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# Associations Between Social Vulnerabilities and Psychosocial Problems in European Children: Results from the IDEFICS Study

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**Associations between social vulnerabilities and psychosocial problems in European children. Results from the IDEFICS study.**

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## **Abstract**

The effect of socioeconomic inequalities on children's mental health remains unclear. This study aims to explore the cross-sectional and longitudinal associations between social vulnerabilities and psychosocial problems, and the association between accumulation of vulnerabilities and psychosocial problems.

5987 children aged 2-9 years from eight European countries were assessed at baseline and two-year follow-up. Two different instruments were employed to assess children's psychosocial problems: the KINDL (Questionnaire for Measuring Health-Related Quality of Life in Children and Adolescents) was used to evaluate children's well-being and the Strengths and Difficulties Questionnaire (SDQ) was used to evaluate children's internalising-problems. Vulnerable groups were defined as follows: children whose parents had minimal social networks, children from non-traditional families, children of migrant origin or children with unemployed parents. Logistic mixed-effects models were used to assess the associations between social vulnerabilities and psychosocial problems at baseline and follow-up.

After adjusting for classical socioeconomic and lifestyle indicators, children whose parents had minimal social networks were at greater risk of presenting psychosocial problems at baseline (OR=1.82;[1.38-2.41]99%CI) and follow-up (OR=1.53;[1.11-2.11]99%CI) as well as those from non-traditional families (OR=1.30;[1.04-1.63]99%CI) compared to non-vulnerable groups.

The highest risk for psychosocial problems was found in children whose parents had minimal social networks (OR=1.97;[1.26-3.08]99%CI) at both time points. Children with more than 3 vulnerabilities were at more than double the risk of developing psychosocial problems at baseline and follow-up.

Therefore, policy makers should implement measures to strengthen the social support for parents with a minimal social network.

## **Introduction**

It has been widely acknowledged that disadvantaged socio-economic circumstances are associated with increased health risk [15, 21]. Socioeconomic status (SES), including family income, parental education, and occupational status, has been associated with a wide range of health, cognitive, and socioemotional outcomes in children, with effects beginning prior to birth and continuing into adulthood [15]. Particularly, children from low SES manifest more behavioural and emotional problems than children from high SES [27].

An array of mechanisms linking SES to child well-being have been proposed, with most involving differences in access to material and social resources or reactions to stress-inducing conditions by the children and their parents [5]. Since in most countries inequality and social vulnerabilities have increased during the last two decades, it is important to study the association between social vulnerabilities and psychosocial problems in children [25]. Some studies concluded that parents' social support was beneficial for children's well-being and negatively predicted delinquency across adolescence [13, 37]. Parents' social support allows children to access other support agents, who reduce stress by promoting skills and resiliency [36, 37]. Children from traditional families had lower risk for high school dropout and teenage pregnancy and had better adult outcomes e.g. fewer socio-emotional as well as higher cognitive scores compared to non-traditional families [4, 6, 10]. Findings on the association between migrant origin and children's mental health were inconsistent with positive, non-significant or negative associations [1, 26, 39]. Concerning unemployment status, children with unemployed parents seemed to have more internalising and externalising problems than those whose parents were both employed [2]. Nevertheless, most of the studies conducted so far are from the United States and focused on classical SES indicators, while other social vulnerabilities (such as children whose parents lack a social network, children from non-traditional families, children of migrant origin and children with unemployed parents) have been less frequently explored in the literature.

Four vulnerable groups will be investigated in the present study: 1) children from non-traditional families, 2) children whose parents lack a social network, 3) children of migrant origin and 4) children with either one or both parents unemployed. **These four vulnerable groups seem to have an independent effect from classical SES indicators and interact between them in ways that increase the likelihood of poor health outcomes suggesting cumulative effects [19]. Therefore,** the present paper aimed to explore (i) the cross-sectional and longitudinal associations between social vulnerabilities and psychosocial problems (poor well-being and internalising problems) in European children participating in the Identification and Prevention of Dietary-and Lifestyle-induced Health Effects in Children and Infants (IDEFICS) Study, (ii) the association between evolution of vulnerabilities over 2-years and psychosocial problems at follow-up and (iii) the association of accumulated vulnerability with psychosocial problems at two time points. Studying these associations will give important insights to understand how disadvantaged socio-economic circumstances in children are associated with increased health risks.

## **Materials and methods**

### *Study population*

IDEFICS is a multi-centre prospective cohort study, including a school- and community-based obesity prevention intervention [11] in eight European countries (Belgium, Cyprus, Estonia, Germany, Hungary, Italy, Spain and Sweden). For comprehensive information about IDEFICS, a detailed description is given by Ahrens et al.[3]. 16,228 children aged 2-9 years were examined from September 2007 to June 2008 at baseline (T0). The follow-up (T1) took place two years later (September 2009-June 2010) applying the same standardised assessments where 11,041 children aged 4–11 years were re-examined.

Two different parent proxy-report instruments were employed to assess children's psychosocial problems at baseline and follow-up: the KINDL (Questionnaire for Measuring Health-Related Quality of Life in Children and Adolescents–Revised Version) was used to evaluate children's well-being during the last week and the Strengths and Difficulties Questionnaire (SDQ), a behavioural screening questionnaire, was used in this study for evaluating children's internalising problems over the last 6 months.

### *Well-being from KINDL<sup>R</sup>*

The KINDL<sup>R</sup>, a validated instrument for assessing health-related quality of life in children and adolescents, was completed by the parents. The instrument included four of the six original KINDL dimensions: Emotional well-being, Self-esteem, Family relations and Social contacts [7]. Questions on Physical well-being and Everyday functioning were excluded in the IDEFICS study. Answers were given according to a 4-point Likert scale (never, rarely, sometimes and often/always) adapted from the original 5-point Likert scale with reversals according to the wording of the question [29]. Scores were summed with higher scores representing more favourable indicators of well-being. The 20th percentile of the total score was taken as threshold to differentiate between children with a poor score (from 0 to 36) and a normal score (from 37 to 48). Although KINDL<sup>R</sup> has been created for those aged 3 years and older, we included children aged 2 years (177 children in total) because those children, to be eligible for IDEFICS participation, were attending pre-schools or kindergartens and then exposed to similar psychosocial factors as their peers. Since analyses excluding these 2-year old children shown similar results, we decided to keep them included.

### *Internalising problems from SDQ*

The SDQ is a 25-item questionnaire [14] divided in 5 scales (Emotional problems, Conduct problems, Hyperactivity-Inattention behaviour, Peer problems and Prosocial behaviour) and validated for children aged 2-7 years old [30]. Since the IDEFICS study did not incorporate the Hyperactivity scale, only internalising problems (from the Emotional and Peer problems subscales) were included and scored in accordance with published scoring instructions [22]. The scale of internalising problems was dichotomized into a normal score vs. abnormal score according to published cut-offs [22, 23].

#### *Definition of vulnerable groups*

Four vulnerabilities obtained from the parental questionnaire were defined at baseline as our exposures.

*Social network:* Based on the parental response to the question of how many persons they could rely on in case of need including their family: “0-1 person” taken as the vulnerable category and “ $\geq 2$  persons” as the non-vulnerable group.

*Family structure:* If the child did not live with both his/her parents, the family was defined as a ‘non-traditional family’ (including single-parent families, stepparent families, living with grandparents or foster parents or in an institution).

*Origin of the parents:* A migrant background (vulnerable group) was assumed if one or both parents were born in a country different from where the study took place.

*Employment status:* If at least one of the parents was unemployed or living on social assistance or welfare, the child was considered as belonging to the vulnerable group.

A total vulnerability score was calculated by adding up the numbers of vulnerabilities a child was exposed to. In all, six vulnerability indicators (minimal social network, non-traditional family, migrant, unemployed, low-income and low-education) were considered. Occupation status was not included as it was highly correlated with employment status. The vulnerability score ranged from 0 (the child had any vulnerability) to 6 (the child had all six vulnerability indicators) and was divided into four categories (three to six vulnerabilities, two vulnerabilities, one vulnerability and no vulnerability).

*Lifestyle indicators* assessed at baseline:

*Fruit and vegetable consumption* was obtained using the food frequency section of Children’s Eating Habits Questionnaire-food frequency questionnaire (CEHQ-FFQ) [18]. This FFQ is a self-administered validated screening tool where parents reported usual at-home-consumption frequencies of 42 food items of the

previous four weeks. The sum of reported intake frequency of fresh fruits, raw and cooked vegetables per week as a healthy diet indicator was calculated.

*Physical activity:* Parents reported the total weekly hours the children spent playing outdoors and children's participation in sports club activities in the previous month. Physical activity per week was obtained with this formula: [(hours playing outdoors on weekdays  $\times$  5) + (hours playing outdoors on weekend days  $\times$  2) + weekly sports participation].

*Screen time:* Parents reported the daily screen time spent on audio-visual media (TV, video, DVD, computer, game console) by the children for a typical weekday and weekend day. Total screen time per week was calculated as: (5  $\times$  weekday + 2  $\times$  weekend).

#### *Weight categories*

Anthropometric measurements were assessed at T0 according to standardised procedures in all participating countries. Barefoot body height was measured to the nearest 0.1 cm by trained staff using a portable stadiometer (SECA 225). Body weight in kg was measured by a child-adapted version of electronic scale TANITA BC-420 SMA with the children weighted in a fasting state and wearing only light clothes. Body mass index (BMI) was calculated by dividing body weight in kilograms by squared body height in metres and then transformed into an age- and sex-specific z-score [8]. Weight groups were categorised using age and sex-specific cut points according to the criteria of the International Obesity Task Force [9].

#### *Classical SES indicators*

*Education:* parents were asked to indicate the highest level of education of both themselves and their partners. The response categories for each country were coded according to the International Standard Classification of Education (ISCED 1997) and re-categorised into three categories: low (ISCED level 0-2), medium (ISCED level 3-4) and high (ISCED level 5-6) [34]. The highest level of either the mother or the father was taken into account.

*Income:* parents also provided information on the monthly net income of the household after taxes and deductions responding to nine country-specific categories (1: from the lowest category to 9: the highest category). The category cut-offs were designed to be country-specific according to a fixed scheme based on the median equivalent income, thus guaranteeing comparability between countries. The results were organised into three categories: low (1-3), medium (4-6) and high income (7-9).



Occupation: parents were asked to specify their occupational position with 18 possible options, which were later transformed into the three-class version of the European Socioeconomic Classification: working class, intermediate and salariat [16].

The highest level of either the mother or the father was taken into account.

After excluding children with missing values in any of the exposures or outcomes at baseline or follow-up or any of the covariates at baseline, the present analysis finally included 5,987 children (50.6% boys) (see also Figure 1). Children lost to follow-up were more likely to belong to the high well-being group (82.2% vs. 75.3% in the present study) and shown less internalising problems (82.5% vs. 85.4%) than those included in the present study. However, no statistically significant differences were found in social vulnerabilities between children included in this study and those lost at follow-up.

Parents or legal guardians gave written informed consent for examinations and data collection for their children, while children expressed oral consent. Ethical approval was obtained from the research ethics authority of each participating centre.

#### *Statistical analyses*

Logistic mixed-effects models were used to assess the cross-sectional and longitudinal associations between the four dichotomised exposures (social network, family structure, migrant origin and employment status) and each outcome (well-being and internalising problems). The reference category used was the normal (healthy) score for each outcome. All models included a random kindergartens/school and a random country effect to account for the clustered study design.

One cross-sectional and two longitudinal analyses were conducted. In the cross-sectional analysis, predictor and outcome variables from T0 were used. In the first longitudinal analysis, children's well-being and internalising problems at T1 were related to the T0 exposures. In the second longitudinal analysis, evolution of vulnerability from T0 to T1 (vulnerable at T0 and T1, vulnerable at T0 and non-vulnerable at T1, non-vulnerable at T0 and vulnerable at T1; and non-vulnerable at T0 and T1) were related to children's well-being and internalising problems at T1. The patterns of vulnerability were assessed for only three of the vulnerable groups considered since migrant status does not change between baseline and follow-up. Finally, two more analyses were conducted to estimate the accumulation of vulnerability at T0 and psychosocial problems at T0 and T1.

To adjust for possible confounders, two models were run for each analysis: model 1 for each outcome/exposure was adjusted for baseline age, sex and frequency of fruit and vegetable consumption, physical activity, total screen time and BMI z-score and model 2 was additionally adjusted for baseline classical SES indicators (education, income and occupation except for employment status model). For both longitudinal analyses, a variable indicating intervention versus control region was added and models were additionally adjusted for baseline outcomes (well-being and internalising problems at T0, respectively). Before model building, correlations among classical SES indicators were checked resulting in the exclusion of occupation status in models with employment status as main exposure to avoid collinearity problems. The significance level was set at 0.01 to account at least partially for multiple testing. The analyses were performed using the Statistical Package for the Social Sciences (version 22.0; SPSS, Inc.).

## Results

Table 1 summarises the distributions of predictors and background variables for the two outcomes (well-being and internalising problems) at T0 and T1. For the continuous covariates, the median is shown.

Table 2 presents odds ratios (OR), 99% confidence intervals (CI) and p-values for the models assessing the cross-sectional and longitudinal associations between the four vulnerability indicators and well-being and internalising problems at baseline and after two-year follow up. After adjusting for lifestyle indicators and the classical SES indicators (full adjustment model 2), those children whose parents had minimal social networks (OR=1.82;[1.38-2.41]99%CI) at T0 and T1 and non-traditional families (OR=1.30;[1.04-1.63]99%CI) at T0 **were more likely to have a poor well-being than those with no vulnerabilities at T0.** Similarly, there was a higher likelihood of internalising problems in children with minimal social network parents at T0 (OR=1.51;[1.12-2.03]99%CI) and T1 (OR=1.53;[1.11-2.11]99%CI) **compared to those non-vulnerable.** No statistically significant associations were observed for the other groups but associations still pointed to the expected directions.

Table 2 presents odds ratios (OR), 99% confidence intervals (CI) and p-values for the models assessing the cross-sectional associations between the four vulnerability indicators and well-being and internalising problems at T0 (basic and fully adjusted models). In model 3 (full adjustment), those children whose parents had minimal social networks (OR 1.82, [1.38; 2.41] 99%CI) and non-traditional families (OR 1.30, [1.04; 1.63] 99%CI) were more likely to have a poor well-being than those with no vulnerabilities at T0. Similarly, there was a higher likelihood of internalising problems in children with minimal social network parents

(OR 1.51, [1.12; 2.03] 99%CI) compared to those non-vulnerable at T0. No statistically significant associations were observed for the other groups but associations still pointed to the expected directions.

Table 3 displays the results for the associations between the patterns of vulnerability evolution over time and well-being and internalising problems at T1. In model 2, those children whose parents reported to have a minimal social network just at T1 (OR=1.95;[1.40; 2.71]99%CI) or at two time points (OR=1.57, [1.06; 2.33]99%CI) as well as children from non-traditional families (OR=1.28;[1.00-1.65]99%CI) were more likely to have a poor well-being than those who were non-vulnerable at two time points. Likewise, there was a higher likelihood of internalising problems in children whose parents reported to have a minimal social network at two time points (OR=1.97;[1.26-3.08]99%CI) and those children from non-traditional families just at T1 (OR=1.60;[1.07-2.39]99%CI) compared to those who were non-vulnerable at two time points.

Table 4 shows the association between the accumulation of vulnerabilities assessed at baseline and well-being and internalising problems at T0 and T1. A higher number of vulnerabilities was associated with a higher likelihood of having psychosocial problems in both T0 and T1, where the OR increased with the number of present vulnerabilities: one vulnerability (OR=1.30;[1.03-1.64]99%CI); two vulnerabilities (OR=1.81;[1.38-2.37]99%CI) and three to six vulnerabilities (OR=2.63;[1.86-3.73]99%CI).

## **Discussion**

The importance of SES for health is well established but there is a lack of research determining the impact of SES and interrelated factors such as vulnerable groups on psychosocial problems in European children [17, 32]. We investigated the association between belonging to a vulnerable (vs. non-vulnerable) group and psychosocial problems (poor well-being and internalising problems) over a two-year period in children aged 2 to 9 years old participating in a European study. This research found that children whose parents had minimal social networks and children from non-traditional families had a higher likelihood of presenting psychosocial problems cross-sectionally and longitudinally compared to non-vulnerable groups. The findings of our study are in line with previous research despite some differences. Several studies have explored the relationship between different socioeconomic and cultural factors and psychosocial problems

[12, 31, 41]. A systematic review shown that socioeconomically disadvantaged children were two to three times more likely to develop mental health problems [31].

In our study, migrant status was not significantly associated with a higher risk of having psychosocial problems. This is in accordance with some investigations [24, 35, 40], although other studies found that migrant children fare worse compared to their native peers in relation to mental health [2, 20]. However, studies varied with the informants used and the characteristics of the migrant group and the host country.

Concerning social network, we found a statistically significant association between children whose parents reported to have a minimal social network with a higher risk of having psychosocial problems; which is in agreement with previous studies that associated parents' minimal social networks and children's behavioural disturbance [13, 33, 37].

Regarding family structure, children from non-traditional families had a higher risk of having psychosocial problems than those children from traditional families. These results confirmed previous investigations that concluded children from traditional families had fewer socio-emotional and higher cognitive scores than those from non-traditional families [10, 38].

Concerning parental unemployment, we did not find a statistically significant association with children's psychosocial problems when controlling for classical SES indicators. This finding contradicted partly the conclusions of Powdthavee and Vernoit (2013) who found that parental job loss had a positive influence on young children's well-being [28].

Some limitations of this study should be acknowledged. Firstly, the IDEFICS study is not representative neither of the European population nor of the countries participating since each survey centre covered a limited geographic area within a country. Secondly, some groups (from the lowest or the highest SES) could be underestimated as participation in this study was voluntary and usually these populations are less likely to take part in research. Likewise, a selection bias cannot be precluded because some participants (with lower well-being score and more internalising problems) did not complete all required information or did not continue the study at follow-up. Finally, migrant origin and reasons for migration may differ significantly from one person to another and consequently some groups of migrants could be more vulnerable than others. However, due to the small size of some migrant groups, no group differences were taken into account in the present investigation.

A special strength of the study is that to our knowledge, previous research has not investigated the association between vulnerabilities such as social network, family structure and unemployment status with psychosocial problems in a longitudinal study. A large sample size including children from eight different countries following standardised procedures and using validated instruments, is also a strength of our study.

## **Conclusions**

The current study suggests associations between social vulnerabilities and psychosocial problems (poor well-being and internalising problems), independent of family income, parental occupation, parental education and lifestyle indicators. Mainly having parents with minimal social network and the lack of a traditional family structure were disadvantageous. Interventions during the early years of a child's life may be needed to reduce inequalities and counteract negative effects on children's mental health. Therefore, policy makers should implement measures to strengthen the social support for parents with a minimal social network.

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The authors' contributions were as follows: I. I carried out the statistical analysis and drafted the manuscript along with N. M. C. B. designed the statistical analyses. K. B., J. M. F.-A., W. G., R. F., B.T., and P.R. developed the measurement instruments; L. R., S. D. H., M. H., L. A. M., and T. V. supervised the national data collection authors read and critically reviewed the manuscript.

## **Conflict of interest Statement**

The authors declare that there are no conflicts of interest.

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