected in some countries and even decreased in others. Multilevel regression models support this finding and reveal that only youth unemployment in 2010 increased the likelihood of psychological health complaints, whereas its change rate in light of the recession as well as adult unemployment did not relate to levels of psychological health complaints. **Conclusion:** In contrast to recent findings, our study indicates that the negative shift of the recent recession on the employment market in several countries has not affected adolescents' psychological health complaints. Adolescents' well-being instead seems to be influenced by the current situation on the labour market that shapes their occupational outlook.

### Introduction

The global economic recession, documented to have begun in December 2007, has affected prospects for prosperity and health among populations of many countries. Like economic downturns in the past, the recent recession threatens individual well-being and living conditions through the anticipated and actual losses of economic and social security.<sup>1–3</sup> Recent studies have found that the recent recession has negatively affected mental and physical health in adults. Its onset in 2007 was accompanied by a rise in suicides in Italy,<sup>4,5</sup> the United Kingdom,<sup>6</sup> the United States<sup>7</sup> and across Europe<sup>8</sup>; an increase of adverse mental health in the United Kingdom<sup>9</sup> and Spain<sup>10</sup>; higher rates of poor self-rated health in Greece<sup>11–13</sup>; and lower subjective well-being in Italy and the United States.<sup>5,13</sup>

However, other studies revealed positive health effects of the economic recession on adults, especially in some rich

countries.<sup>3,5,13</sup> Those studies argue that the recession might actually improve health, at least in the short-term.<sup>5</sup> According to Bezruchka,<sup>14</sup> having more leisure time spent with friends and children, better health behaviours and less job-related stress during the recession might yield positive effects of a recession on health. Therefore, while recent findings largely provide evidence of the detrimental health effects of an economic recession, they also highlight a complex causal chain between social, economic and political factors and individual health with some counter-intuitive relationships.<sup>3,8</sup>

Research on the potential effects of an economic recession on adolescent health is scarce. Besides the financial strain among parents, life opportunities and living conditions of adolescents may also have been under pressure since the beginning of the recession in 2007. Youth and adult unemployment rates increased rapidly in many countries (e.g., Spain, Greece, Lithuania, Latvia, Estonia and Ireland).<sup>11,15</sup> A similar trend has been reported for child and adult poverty rates in many countries.<sup>16</sup> Research in the

United Kingdom has found that since the economic recession in 2007, intensified concerns about job security, the financial situation and future prospects resulted in increased family tensions.<sup>17</sup> The impact of the economic hardship that began in 2007 on adolescent health is still unclear. However, research on Finland's economic recession in the early 1990s shows that increased economic pressure and negative changes in parental mental health, marital interaction and parenting quality were risk factors for child mental health.<sup>18</sup> Furthermore, Harris et al.<sup>19</sup> suggested that adolescents with negative expectations about their future occupation show higher rates of health detrimental behaviours. To date, such findings have come from national studies and no multi-country study has yet investigated the impact of the recent economic recession on cross-national trends in youth health.

The present study examined the effect of the 2007 global economic recession on weekly psychological health complaints in adolescents. We focused on youth and adult unemployment as outcomes of the recession because the economic downturn might imply psychological health complaints through changes in adolescent life chances and those of their parents. Furthermore, unemployment is a more useful indicator than national wealth or productivity, given its immediate and direct impact on lives of families and individuals.<sup>1</sup> Information on the overall trend and the relation between unemployment and psychological health during the recession can help elucidate the health consequences of an economic downturn and future prospects for the next generation of workers. Thus, the present article aimed to investigate (i) whether psychological health complaints changed during the recession, (ii) how this change related to changes in youth and adult unemployment during the recession and (iii) whether adolescents' psychological health complaints in 2010 related more to the absolute level of youth and adult unemployment in 2010 or to relative changes in unemployment after the onset of the recession in 2007.

## Methods

The analyses used data from the 2005–06 and 2009–10 cycles of the Health Behaviour in School-aged Children (HBSC) study, a cross-national survey of 11-, 13- and 15-year-old children and adolescents conducted in collaboration with the World Health Organization.<sup>20</sup> The data were collected by means of standardized questionnaires, administered in school classrooms according to standard instructions.<sup>21,22</sup> Each participating country used a hierarchical sample design with the school or class being the sampling unit. According to the international HBSC report, the response rate on school, class and pupil level exceeded 60% in 2005–06 and 2009–10.<sup>21,22</sup> Student participation was voluntary. Ethical approval was obtained for each national survey according to the national guidance and regulations at the time of data collection.

## Sample

The present analysis is based on data of the past two HBSC cycles (2005–06 and 2009–10) collected in 31 countries. Greenland was excluded from analysis because of unavailable information on their gross domestic product (GDP) and unemployment. For the United Kingdom, individual national surveys from England, Wales and Scotland were combined. Also, surveys from the Flanders and Wallonian regions were combined for Belgium. The analysis included 164 623 individual students from the 2005–06 cycle and 168 284 students from the 2009–10 cycle (table 1) (for a detailed data description, see Supplementary Appendix S1 and S2).

## Psychological health complaints

Psychological health complaints were measured using the HBSC symptom checklist.<sup>23</sup> Pupils were asked how often in the past 6 months they had experienced the following symptoms: feeling low, irritable or bad-tempered; feeling nervous; and difficulties in getting to sleep. The response options for each item ranged from 'about every day' to 'rarely or never'. These response options were categorized into 'two or more symptoms more than once a week' (coded as 1) vs. 'less than two symptoms' (coded as 0).<sup>24</sup> The scale has been validated in a number of studies.<sup>25,26</sup>

## Individual-level control variables

The analyses were adjusted for individual differences in family affluence, gender and age. 'Family affluence' were measured with the family affluence scale (FAS).<sup>24</sup> The FAS is a validated measure of material affluence derived from the characteristics of a pupil's household (i.e., car ownership, having one's own bedroom, number of computers at home and number of family holidays). In accordance with previous studies, we used an additive score that was subsequently recoded into tertiles of high, middle and low family affluence for each country separately.<sup>24,27</sup>

## Youth and adult unemployment

Unemployment rates have been used in previous health studies as an outcome indicator of an economic recession.<sup>1,28</sup> We used data on adult and youth unemployment to capture their possible differential effects on adolescent psychological health. Unemployment figures obtained from EUROSTAT refer to the number of persons who are unemployed as a percentage of the total number of employed and unemployed persons between the age of 15 and 24 years (youth unemployment) and between the age of 25 and 75 years (adult unemployment).<sup>29</sup> Our analyses tested the psychological health effects of both the absolute level of youth and adult unemployment in 2010 and percentage changes in youth and adult unemployment during the recession. To adjust for short-term fluctuations in unemployment, changes were measured by the relative difference between the average in unemployment of the pre-recession period (2005–06) and the enduring-recession period (2009/10).

## National-level control variables

To control for differences in absolute wealth between countries, we used information on each nation's GDP per capita in 2010 based on purchasing power parity (PPP) and converted to current international dollars from the World Bank database (<http://data.worldbank.org>). In previous research, GDP has also been used as an indicator of an economic recession,<sup>30</sup> demonstrating the theoretical dependency between unemployment and national wealth, which is also exemplified by their high correlation in table 2.

## Statistical analysis

The statistical analyses were carried out in two phases. First, a descriptive analysis of the association between the change rate in youth and adult unemployment and psychological health complaints was conducted covering the pre-recession period (2005/06) and the enduring-recession period (2009/10). We correlated the relative percentage increase in rates of psychological health complaints and unemployment. Pearson and Spearman correlation coefficients were applied to examine their interrelations.

Second, logistic multilevel regression models were fitted to the hierarchical data of individual respondents within countries.<sup>31–34</sup> Multilevel logistic regression allows both contextual and individual differences to be modelled in a multilevel population hierarchy. The multilevel logistic regression model is based on a logit-link function that consists of fixed and random parts. The fixed part of the model

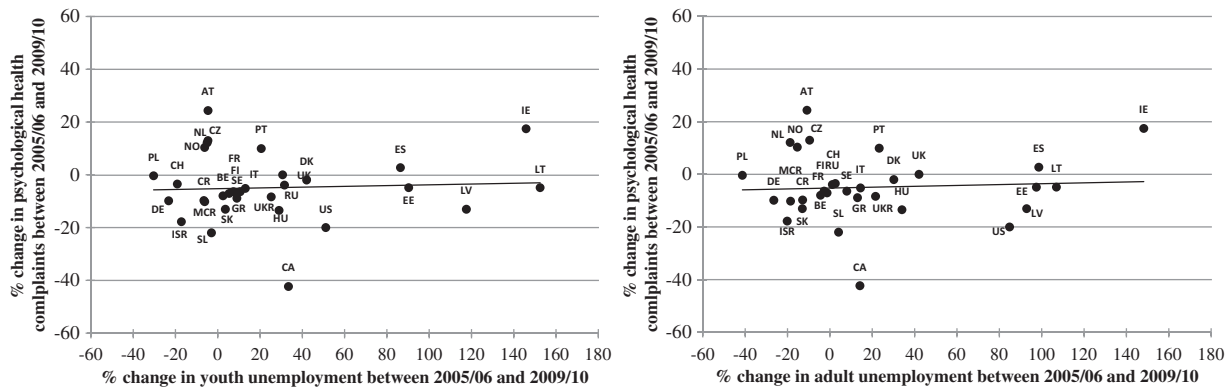
Table 1 Data description (HBSC 2005/06, 2009/10; EUROSTAT; World Bank database)

Country (N = 31)	2005/06		2009/10		2005/06 to 2009/10		Youth unemployment in %			Adult unemployment in %			GDP per capita, PPP in 2010 (int. \$)
	Total	Percent reporting psychological health complaints	Total	Percent reporting psychological health complaints	Percent relative change rate in psychological health complaints in light of the recession	Pre-recession period (2005/06)	Enduring-recession period (2009/10)	In 2010	Pre-recession period (2005/06)	Enduring-recession period (2009/10)	In 2010		
Austria	4418	10.1	4722	12.6	24.4	9.4	8.9	8.8	4.0	3.6	3.7	40401	
Belgium	7911	19.7	7220	18.1	-8.0	20.3	20.8	22.4	6.8	6.5	7.0	37833	
Canada	5535	22.2	14198	12.8	-42.3	11.5	15.4	17.4	5.2	5.9	6.4	39050	
Croatia	4774	23.6	6123	21.3	-9.7	28.4	26.5	32.6	9.1	7.9	9.5	18727	
Czech Republic	4626	26.2	4213	29.6	13.0	15.7	15.0	18.3	6.0	5.4	6.4	25358	
Denmark	5313	15.0	3871	14.7	-2.0	7.9	11.3	14.0	3.5	4.6	6.3	40588	
Estonia	4321	22.5	4102	21.4	-4.9	12.7	24.2	32.9	5.3	10.5	15.0	20092	
Finland	5016	18.8	6406	17.6	-6.4	18.4	19.8	21.4	6.1	6.0	6.6	36030	
France	6846	25.5	5805	23.7	-7.1	21.2	22.3	23.6	7.6	7.5	8.1	34262	
Germany	6979	13.2	4787	11.9	-9.8	13.8	10.6	9.9	9.6	7.0	6.7	37652	
Greece	3620	34.9	4703	31.8	-8.9	24.7	26.9	32.9	7.7	8.7	11.1	27520	
Hungary	3396	24.5	4690	21.2	-13.5	18.9	24.3	26.6	6.4	8.5	10.0	20734	
Ireland	4435	17.2	4077	20.2	17.4	8.8	21.6	27.6	3.7	9.1	12.0	40883	
Israel	4698	42.2	3782	34.7	-17.8	18.0	14.9	16.1	7.0	5.6	5.4	26582	
Italy	3813	34.8	4641	33.0	-5.2	22.0	24.8	27.8	5.5	6.3	7.0	32110	
Latvia	4061	26.8	3973	23.3	-13.1	13.5	29.3	37.2	7.0	13.6	17.7	15943	
Lithuania	5425	26.7	5135	25.4	-4.9	10.1	25.5	35.3	5.3	10.9	16.2	18120	
The Netherlands	4065	13.2	3380	14.8	12.1	8.0	7.6	8.7	3.7	3.0	3.7	41673	
Norway	4442	17.4	3179	19.2	10.3	9.1	8.6	9.2	2.6	2.2	2.7	56976	
Poland	5401	27.5	4078	27.4	-0.4	29.4	20.5	23.7	11.7	6.9	8.1	20033	
Portugal	3755	15.1	3868	16.6	9.9	20.1	24.2	27.7	7.3	9.0	10.6	25519	
Russian Federation	7712	25.7	4823	24.7	-3.9	15.5	20.4	23.5	5.5	5.6	5.4	19940	
Slovakia	3543	31.4	4699	27.3	-13.1	26.0	26.9	33.9	12.1	10.5	12.5	23149	
Slovenia	4954	14.1	5297	11.0	-22.0	13.3	12.9	14.7	4.9	5.1	6.5	26509	
Spain	8644	22.1	4852	22.7	2.7	18.6	34.7	41.6	7.3	14.6	18.0	31575	
Sweden	4214	21.9	6230	20.5	-6.4	21.1	23.3	24.8	5.0	5.4	6.2	39251	
Switzerland	4408	20.0	6397	19.3	-3.5	7.9	6.4	6.0	3.4	3.5	3.9	48712	
Ukraine	4674	28.7	5447	26.3	-8.4	14.3	18.0	19.2	5.4	6.6	7.0	6678	
Macedonia	5163	24.5	3626	22.0	-10.2	60.0	56.3	55.8	32.7	26.6	24.5	11083	
The United Kingdom	14133	20.0	13957	20.0	0.0	13.7	17.9	19.6	3.6	5.1	5.8	35316	
The United States	3837	27.5	6003	22.0	-20.0	10.8	16.3	18.4	3.7	6.9	8.2	46612	
Total	164123	23.0	168284	21.6	6.1	17.5	20.5	23.6	6.9	3.6	9.0	30481	

**Table 2** Pearson ( $r_p$ ) and Spearman ( $r_{sp}$ ) correlation coefficients between the macro-level determinants

GDP per capita	Adult unemployment						Youth unemployment				
			Percent in 2010		Percent change after the economic recession in 2007		Percent in 2010		Percent change after the economic recession in 2007		
	$r_p$	$r_{sp}$	$r_p$	$r_{sp}$	$r_p$	$r_{sp}$	$r_p$	$r_{sp}$	$r_p$	$r_{sp}$	
GDP per capita	1.00	1.00									
Adult unemployment											
Percent in 2010	-0.55	-0.55	1.00	1.00							
Percent change after the initiation of the economic recession in 2007	-0.01	0.00	0.45	0.31	1.00	1.00					
Youth unemployment											
Percent in 2010	-0.62	-0.63	0.91	0.81	0.32	0.29	1.00	1.00			
Percent change after the initiation the economic recession in 2007	-0.15	-0.02	0.52	0.31	0.93	0.88	0.41	0.33	1.00	1.00	

Number of observations = 31;  $r_p$  = Pearson correlation coefficient;  $r_{sp}$  = Spearman correlation coefficient.



**Figure 1** Association between change rate (in %) in two or more psychological health complaints (y-axis: HBSC 2005/06 and 2009/10) and in youth and adult unemployment\* (x-axis: EUROSTAT 2005/06 and 2009/10) in the light of the economic recession in 2007.

\*Changes in unemployment rates were measured by the relative difference between the average in unemployment of the pre-recession period (2005/2006) and the enduring-recession period (2009/10).

Labels: Austria (AT), Belgium (BE), Canada (CA), Croatia (CR), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Israel (ISR), Italy (IT), Latvia (LV), The Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Russia (RU), Slovakia (SK), Slovenia (SL), Spain (ES), Sweden (SE), Switzerland (CH), Ukraine (UKR), Macedonia (MCR), the United Kingdom (UK) and the United States (US)

is a linear function of individual- and contextual-level determinants. The random part includes three variance components between countries (Level 3), schools (Level 2) and students (Level 1). All multilevel logistic regression models were fitted to the data using the adaptive Gauss-Hermite likelihood approximation in the xtmelogit command in Stata 12.1 (StataCorp LP, College Station, TX).<sup>34</sup>

Five models were fitted by stepwise regression. Model 1 (intercept-only) considered only the outcome measure to analyse the country- and school-level variance in adolescent psychological health complaints. Model 2 included the individual-level variables. In Model 3, absolute levels and relative change of youth unemployment were considered, and Model 4 considered the same indicators for adult unemployment. Finally, Model 5 included all individual- and macro-level determinants. This strategy was able

to quantify the design effects of clustering in adolescents' psychological health complaints (Model 1) and the added contributions of age, gender and family affluence (Model 2). In Models 3 and 4, we estimated the effects of youth and adult unemployment independently from each other as well as the effects of national wealth to avoid problems of multicollinearity. There were high correlations between macro-level determinants, especially between the indicators of youth and adult unemployment (table 2). For this reason, the interpretation of the full model (Model 5) requires caution.

To quantify the proportion of the total variance attributable to the country level, we estimated the population intraclass correlation coefficient (ICC) as the ratio of country-level and school-level variance to total observed variance.<sup>35</sup> We also calculated the median odds ratio (MOR) to quantify the cross-country and cross-school

**Table 3** Odds ratios (Ors) and 95% confidence intervals (CIs) for the associations between two or more psychological health complaints more than once a week in 2010 and measures of the economic recession, adjusted for GDP per capita and individual-level factors

Countries = 31 Schools = 6741 Individuals = 168 284	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4 OR (95% CI)	Model 5 OR (95% CI)
Intercept	0.26*** (0.23–0.30)	0.20*** (0.18–0.24)	0.20*** (0.18–0.23)	0.20*** (0.18–0.23)	0.21*** (0.19–0.23)
Individual-level factors					
Age (reference: 15 years)					
13 years		0.87*** (0.85–0.90)	0.87*** (0.85–0.90)	0.87*** (0.85–0.90)	0.87*** (0.85–0.90)
11 years		0.70*** (0.68–0.72)	0.70*** (0.68–0.72)	0.70*** (0.68–0.72)	0.70*** (0.68–0.72)
Gender (reference: boys)					
Girls		1.73*** (1.69–1.77)	1.73*** (1.69–1.77)	1.73*** (1.69–1.77)	1.73*** (1.68–1.77)
Family affluence (reference: high)					
Medium		1.05** (1.02–1.09)	1.05** (1.02–1.09)	1.05** (1.02–1.09)	1.05** (1.02–1.08)
Low		1.31*** (1.27–1.35)	1.31*** (1.27–1.35)	1.31*** (1.27–1.35)	1.31*** (1.27–1.35)
Contextual-level factors					
Youth unemployment in 2010			1.02* (1.00–1.03)		1.04** (1.02–1.07)
Percent relative change after the economic recession in 2007 <sup>c</sup>			1.00 (0.99–1.00)		1.00 (0.99–1.01)
Adult unemployment in 2010				1.02 (0.99–1.05)	0.92** (0.87–0.98)
Percent relative change after the economic recession in 2007 <sup>c</sup>				1.00 (0.99–1.00)	1.00 (0.99–1.01)
National wealth [GDP per capita. PPP (int. \$)]					0.99 (0.98–1.01)
Country-level					
$\sigma^2_{i0}/\text{ICC}$ in %	0.13/3.5%	0.13/3.7%	0.11/3.1%	0.12/3.6%	0.08/2.4%
PCV <sup>a</sup>	–	+3.1%	–16.6%	–2.1%	50.6%
MOR	1.40	1.41	1.37	1.40	1.32
School-level					
$\sigma^2_{i0}/\text{ICC}$ in %	0.09/2.6%	0.07/2.0%	0.07/2.0%	0.07/2.0%	0.07/2.0%
PCV <sup>a</sup>	–	–33.9%	–33.9%	–25.3%	–33.9%
MOR	1.33	1.28	1.28	1.28	1.28
Likelihood <sup>b</sup>	–86258.9	–84 833.8***	–84 831.0***	–84 833.0***	–84 827.0***

Model 1 = empty model; Model 2 = individual variables; Model 3 = Model 2 + absolute level and change rate in youth unemployment; Model 4 = Model 2 + absolute level and change rate in adult unemployment; Model 5 = Model 3 + Model 4.

a: The proportional change in variance (PCV) is the change rate of variance in comparison with the empty model (Model 1).

b: Refers to the increase of model fit in comparison with the empty model (Model 1).

c: The change rate refers to the relative difference between the average in unemployment of the pre-recession period (2005/06) and the enduring-recession period (2009/10).

\*\*\* $P < 0.001$ ; \*\* $P \leq 0.01$ ; \* $P \leq 0.05$ .

variation in adolescent psychological health complaints.<sup>35</sup> Furthermore, according to the stepwise model specification, the percentage change of the country-level variance was used. Finally, we applied a log-likelihood ratio test to analyse whether the model fit has increased after controlling for individual-level country-level determinants.

## Results

Figure 1 shows the correlation between youth and adult unemployment and two or more weekly psychological health complaints. Although youth and adult unemployment increased during the economic crisis in most countries, these scatter plots suggest the rates of psychological health complaints, overall, were unaffected or even decreased. Only Ireland (IE) and Portugal (PT), faced a rise in psychological health complaints (9–17%) with increasing unemployment (21–148%). Thus, we did not observe a consistent correlation between relative changes in unemployment and rates of psychological health complaints.

Table 3 shows the results of the logistic regression analyses of two or more weekly psychological health complaints in 2010. Model 1 indicates the variance in psychological health complaints among the 31 countries (ICC = 3.5%) and the 6741 schools (ICC = 2.6%). Model 2 only controls for individual characteristics. Risks of psychological health complaints increased significantly with age, and were higher for medium- and low-affluent students compared with high-affluent students. Females showed a higher likelihood

(odds ratio = 1.73) of reporting two or more psychological health complaints compared with their male counterparts. These associations and coefficients did not change when the macro-level indicators were included in Models 3–5. Model 3 considers absolute youth unemployment rate in 2010 and the change rate in youth unemployment between 2005/06 and 2009/10. There was a higher risk of having two or more psychological health complaints for adolescents in countries with higher absolute youth unemployment rates in 2010, whereas the change rate in youth unemployment was not related to psychological health complaints. In Model 4, the absolute and change rates in adult unemployment rate did not relate to adolescents' psychological health complaints. The full model (Model 5) includes all macro-level indicators simultaneously, and further controls for GDP. The absolute rate of youth unemployment still matters for adolescent psychological health complaints as in Model 3. Additional analyses showed that the effect of the absolute rate of youth unemployment on psychological health complaints significantly increases with age (results not shown). For the absolute and change rates in adult unemployment, only the absolute level is significant, which probably stems from the high correlation with the absolute rate of youth unemployment ( $r = 0.88$ , table 2). The effect of the absolute rate in adult unemployment decreases with age, whereas change rate in youth and adult unemployment did not significantly differ by age (results not shown). National wealth did not show a significant association with adolescents' psychological health complaints. Finally, the consideration of all individual- and contextual-level determinants

(Model 5) explains 33% of the overall country variance in psychological health complaints (Model 1). However, the log-likelihood ratio test reveals that the fit of the data did not significantly increase after including all macro-level determinants (Model 5).

## Discussion

The aim of this study was to examine the impact of the global economic recession of 2007 on psychological health complaints in an international sample of adolescents. To our knowledge, this is the first cross-national study on the relationship between unemployment and adolescent psychological health complaints. Multilevel regression analyses showed that psychological health complaints related more closely to absolute differences in unemployment in 2010 than to changes in unemployment rates since 2007. In this context, it was not so much adult unemployment but youth unemployment that related to psychological health complaints. This association significantly increased with adolescents' age. Thus, adolescent psychological health seemed to be affected more by the immediate economic situation and future prospects on youth employment market than by adult unemployment rates and recent economic changes.

We found that despite sharp increases in youth and adult unemployment during the recent recession, the prevalence of psychological complaints declined in most countries. A negative association between changes in youth and adult unemployment and psychological health complaints contradicts a vast body of national research on the effects of economic recessions on adult health.<sup>3</sup> Accordingly, Cusworth<sup>36</sup> argues that parental unemployment mostly has a negative effect on adolescents' health by limiting the access to financial, social and cultural resources and owing to tensions within the family. In this context, most individual-level studies found that (especially long-term) parental unemployment is negatively associated to adolescents' health.<sup>37</sup>

But a few studies also argue that children might profit from parental unemployment, at least in the short run. As Bezruchka noted, economic recessions relate to declines in several negative health behaviours such as smoking, overeating and alcohol misuse and to increases in leisure time, physical activity and the amount of time that families spend together.<sup>15,38,39</sup> This is consistent with our finding that recent changes in adult and youth unemployment were unrelated to adolescents' health, as they rather reflect a very short-term effect of the recession.

The absolute level of youth unemployment, on the other hand, better reflects long-term structural economic conditions in a country. As adolescents develop expectations about their future within institutional settings and social structures, youth unemployment might affect students' psychological health through the perception and interpretation of declining economic opportunities.<sup>3,40</sup> This might explain why the absolute level of youth unemployment is more important for psychological health than relative changes in unemployment, especially among older adolescents given their proximity to the labour market. Furthermore, the sample might be too young to appreciate the situation on the employment market years ago, as other aspects of adolescents' life were more relevant during that time. However, the results showed a moderate interaction between the change rate in youth unemployment and its absolute level in 2010, indicating structural deficits in some countries that might be intensified by the recent recession. An increase of psychological health complaints during the recession could not be observed across all countries. Moreover, the overall trend of psychological health complaints between 1994 and 2010 showed that prevalence rates were rather stable till 2006 and decrease in 2010 (Supplementary Appendix S3).

In this context, we identified strong differences in trend rates of psychological health complaints between countries grouped into

types of welfare regimes (Supplementary Appendix S3). Noack and Kracke<sup>41</sup> argue that especially 'healthy' countries protect adolescents from negative social changes. In accordance with our findings on trend rates, Richter et al.<sup>42</sup> show that countries with less egalitarian and less redistributive welfare provision as the Anglo-saxon, Southern and Eastern European countries reported a higher likelihood of psychological health complaints among adolescents. Further, their findings indicate that adolescents might benefit from the principle of familism, which is prevalent for the southern European countries. Thus, social protection and cultural importance of families might protect adolescents from economic downturns.

The strengths of the study include the nationally representative samples of adolescents from a diverse group of countries. A limitation was the short duration of the study, as some health impacts of economic change may take several years to observe.<sup>43</sup> As well, Noack and Kracke<sup>41</sup> argue that using aggregate data to illustrate socioeconomic trends is often problematic owing to the high correlation with other unobserved characteristics of a society on the macro level. Furthermore, the number of countries for which we had comparable individual data constrained the number of country-level variables we could investigate. Thus, large cross-national studies are needed to provide sufficient statistical power. Finally, we were not able to control for levels of non-response across time and countries, as the HBSC did not provide such information. Different rates of non-response could bias the results, as students' attendance might depend on characteristics such as the socioeconomic status or levels of health. Thus, according to Weitzman et al.,<sup>44</sup> levels of psychological health complaints could be underestimated in our study.

This study found that adolescent psychological health complaints related more to the immediate situation on the youth employment market than by adult unemployment and economic changes during the recession. According to Leyland,<sup>43</sup> the failure to reduce youth unemployment implies financial, social and health costs for adolescents as well as for the whole society. Thus, governments have to increase efforts to recover the situation on employment market for adolescents. Despite immediate benefits on adolescents' health, following this strategy will increase future prospects and opportunities of adolescents and reduce the long-term costs of the recent economic recession.

## Supplementary data

Supplementary data are available at *EURPUB* online.

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## Key points

- Adolescents' health complaints were unaffected by the increase of youth and adult unemployment during the recession.
- Only current unemployment in youth was significantly associated with psychological health complaints, whereas its change rate in light of the recession as well as adult unemployment did not.
- Governments have to intensify efforts to decrease youth unemployment that was enhanced by the recent recession to reduce the short- and long-term costs of economic insecurity for adolescents and society.

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