Subjective economic status in adolescence: Determinants and associations with mental health

in the Norwegian youth@hordaland study

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Abstract

We aimed to identify factors associated with perceived economic well-being (PEWB), and examine its association with symptoms of depression and attention-deficit/hyperactivity disorder. In the Norwegian youth@hordaland study, 9,166 16-19-year-olds provided information on perceived economic well-being and relevant covariates. Information about families' income-to-needs was obtained from tax return forms. Adolescents in households with a low income-to-needs ratio, with non-working parents, and in single-parent households were more likely to report poor PEWB. Adolescents with poor PEWB reported more symptoms of depression and ADHD, also after adjusting for covariates, including income-to-needs. There was a significant indirect effect of income-to-needs on mental health problems though PEWB. The current study demonstrates the role of PEWB as a contributor in the pathway from social inequalities to disparities in mental health.

Subjective economic well-being in adolescence: Determinants and associations with mental health in the Norwegian youth@hordaland study

Family socioeconomic status is associated with mental health (Bradley and Corwyn 2002). Those who grow up in families with poorer socioeconomic conditions are at higher risk of developing mental health problems compared to their more advantaged peers, across a spectrum of outcomes such as externalizing problems (i.e., conduct-/oppositional, hyperactive behavior), internalizing problems (i.e., anxiousness and depressed mood) and academic achievement (Amone-P'Olak et al. 2011; McLaughlin et al. 2012; Newacheck et al. 2003; Schneiders et al. 2003; Zachrisson and Dearing 2015).

In investigations of its relation with adolescent mental health, socioeconomic status (SES) has been operationalized in various ways. SES is defined according to objective measures, such as family income, parental education levels and occupational status, or combinations of these (Braveman et al. 2005; Hauser 1994). Another approach is to define SES using subjective assessments. Here, an individual is asked about their perceptions of their placement in a socioeconomic structure. One way of obtaining subjective ratings of SES has been to use pictorial representation of a ladder where respondents indicate their perceived relative placement with the steps (N. E. Adler et al. 2000; Goodman et al. 2001), others have asked questions like "Compared to others, how would you describe your family's socioeconomic status" or similar methods (Bøe et al. 2012; Quon and McGrath 2015, 2014).

Studies of adolescents and adults have found that subjective ratings of SES predict health outcomes at least as well as objective indicators (Quon and McGrath 2014; Singh-Manoux et al. 2003), and that subjective ratings predict health outcomes even after controlling for objective measures of SES (N. E. Adler et al. 2000; Elgar et al. 2015; Operario et al. 2004; Quon and McGrath 2014; Singh-Manoux et al. 2005).

Questions still remain about how objective and subjective measures of SES are related, and how they link to health outcomes. Singh-Manoux et al. (2003) have suggested that subjective ratings may represent a cognitive average of various markers of SES. In line with this, studies of adults find subjective SES to be associated with gender, occupational grade, personal income and education, household financial situation, general satisfaction with life and standard of living, and job control (Miyakawa et al. 2012; Operario et al. 2004; Singh-Manoux et al. 2003). Few studies have investigated which criteria adolescents use to locate themselves on subjective ratings of SES, and the findings from these studies have been inconsistent. Goodman et al. (2001) found subjective social status to be unrelated to paternal education levels, but others found moderate correlations between subjective measures and parent education and household income, and with possession of material assets (Elgar et al. 2015; Goodman et al. 2007). The few and inconsistent findings highlight a need for further refinement of subjective SES measures in adolescence, and for investigating the variables that influence these ratings.

There is also evidence for cultural or regional influences in the extent to which subjective ratings of SES influence health outcomes. In a meta-analysis of 44 studies, Quon and McGrath (2014) found the largest effects of subjective measures in Western European samples. Viner et al. (2012) identified the strongest determinants of adolescent health to be national wealth, income inequality and access to education. This underscores the importance of considering the greater sociopolitical context when studying how perceived relative economic standing influences health during adolescence. The present study was conducted in Norway, a wealthy country with relatively small income inequalities (as indicated by a GINI-index of .25) and where absolute deprivation is uncommon (OECD 2011; UNICEF Innocenti Research Center 2012). Only one previous study has investigated how subjective ratings of SES perceived economic standing influences health in this context. Using data from the

"Social Competence in Early Adolescence" and the "Eat More!" studies conducted in 2004, Iversen and Holsen (2008) found that lower perceived wealth was associated with more health complaints, less life satisfaction and poorer overall health in a sample of 5th - 7th graders.

One challenging aspect of using omnibus subjective SES measures is that they may obfuscate important nuance and unique associations between particular aspects of SES and developmental outcomes. Different aspects of subjective SES may relate to different outcomes and operate through different pathways, as have been found for objective indicators of SES (Bøe et al. 2012; Bøe et al. 2014; Gershoff et al. 2007; Yeung et al. 2002). This may in particular be a concern in contexts like Norway, with relatively low income disparities and where education and income is less strongly correlated than in many other countries (Barth 2005). Yet, both education and income gradients in mental health are evident in Norway (e.g., Bøe et al., 2014; Zachrisson & Dearing, 2015).

In the current investigation, the purpose was to evaluate the importance of subjective and objective measures of adolescents' economic well-being in predicting internalizing and externalizing mental health problems in Norway, a society with relatively small economic disparity. We first investigated the association between the adolescents' perceived economic well-being and several objective indicators of family, parent and adolescent SES. Secondly, we examined the association between an objectively derived measure of the adolescents' household income-to-needs and the adolescents perceived relative economic standing and symptoms of depression and attention-deficit/hyperactivity disorder (ADHD). Finally, we investigated how, and to which extent objective measures of economic well-being exert their influence on adolescents' mental health (indirectly) through perceived economic well-being.

Methods

Study design

The current data is from the youth@hordaland study, a cross-sectional population-based study of adolescents in the county of Hordaland in Western Norway. All adolescents born from 1993 to 1995, and all students attending upper secondary education during spring 2012, were invited to participate in the survey with the main aim of assessing prevalence of mental health problems and service use among adolescents. One year prior to the survey, all included questionnaires were piloted in a single school hour and subsequently refined. Adolescents in secondary education received information by email followed by an SMS reminder, and they were given time during regular school hours to complete the questionnaire. For those not at school during the allocated school completion, the questionnaire could be completed at other times at their convenience during the study period, and some schools also arranged catch up days. We also arranged for participation for adolescents in hospitals or institutions during the study period. The web-based questionnaire was administered using computers, and a teacher was present to organize the data collection and to ensure confidentiality. Adolescents and school personnel could direct queries to survey staff that was available by phone during the study period. Adolescents not in school received information by postal mail and could complete the questionnaire online. The study was approved by the Regional Committee for Medical and Health Research Ethics in Western Norway.

Sample

Invitations to participate were sent to a total of 19,430 adolescents, and 10,220 (53%) of these agreed. The mean age of the participants was 17 years, with somewhat higher participation among girls (53.5%, $n = 5,252$) than boys (46.5%, $n = 4,594$). The majority of

the participants (97.9%, *n* = 9,219) were high school students. The current analysis is based

on a subsample of 9,166 adolescents who consented to register linkage and thus for whom

income information was available. Preliminary investigations suggested that the sample was

skewed towards higher socioeconomic status. Although differences in methodology does not

allow for direct comparison by numbers, the proportion of parents with higher education and

that participated in the workforce was higher, whereas the proportion of adolescents that live

in a single-parent household was lower in the current sample, than what is commonly

observed in official national statistics for the age-group participating in the current study.

Instruments

    Demographic information. Gender and year of birth were based on the personal

identity number in the Norwegian national population registry. The adolescents were asked

about their family structure, on the basis of which it was determined whether they lived in a

single- or two-parent household. Ethnicity was based on adolescent self-reported country of

origin, and categorized as "Norwegian"- or "Foreign"-born.

    Perceived economic status. Perceived economic status was assessed by the

following question to the adolescents: "Compared to others, how would you rate your

family´s economic situation." The response options were "Poorer than others," "Equal to

others," or "Better than others." Similar questions have previously been used with

adolescents to determine their perceived socioeconomic status (Quon and McGrath 2014).

    Income-to-needs. Register-based information about household income in 2012 was

obtained for 9,151 adolescents. Using information about the number of adults and children in

each household we calculated a family size adjusted total household income according to the

EU weighting scheme. We then calculated a ratio of family income-to-needs (ITNR) by

dividing the family size adjusted total household income by 60% of the family adjusted

median income in the population (e.g., for a family consisting of two adults and two children,

we used the population median income for a family consisting of two adults and two children). An income-to-needs of 1 corresponds to a family having an income that corresponds to the family size adjusted 60% median threshold, whereas lower and higher ratios indicate income below and above that threshold respectively. As a robustness check, the analyses were also done using an alternative specification for which ITNR was converted into ranks within the sample. The pattern of findings that we report in the paper proved robust when using this alternative definition (results available upon request).

Parent-related SES-indicators. The adolescents were asked to indicate the level of education of their parents using the options "elementary school," "high school, vocational," "high school, general," "college/university less than four years," "college/university four years or more," and "don't know." This variable was re-categorized into basic (i.e., elementary school level), intermediate (i.e., high-school levels), higher (i.e., college/university levels) and unknown. We decided to keep the unknown category in the analysis in order to retain as much of the sample as possible. Based on these parental education questions, a variable denominating the highest education in the household was created.

Adolescents were also asked to indicate their parents' work affiliation and which type of work they were doing. Based on this information, a variable "work-status" was created consisting of three categories: "Working" (i.e., those currently working), "Benefits" (e.g., unemployment/seeking employment and sickness/disability) and "Other" consisting of students, retired and stay-at-home parents. We used information about work status from both parents, including instances in which an adolescent was living with only one parent; it is common in Norway for children to have regular contact with both parents following dissolution of a relationship/marriage, and both parents have a statutory financial

responsibility to support their children until they graduate high-school, regardless of relationship status or living arrangement.

Adolescent-related SES-indicators. All adolescents indicated their current school program which was categorized as either "general studies" or "vocational studies" based on the Norwegian high-school system. Whereas general studies prepare students for pursuing higher education, such as studies at University or College, vocational studies focus on practical skills and a specific trade. Adolescents were also asked whether they were currently working using the options "No," "Yes, part-time," and "Yes, full-time," and from this a dichotomous adolescent work-status variable was created indicating whether they worked or not.

Depression. The short form of the moods and feelings questionnaire (SMFQ; Angold et al. 1995) was used to measure symptoms for depression. The SMFQ consists of 13 statements (e.g., "I am feeling low," "No one likes me," etc.) that the participants respond to using Norwegian translations of the response categories "Not true," "Sometimes true," and "True." The SMFQ has adequate psychometric properties (Sharp et al. 2006), and a previous study using the current sample as the current found the SMFQ to be essentially unidimensional, supporting the use of the sum score of SMFQ (Lundervold et al. 2013). Reliability in the current sample was high (Chronbach's $\alpha = 0.91$). Due to the ordinal categorical nature of the response options, reliability was also assessed using polychoric-correlation-based α also suggesting high reliability (ordinal $\alpha = 0.95$). The range of scores in the sample was 0-26.

Hyperactivity-inattention. Hyperactivity-inattention was measured using a Norwegian version of the Adult ADHD Self-report scale (ASRS; Kessler et al. 2005). The ASRS consists of 18 statements about hyperactivity-inattention (e.g., "I never remember," "I concentrate easily"), that the participants respond to using options "Never," "Rarely,"

"Sometimes," "Often," or "Always." The ASRS was originally constructed for use in adults, but has been validated for use among adolescents (L. A. Adler et al. 2012). The current study used the screener score where all 18 items were added together, yielding high reliability (Chronbach's α = 0.89, ordinal α = 0.91), and the range of scores in the sample was 0-24.

Statistical analyses

Data were analyzed using R version 3.2.2 for Mac (OSX 10.10.5). With regards to incomplete responses, family structure had the majority of missing values (12.5%), followed by paternal work status (10.6%), whereas the proportion of missing values for the remaining variables were lower (0-7%). Missing data were handled by multiple imputation using the package "mice" for R (van Buuren and Groothuis-Oudshoorn 2011) which performs multivariate imputation by chained equations. In the imputation model, the following variables were entered: gender, age, parental work status, parental education status, ethnicity, family structure, own education and work status, perceived economic well-being, and symptom scores of depression and attention-deficit/hyperactivity disorder. The estimates and standard errors from the statistical analyses were pooled into overall estimates according to established rules (Rubin 1987) using R package "rms" (Harrel 2016). Reliability analyses (Chronbach's and ordinal α) was conducted using the package "psych" (Revelle 2015). Ordinal α was calculated using polychoric correlations, as recommended by Gadermann et al. (2012).

Logistic regression models were used to investigate associations with perceived economy. In the analyses, perceived economy was dichotomized into "Poor" versus "Average/Better," and the included predictors were gender, age and ethnicity of the participants, highest parental education in the family, parental occupation status, family structure and adolescent education- and work status. The logistic regression analyses were

initially ran separately for males and females (results not shown), but as the pattern of associations were identical for both males and females, the final model includes both genders.

The association between socioeconomic status variables and symptoms of depression and ADHD were investigated using linear regression models. We first assessed the bivariate associations between perceived economic well-being and income-to-needs and symptoms of depression and ADHD (i.e., the crude models in Tables 3 and 4). In the next model, perceived economic well-being and income-to-needs was entered simultaneously as predictors of depression and ADHD (i.e., Model 1 in Tables 3 and 4). The final model included perceived economic well-being, income-to-needs as well as age, gender, highest education in family, own education, ethnicity, family structure and parental work status (i.e., Model 2 in Tables 3 and 4). R package "rms" (Harrel 2016) was used for all regression analyses. Cohen's ds were calculated by dividing the pooled coefficients from the regression analyses (which represent the difference in mean score from the reference category) on the pooled standard deviation from the imputed datasets for the relevant symptom scale and subsample (e.g., for Poor relative to Average economic well-being, the pooled SD was calculated for participants with ratings of Poor and Average ratings only).

Indirect effects analyses of income-to-needs on mental health problems through perceived economic well-being was conducted with Mplus version 7.4 (Muthén and Muthén 1998-2012). Indirect effects were modelled by 1) regressing symptoms of depression/ADHD on subjective economic well-being and ITNR, 2) regressing subjective economic well-being on ITNR, and 3) estimating the indirect effects of ITNR on symptoms of depression/ADHD using the 'Model indirect' command in Mplus. Bootstrapped confidence intervals were obtained for the indirect effect using 5000 replications. A robust weighted least squares estimator (WLSMV) was used, as subjective economic well-being was a categorical measure.

Results

Demographic and socioeconomic characteristics of the sample

Data from 9,166 adolescents (47.3% males, mean age = 17.4, 53% participation rate) was analyzed. The majority of the participants were born in Norway and lived in two-parent households. More than 90% of the participants described their economic well-being as equal to or better than others, and most had parents with intermediate or higher education levels who were working. There was correspondence between perceived economic well-being and objective SES indicators; the mean income-to-needs ratio was lower, and there were higher proportions of single parent households, elementary level parental education, and non-working parents among those with a poor perceived economic well-being relative to their peers (Table 1).

INSERT TABLE 1 ABOUT HERE

Predictors of poor perceived economic well-being

Having a lower income-to-needs ratio, being female, living in a single parent household, having parents outside of the work force and being enrolled in vocational studies were predictors of poor perceived economic well-being in the logistic regression model (Table 2 and Figure 1). The strongest predictors (i.e., with highest odds-ratios) were those relating to single parenting (*OR*s 3.19) and parents on benefits in contrast to working (*OR*s 3.1-3.13). There was evidence of nonlinearity in the association between income-to-needs ratio and poor economic well-being, with significant quadratic ($b = -1.13$, $p < .001$), and cubic associations ($b = 0.17$, $p = .006$), (Figure 1, lower half). The probability for reporting poor perceived economic well-being was highest in the income-to-needs range from 0 to 1, and then decreased steadily with increasing income-to-needs ratio.

INSERT TABLE 2 ABOUT HERE

INSERT FIGURE 1 ABOUT HERE

Symptoms of depression

The results of the crude linear regression analysis revealed that both poor perceived economic well-being and low income-to-needs ratio was significantly related to symptoms of depression (Crude, Table 3), also when they were entered simultaneously (Model 1, Table 3). The negative coefficient for income-to-needs suggested that better financial circumstances were associated with lower scores on symptoms of depression. These associations attenuated, but remained significant, in the model including both perceived economic well-being and low income-to-needs ratio (Model 1, Table 3). However, when adjusting for several objective SES indicators, only poor perceived economic well-being remained as a significant predictor of higher depression scores (Cohen's d = .48 corresponding to a "medium" effect). The relationship between income-to-needs and symptoms of depression (Model 1, Table 3) was mediated by perceived economic well-being. The indirect effect was tested using a bootstrap estimation with 5000 samples, and the results indicated that the indirect coefficient was significant, b = -0.258, SE = .083, 95% CI = [-0.332, -0.187], and accounted for 59% of the total effect (b = -0.435, SE = .078, 95% CI = [-0.589, -0.308]).

INSERT TABLE 3 ABOUT HERE

The relative influence of the predictors in Model 2 was also assessed by inspecting the proportion of overall R^2 attributable to each set of predictors, and the mean score difference for each predictor relative to its reference category (Figure 2). This analysis demonstrated that poor perceived economic well-being is an important contributor to higher depression scores, but also that it is a stronger predictor of depression scores relative to more objective indicators of SES.

INSERT FIGURE 2 ABOUT HERE

Symptoms of ADHD

The results of the crude linear regression analysis revealed that poor perceived economic well-being was significantly associated with more symptoms of ADHD whereas better perceived economic well-being was associated with fewer symptoms of ADHD. Higher income-to-needs ratio was significantly associated with fewer symptoms of ADHD (cf. Crude, Table 4). These associations attenuated, and income-to-needs ratio was no longer a significant predictor when it was entered as a predictor simultaneously with perceived economic well-being (Model 1, Table 4). In the fully adjusted model, only poor perceived economic well-being remained as a significant predictor for more symptoms of ADHD (Cohen's d = .36, Model 2, Table 4). The relationship between income-to-needs and symptoms of ADHD (Model 1, Table 4) was mediated by perceived economic well-being. The indirect effect was tested using a bootstrap estimation with 5000 samples, and the results indicated that the indirect coefficient was significant, b = -0.200, SE = .027, 95% CI = [-0.253, -0.150], and accounted for 96% of the total effect (b = -0.208, SE = .056, 95% CI = [-0.315, -0.095]).

INSERT TABLE 4 ABOUT HERE

The analysis of the relative influence of the predictors revealed that those reporting poor perceived economic well-being had more symptoms of ADHD relative to their peers. The analysis also demonstrated that a larger proportion of R^2 was attributed to poor perceived family economy relative to the other SES-indicators.

INSERT FIGURE 3 ABOUT HERE

Discussion

In the current cross-sectional population-based study of Norwegian adolescents, a lower income-to-needs ratio, being female, having parents with lower education levels, living in a single parent household, having parents outside of the work force, and being enrolled in vocational studies, were associated with a poor perceived economic well-being. The strongest associations were related to family structure and parents being outside of the work force. Poor perceived economic well-being was associated with symptoms of depression and ADHD, after controlling for several objective indicators of family SES as well as the educational standing of parents and adolescent. Income-to-needs was associated mainly indirectly to symptoms of mental health problems, through perceived economic well-being.

Parent-related SES variables were strongly associated with adolescents' perceptions of their family economy. This is in correspondence with the findings from one previous study of the associations between objective indicators of SES and a global measure of subjective SES in adolescents (Goodman et al. 2007). The results showed that single parenting, and having parents outside of the workforce were strongly associated with adolescents rating their family economy as poor. Growing up with a single parent, as well as having parents outside of the workforce are among the most common variables associated with poverty in Norwegian children and youth (Epland 2005), suggesting that the adolescent perceptions of being poor is a reflection of actual poor economy in these families. This is also supported by the association with income-to-needs representing the financial situation in the household relative to the poverty line.

Singh-Manoux et al. (2003) has suggested that subjective socioeconomic status is a function of several socioeconomic status indicators, and the results from the current study appears to fit such a description as several classic objective indicators contribute to increase the odds ratios of perceiving the family economy as poor.

The adolescents' subjective economic well-being was, interestingly, also associated with both the kind of educational program they were enrolled in and gender. Even though the educational system in Norway is found to be the least socially segregated among the countries in the OECD (e.g., Jenkins et al. 2008), family income and parental income are important factors in predicting students' educational attainments in Norway (Aakvik et al. 2005), one of the foremost of these includes the difference between enrollment in vocational and general studies. Explanations for why the students' choice of educational programs in itself, in addition to objective SES measures, should be associated with the students' perception of family economy are not clear. It could be factual (as the income-to-needs measure does not account for family spending) or subjective, such as differences in perceived social status between the two education programs. The exact mechanisms behind this association need to be explored further.

The finding that there also is a gender difference in the perception of their family's economic status is also interesting and surprising, since it is found among students in Norway, which is regarded to be high in gender equality. It thus seems unlikely that this difference could be attributed to factual overall economic differences between girls and boys, but that it rather is due to differences in how girls and boys perceive economic well-being, whether this is due to higher economic needs in girls than in boys to keep up with societal pressure on fashion and appearance, or that perception of family economy is less accurate in boys than in girls. The association with mental health outcomes needs to be explored, in order to determine if this moderates the observed gender differences in perceived economic well-being.

The results of the current study demonstrated that adolescents who perceive their economic well-being as poorer than others score higher on symptoms of depression and ADHD relative to their peers who perceive their family economy to be equal to others.

Importantly, these associations were robust to adjustment for several objective family-related

SES indicators including income-to-needs, as well as parental and own educational standing.

For depression, these results are in line with previous findings that have found subjective

indicators of socioeconomic status to be associated with more mental health problems (Quon

and McGrath 2014). For ADHD, the findings replicate studies that have been found for

income (Cuffe et al. 2005; Froehlich et al. 2007), and show the utility of using subjective

indicators of relative economic standing as predictors also in studies where ADHD is the

outcome.

In correspondence with the findings reported by Quon and McGrath (2014) and what

has been found for adults (N. E. Adler et al. 2000; Operario et al. 2004; Singh-Manoux et al.

2005), the current study demonstrated that including objective indicators of socioeconomic

status in the models, did little to reduce the influence of perceived economic well-being.

These findings suggest that the association between perceived economic well-being and

mental health outcomes extend beyond the influence of their objectively measured SES. This

is further illustrated in the way income-to-needs was mainly indirectly associated with

symptoms of mental health problems through perceived economic well-being. This finding is

in line with a previous study by Gershoff et al. (2007) who found stronger support for a

model where income was indirectly associated with mental health outcomes through material

hardship, compared to a model where only direct effects of income on mental health

outcomes were included.

The proportion of explained variance by the models including both subjective and

objective SES measures was relatively low (R^2 = .11 for symptoms of depression, and R^2

= .04 for symptoms of ADHD). This suggests that SES-variables explain a relatively limited

amount of the variation in the symptoms of these mental health problems in the current

sample. One possible interpretation of this finding is that the Norwegian sociopolitical

context with low income inequality, universally provided free education, and low levels of absolute deprivation, have reduced the overall role of socioeconomic circumstances in contributing to mental health problems in adolescence. Having said that, the effect size of the mean difference in symptoms between those who did perceive themselves as poorer than the others, and those who perceive themselves as equal to- or better off, is comparable to what has been found in international studies (Quon and McGrath 2014).

The pattern of results from the current study were not consistent with a social gradient pattern, where one would expect lower symptom score among those with better economy, and higher symptom scores among those with a poorer economy, relative to those who rated their family economy as equal to others. Social gradients emerge inconsistently in studies of adolescents, and seem in part to depend on the type of SES indicator used and the health outcome that is measured (Chen et al. 2006; Goodman 1999; Lowry 1996). Specifically for mental health problems, West (1997) did not find social gradients in adolescent mental health problems, but others have found social gradients in depression, emotional discomfort and mental health disorders across objective SES indicators such as parental occupation and education, family income, and social class (Goodman 1999; Meltzer et al. 2000; Starfield et al. 2002).

Low SES can affect health through multiple pathways, but the precise mechanisms remain unclear. The mechanisms that have been proposed to explain how SES "gets under the skin" relate to differences in material conditions, psychosocial conditions and health behaviors, and some are related to social rank and social comparisons (N. E. Adler and Stewart 2010; Wilkinson 1999). It is likely that many of these mechanisms interact in influencing the mental health of adolescents.

Among the strengths of the current study are the considerable sample size, use of validated measures of mental health problems, the use public records to provide data on

family income, and the rich set of related covariates that enabled us to investigate associations between adolescents perceived relative economic standing and their mental health, while controlling for family and adolescent educational standing. It is also important to acknowledge several limitations regarding the study. Firstly, the associations between perceived family economy and self-reported ratings of mental health symptoms could be due to mono-informant bias or reverse causation. Reciprocal associations between subjective SES and health have been found in studies of adults, and symptoms of depression contributed to lower ratings of SES, although the effect of subjective SES on health was stronger (Garbarski 2010). However, in studies of adults, experimentally induced negative mood, and/or chronic negative affect has not been found to contribute to lower ratings of subjective SES or its association with self-rated health (Operario et al. 2004). An experimental study suggest that subjective experiences of socioeconomic status is not influenced by negative affect, using a mood induction paradigm in adult participants (Kraus et al. 2013). While being from a single study, this speaks to a causal pathway from subjective experience to e.g., depression and self-rated health, rather than depression causing experiences of low socioeconomic status.

The reciprocity between health and subjective SES is not studied among adolescents, but findings from longitudinal studies of subjective SES and subsequent poor self-rated health demonstrates that this association is not merely an artifact in this age group (Goodman et al. 2007). Furthermore, the restricted range of the perceived family economy measure, which was measured using a three-point scale, may have reduced the variation in this measure, and limited our abilities to compare groups where the differentiation in family economy may have been ever higher. A final limitation relates to representativeness of the sample, specifically nonresponse and generalizability of the results. The participation rate was 53%, and low response rates is unfortunately increasingly common in survey research (Morton et al. 2012). Participants appeared to have higher socioeconomic status compared to

the population by reference to parental education levels, intact family status, and workforce participation, although differences in methodology did not allow for direct comparisons by numbers. Previous investigations of nonresponse in earlier waves of the current study have also found that nonresponse is related to poorer mental health (Stormark et al. 2008). However, there were still a substantial number of participants with lower SES in the sample, and substantial variation in income-to-needs. Inclusion of a more representative sample would add more precision to the estimates, especially among participants with lower SES, but would probably not change the results in any substantive manner. The current results may also underestimate the strengths of the associations in the overall whole population, due to the relatively lower rate of participation among those with lower SES and poorer mental health.

To conclude, the current study has demonstrated that subjective ratings of poor economic well-being, rather than an objective income-to-needs measure relate to symptoms of depression and attention-deficit/hyperactivity disorder in adolescents. This was also substantiated by the finding that the association between household income and symptoms for depression and ADHD was mediated by the adolescents' perceptions of their economic well-being.

The findings from the current study has implications for research, policy and practice. The demonstration of the utility of information about subjective- as well as objective indicators of economic circumstances in studies of adolescents suggest future studies should use several sources of information about economic circumstances as the may be associated with each other and with outcomes through different pathways (Braveman et al. 2005). The associations between objective and subjective indicators suggest that one pathway of improving economic well-being could go through improved objective financial circumstances, which indirectly could then have positive effects on mental health. However,

the association to subjective economic well-being also suggest that there may be viable compensatory strategies that could benefit mental health among those who grow up in poorer economic circumstances. For children and adolescents growing up in relatively poverty in Norway and other countries where absolute poverty is rare, the biggest challenge is perhaps not absolute deprivation (in terms of not affording food, clothing and housing), but lack of opportunities for participation in society on the same terms as their more affluent peers. Compensatory strategies do little about objective economic circumstances, but may provide access to resources that may otherwise be out of reach for families and adolescents with low income and therefore contribute to improved perceptions about economic well-being.

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Tables

Table 1.

Descriptive statistics by Perceived Family Economy

	Poorer than others (*N*=655)	Equal to others (*N*=6,169)	Better than others (*N*=2,342)
	% (*N*)	% (*N*)	% (*N*)
Gender: Male	42% (273)	45% (2,758)	55% (1,288)
Age (*M, SD*)	17.47 (0.84)	17.39 (0.83)	17.43 (0.85)
Ethnicity: Foreign	7% (49)	5% (330)	6% (135)
Family structure: Single parent	44% (291)	16% (986)	12% (282)
Highest education in family			
Elementary	9% (59)	4% (257)	3% (63)
Intermediate	37% (241)	33% (2,019)	26% (598)
Higher	35% (226)	42% (2591)	57% (1,346)
Unknown	20% (129)	21% (1,302)	14% (335)
Maternal work status			
Work	76% (496)	93% (5,721)	94% (2,195)
Benefits	17% (114)	4% (271)	2% (56)
Other[a]	7% (45)	3% (177)	4% (91)
Paternal work status			
Work	80% (524)	95% (5,862)	97% (2,269)
Benefits	15% (96)	3% (202)	2% (41)
Other[a]	5% (35)	2% (105)	1% (32)
Income-to-needs (*M, SD*)	1.23 (0.64)	1.69 (0.71)	2.09 (0.94)
Own education: Vocational	56% (370)	45% (2,784)	41% (959)
Own work status: Not working	62% (407)	58% (3,558)	57% (1,336)

Note. [a]Other included students, retired and stay-at-home parents.

Table 2.

Predictors of "Poor" Perceived Economic well-being

	b (SE)
Age	-0.02 (0.06)
Income-to-needs	**1.07 (0.43)**
Income-to-needs $^{(k = 2)}$	**-1.13 (0.31)**
Income-to-needs $^{(k = 3)}$	**0.17 (0.06)**
Gender (Female is reference)	
Male	**-0.18 (0.09)**
Ethnicity (Norwegian is reference)	
Foreign	-0.35 (0.18)
Family structure (Two parent is reference)	
Single parent	**1.16 (0.10)**
Highest education in family (Higher is reference)	
Elementary	0.35 (0.19)
Intermediate	0.15 (0.11)
Unknown	-0.06 (0.13)
Maternal work status (Work is reference)	
Benefits	**1.13 (0.14)**
Other	**0.61 (0.20)**
Paternal work status (Work is reference)	
Benefits	**1.14 (0.15)**
Other	**0.54 (0.24)**
Own education (General is reference)	
Vocational	**0.22 (0.09)**
Own work status (Not working is reference)	
Working	0.00 (0.09)

Note. Pooled estimates from 25 imputed datasets shown. Estimates in bold indicate statistical significant associations.

Table 3.

Predictors of Symptoms of Depression

| | Symptoms of depression | | | | | | | | |
| | Crude | | | Model 1 | | | Model 2 | | |
	b (*S.E.*)	95 % *CI* (Lower, Upper)	Cohen's *d*	*b* (*S.E.*)	95 % *CI* (Lower, Upper)	Cohen's *d*	*b* (*S.E.*)	95 % *CI* (Lower, Upper)	Cohen's *d*
Perceived economic well-being (Average is reference)									
Poorer	**3.19** (0.25)	(2.71, 3.67)	0.56	**3.04** (0.25)	(2.63, 3.60)	0.53	**2.73** (0.25)	(2.4, 3.2)	0.47
Better	-0.24 (0.14)	(-0.53, 0.03)	-0.04	-0.11 (0.15)	(-0.40, 0.18)	-0.02	0.25 (0.14)	(-0.03, 0.53)	0.04
Income-to-needs	**-0.53** (0.08)	(-0.60, -0.33)	0.08	**-0.30** (0.07)	(-0.44, -0.16)	0.05	-0.13 (0.08)	(-0.30, 0.01)	0.02

Note. Pooled estimates from 25 imputed datasets shown. For perceived economic well-being, *b* represents difference in symptom score from reference category. For income-to-needs, *b* represents interquartile range (IQR; i.e., an income-to-needs value in the lower half of the distribution contrasted with an income-to-needs value in the upper half of the distribution). *Crude*: Perceived economic well-being and income-to-needs entered in separate models, *Model 1*: Perceived economic well-being and Income-to-needs entered simultaneously, *Model 2* = Model 1 adjusted for age, gender, highest education in family, own education, ethnicity, family structure and parental work status.
Model 1: R^2 = .023, Model 2: R^2 .109, Adjusted R^2 = .107.

Table 4.

Predictors of Symptoms of Attention-deficit/hyperactivity disorder

| | Symptoms of ADHD | | | | | | | | |
| | Crude | | | Model 1 | | | Model 2 | | |
	b (*S.E.*)	95 % *CI* (Lower, Upper)	Cohen's *d*	*b* (*S.E.*)	95 % *CI* (Lower, Upper)	Cohen's *d*	*b* (*S.E.*)	95 % *CI* (Lower, Upper)	Cohen's *d*
Perceived economic well-being (Average is reference)									
Poorer	**1.73** (0.18)	(1.37, 2.09)	0.42	**1.70** (0.18)	(1.32, 2.04)	0.41	**1.54** (0.19)	(1.17, 1.92)	0.37
Better	**-0.36** (0.11)	(-0.56, -0.15)	-0.09	**-0.31** (0.11)	(-0.52, -0.10)	-0.08	-0.19 (0.11)	(-0.40, 0.02)	-0.05
Income-to-needs	**-0.22** (0.05)	(-0.31, -0.11)	0.05	-0.09 (0.05)	(-0.19, 0.01)	0.02	-0.04 (0.05)	(-0.15, 0.06)	0.01

Note. Pooled estimates from 25 imputed datasets shown. For perceived economic well-being, *b* represents difference in symptom score from reference category. For income-to-needs, *b* represents interquartile range (IQR; i.e., an income-to-needs value in the upper half of the distribution contrasted with an income-to-needs value in the lower half of the distribution). *Crude*: Perceived economic well-being and income-to-needs entered in separate models, *Model 1*: Perceived economic well-being and Income-to-needs entered simultaneously, *Model 2* = Model 1 adjusted for age, gender, highest education in family, own education, ethnicity, family structure and parental work status. Model 1: R^2 = .014, Model 2: R^2 .030, Adjusted R^2 = .029.
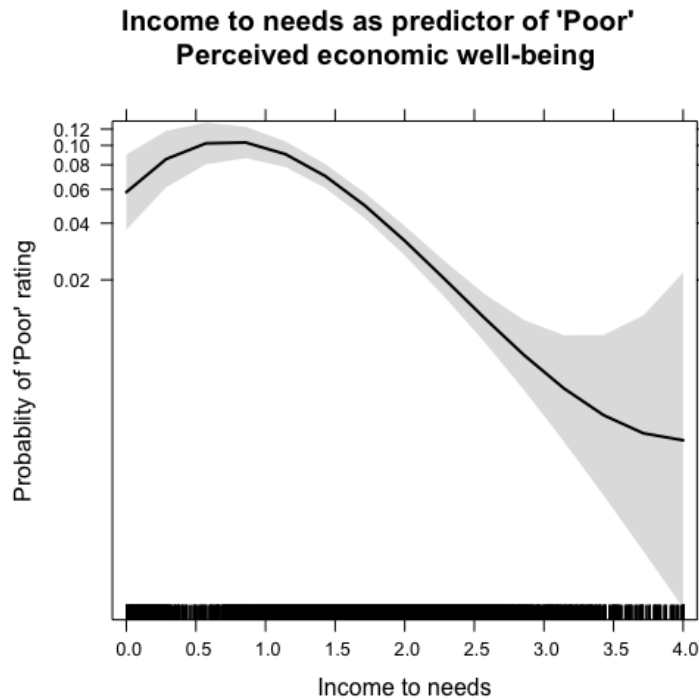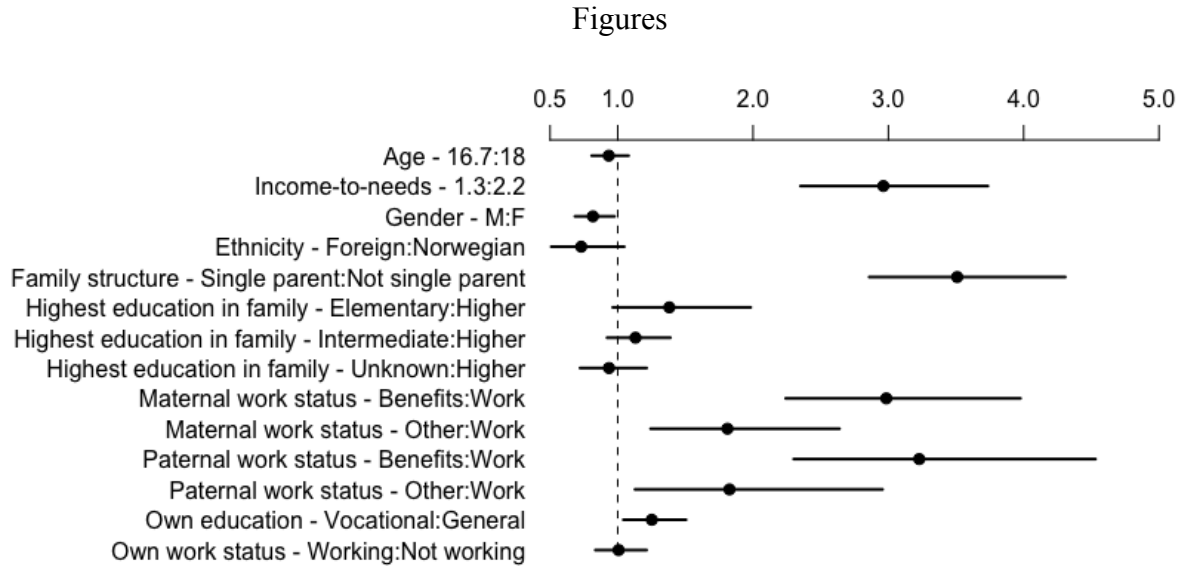
Figures

Figure 1. The figure illustrates the odds-ratios (*OR*) for a "Poor" rating of perceived economic well-being associated with each level of the predictors, where the latter category in the labels represents the reference level. For age and income-to-needs the interquartile range is used for scaling (i.e., comparing the odds-ratio for values in the lower half of the distribution to values in the upper half of the distribution). The broken line represents an *OR* of 1, the solid circles represent the *OR*, and the errorbars represent the 95% *confidence interval* of the *OR*. Errorbars crossing the broken line suggest that there was no significant increase in *OR* associated with the category of the predictor. The figure in the lower half illustrates the non-linear association between income-to-needs and the log odds for rating perceived economic well-being as poor.
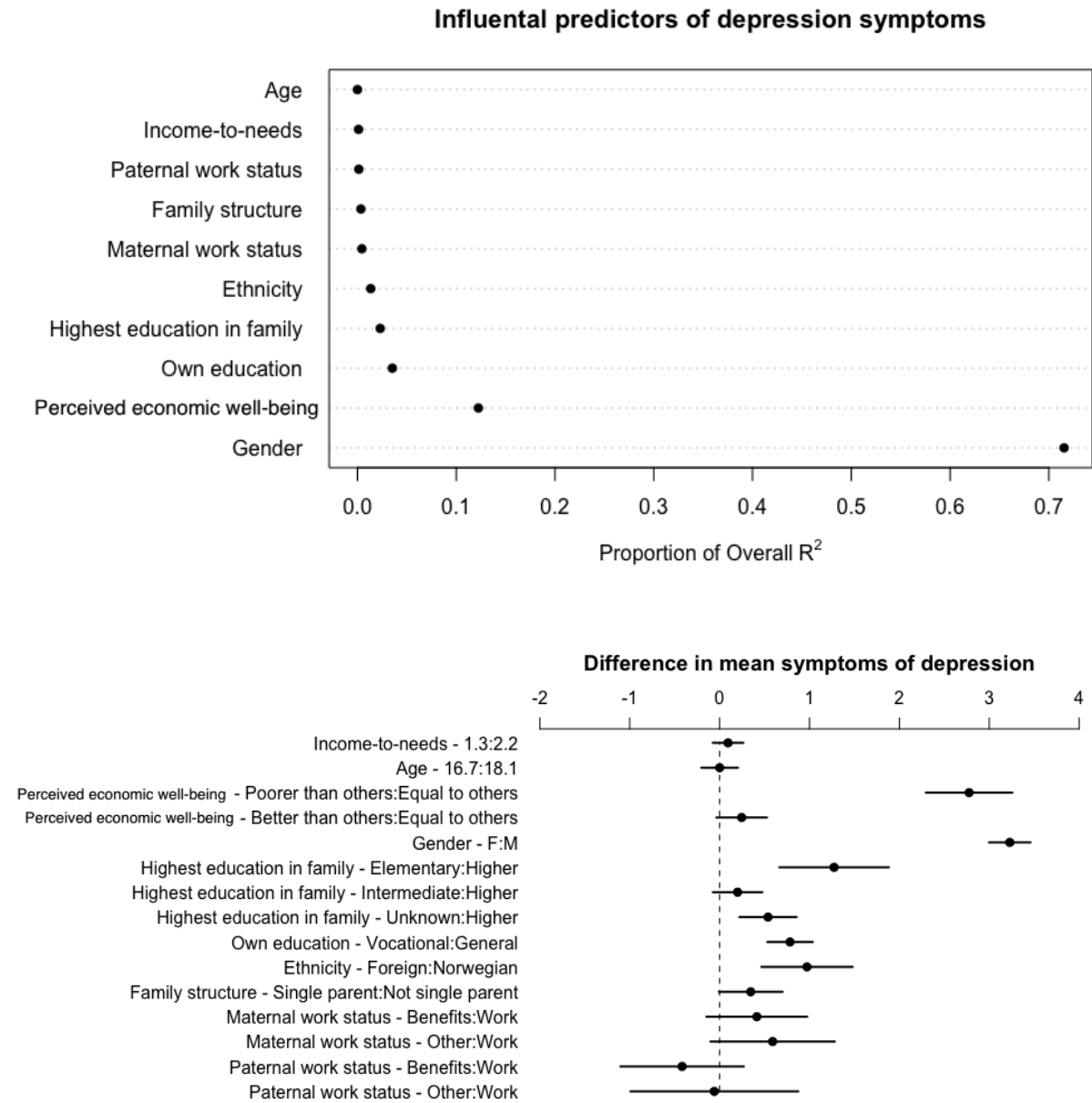
Influental predictors of depression symptoms

Difference in mean symptoms of depression

Figure 2. The top figure illustrates the importance (expressed as proportion of overall R^2) of each variable in predicting symptoms of depression measured with the SMFQ. The bottom figure illustrates the mean difference in depression symptom score associated with each level of the predictors relative to the reference level (the latter category in the label).
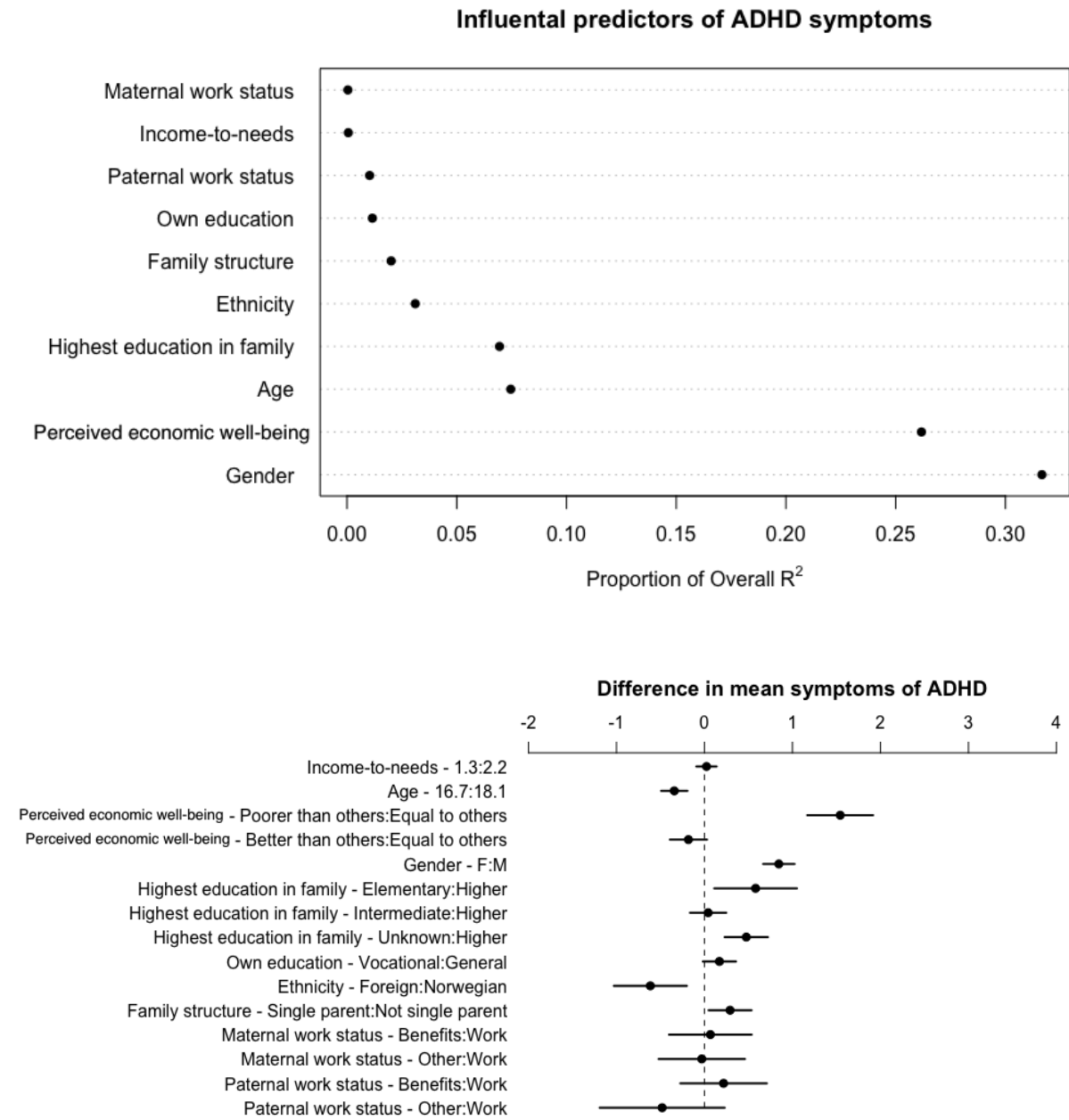
Influential predictors of ADHD symptoms

Difference in mean symptoms of ADHD

Figure 3. The top figure illustrates the importance (expressed as proportion of overall R^2) of each variable in predicting symptoms of attention-deficit/hyperactivity disorder as measured with the ASRS. The bottom figure illustrates the mean difference in depression symptom score associated with each level of the predictors relative to the reference level (the latter category in the label).

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.