Explaining subjective social status in two countries: The relative importance of education, occupation, income and childhood circumstances

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ARTICLE INFO

Keywords:
Subjective social status
Socioeconomic position
Childhood circumstances
Health inequalities
Australia
Norway

ABSTRACT

In the literature on social inequalities in health, subjective socioeconomic position (SEP) is increasingly applied as a determinant of health, motivated by the hypothesis that having a high subjective SEP is health-enhancing. However, the relative importance of determinants of subjective SEP is not well understood. Objective SEP indicators, such as education, occupation and income, are assumed to determine individuals’ position in the status hierarchy. Furthermore, an extensive literature has shown that past childhood SEP affects adult health. Does it also affect subjective SEP? In this paper, we estimate the relative importance of i) the common objective SEP indicators (education, occupation and income) in explaining subjective SEP, and ii) childhood SEP (childhood financial circumstances and parents’ education) in determining subjective SEP, after controlling for objective SEP. Given that the relative importance of these factors is expected to differ across institutional settings, we compare data from two countries: Australia and Norway. We use data from an online survey based on adult samples, with \( N \approx 1400 \) from each country. Ordinary least squares regression is conducted to assess how objective and childhood SEP indicators predict subjective SEP. We use Shapley value decomposition to estimate the relative importance of these factors in explaining subjective SEP. Income was the strongest predictor of subjective SEP in Australia; in Norway, it was occupation. Of the childhood SEP variables, childhood financial circumstances were significantly associated with subjective SEP, even after controlling for objective SEP. This association was the strongest in the Norwegian sample. Only the mother’s education had a significant impact on subjective SEP. Our findings highlight the need to understand the specific mechanisms between objective and subjective SEP as determinants of inequalities in health, and to assess the role of institutional factors in influencing these complex relationships.

1. Introduction

In the literature on social inequalities in health, different indicators for socioeconomic position (SEP), most commonly education, occupation and income, are applied (Galobardes et al., 2007). These objective SEP indicators are used to place individuals in the status hierarchy when analysing social inequalities in health. Additionally, an increasingly applied indicator is subjective SEP, also referred to as subjective social status, that reflects how the objective SEP influences individuals’ perceived placement in the social hierarchy (Demakakos et al., 2018; Jackman & Jackman, 1973; Nobles et al., 2013). However, little is known about the relative importance individuals place on these objective SEP indicators when judging their position in society. A high subjective SEP is hypothesised to be health-enhancing (Marmot, 2004); a range of studies has documented that subjective SEP predicts various health outcomes above and beyond objective SEP measures. The most studied health outcome in this regard is self-rated health (see e.g., Demakakos et al., 2008; Präg, 2020), but subjective SEP has also been found to predict outcomes such as mortality (Demakakos et al., 2018), depression (Singh-Manoux et al., 2003), cortisol levels (Wright & Steptoe, 2005), obesity (Goodman et al., 2003), and vulnerability to the common cold (Cohen et al., 2008).

The hypothesised association between subjective SEP and health inequalities is rooted in psychosocial explanatory pathways (Schnittker et al., 2013). The importance of childhood circumstances is underscored by the significant residual effect they have on adult health, particularly in contexts with high socioeconomic inequalities (Wright & Steptoe, 2005; Wright et al., 2008). However, the relative importance of determinants of subjective SEP is not well understood. Objective SEP in childhood influences health through factors such as socioeconomic status (SES), parental educational level and household income. The relative importance of these factors is expected to differ across institutional settings. In this paper, we estimate the relative importance of objective SEP indicators (education, occupation and income) in explaining subjective SEP, and childhood SEP (childhood financial circumstances and parents’ education) in determining subjective SEP, after controlling for objective SEP. In doing so, we aim to understand how subjective SEP is formed in two different settings and how these complex relationships are influenced by institutional factors.

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https://doi.org/10.1016/j.ssmph.2021.100864
Received 12 April 2021; Received in revised form 4 June 2021; Accepted 30 June 2021
Available online 3 July 2021
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People internalise perceptions of their position in socioeconomic hierarchies through social comparison, which may influence health via neuroendocrine mechanisms related to stress (McEwen & Gianaros, 2010; Nobles et al., 2013). From this perspective, the feeling of inferiority is considered to be a risk factor in itself (Marmot, 2004; Theodosiou & Zangeldis, 2009; Wilkinson, 1999). Subjective SEP is, therefore, both strongly determined by objective SEP, but is also considered a distinct construct, as subjective SEP picks up other aspects than objective SEP in capturing how socioeconomic factors influence health (Demakakos et al., 2008).

Further, extensive literature has established that childhood SEP affects adult health (see e.g., Case et al., 2005; Cohen et al., 2010; Nettle & Bateson, 2017; Smith et al., 1997); however, the many pathways through which this occurs are challenging to trace. The association between childhood and subjective SEP could potentially explain the pathway from childhood SEP to adult health via the status generated from growing up with a ‘silver spoon’. However, the influence of childhood SEP on subjective SEP in adulthood has been sparsely studied (Ferreira et al., 2018; Kim & Radioja, 2019), especially in Western contexts.

The association between childhood and subjective SEP would indicate that not only objective SEP, but also childhood SEP determines subjective SEP: the better the conditions during childhood, the higher the subjective SEP. Nevertheless, the relative importance of objective SEP on the one hand and childhood SEP on the other, in determining subjective SEP, remains unknown. Identifying their relative importance is important for developing appropriate policy responses that mitigate the impact of exposure to damaging socioeconomic factors.

The relative importance of determinants of subjective SEP is likely to vary across countries with different macro-level contexts (e.g., economic growth, unemployment rate) and institutional settings (such as social policies), since these factors are likely to shape the determinants of individuals’ subjective SEP. This paper compares Australia and Norway, which have similar life expectancies, and they both rank high on the Human Development Index (Australia 6th, and Norway 1st; UNDP, 2020). In terms of income inequality, measured using the Gini index, Australia (0.33) is more unequal than Norway (0.26) (OECD, 2018a). While both countries have a publicly funded national health service, it is more common in Australia to have voluntary private health insurance (Australian Institute of Health and Welfare, 2020). The share of the population with higher education is similar in the two countries, although it is more common in Norway to pursue postgraduate degrees (10.3% in Norway vs 5.4% in Australia; Australian Bureau of Statistics, 2017; Statistics Norway, 2019).

In this paper, we have quantified respondents’ implicit weighting of education, occupation and income in explaining their own subjective SEP, as the relative importance of these factors is not well understood in the assessment of subjective SEP (Navarro-Carrillo et al., 2020). We have further provided new insights into the importance of childhood SEP, measured using childhood financial circumstances and parents’ education level, in determining subjective SEP, to investigate whether there are determinants of adult subjective SEP that can be traced back to early-life conditions, independently of objective SEP.

The aim of this study was to estimate the relative importance of a) objective SEP indicators (education, occupation and income), and b) childhood SEP, independent of objective SEP, in determining subjective SEP in adulthood. Since the relative importance of these components is expected to differ across institutional settings, we have compared data from two countries. The paper is structured as follows: Section 2 describes the data, variables and methods and Section 3 presents the results, followed by a discussion in Section 4 and conclusions in Section 5.

### 2. Material and methods

#### 2.1. Data

An anonymous survey was developed on an online survey platform, Qualtrics (www.qualtrics.com). Request responses were set up to increase the question response rate such that respondents were reminded to complete the missing question before moving to the next page, to reduce the number of missing values. The respondents were recruited by Cint (www.cint.com), a global panel company, among members of its panel in December 2018–February 2019. For each country, a targeting sample size of 1400 was used and demographic quotas (with regard to the age and sex distribution) were applied. Initially, a total of 1920 respondents in Australia and 2418 in Norway consented and clicked the survey link. Next, respondents were excluded if they a) did not submit the survey, or the quota was full (N = 249 in Australia; N = 665 in Norway); or b) failed quality thresholds, e.g., spent less than 5 min to complete the survey (N = 248 in Australia; N = 353 in Norway). After the exclusion, the Australian and Norwegian sample sizes were left at N = 1423 and N = 1400, respectively. Upon completion of the survey, panel members received a small amount of reimbursement for their time and effort to complete the survey. As an example, Cint has successfully facilitated a large multi-instrument comparison study on quality of life and subjective wellbeing across six countries (Richardson et al., 2016).

Post-stratification weights were created after data collection to align the respondent data with population statistics of each country according to age group and sex. The study was approved by the Monash University Human Research Ethics Committee (project ID: 17490).

#### 2.2. Variables

The outcome variable, subjective SEP, was measured with the MacArthur scale of subjective social status (Adler et al., 2000), developed to examine how subjective status determines health (Singh-Manoux et al., 2003). The MacArthur scale was originally developed for the US (Adler et al., 2000), but has since been applied in various contexts and populations, making it a frequently applied measure of subjective SEP. The respondents were instructed to place themselves on a ladder with rungs 1–10: ‘Think of the ladder as representing where people stand in society. At the top of the ladder are the people who are best off – those who have the most money, education and the best jobs. At the bottom are the people who are worst off – those who have the least money, least education and the worst jobs or no job. The higher up you are on this ladder, the closer you are to people at the very top, and the lower you are, the closer you are to the bottom’. The variable was analysed as a continuous measure ranging from 1 to 10, with higher values denoting higher subjective SEP.

Education was recorded based on the highest completed of four education levels: primary education up to ten years; upper secondary and vocational school; undergraduate (less than four years of higher education); and postgraduate degree (higher education of four years or more). For the analyses, we used the upper secondary level as the reference due to few respondents in the primary education category in the Norwegian sample.

Income was recorded as the combined gross income of adults in the household, with eight income brackets in the Norwegian sample and ten in the Australian. For the analysis, income was recorded into five categories to approximate similar distributions across income groups for the two samples.

Occupation was grouped into five categories: not in labour force; machinery operators, drivers and labourers; sales, clerical and service workers; technicians and trade workers; managers and professionals. For the analyses, we recoded the occupation variable into three: the categories not in labour force and managers and professionals were retained, while the other three were merged into the category other professions. The category not in labour force includes students, unemployed people and
people on disability benefits. Retired people were asked to tick the category that best described their latest occupation.

Childhood SEP was measured by factoring in childhood financial circumstances (CFC) and parental education. The CFC variable was recorded as a response to the question: ‘What was your family’s financial situation during your childhood?’, with five possible responses: very good; good; neither good nor bad; difficult; very difficult. As only a few respondents selected very difficult, they were included into the category difficult. Similar indicators have been used to proxy childhood SEP in a range of epidemiological studies (see e.g., Listl et al., 2018; Straughen et al., 2013). Parents’ education was recorded based on the mother’s and father’s highest completed of four education levels, with the same categorisation as for respondents’ own education level. We analysed it by collapsing the higher (post-secondary) education levels into a tertiary education category and the primary and upper secondary levels into a lower than tertiary category. We dichotomised them due to substantial differences in the distribution of respondents between the Australian and Norwegian samples (e.g., a substantially lower share of respondents with postgraduate degrees among Australian parents than Norwegian ones). Childhood SEP was hypothesised to proxy respondents’ degree of social privilege in early life.

We included age as a continuous variable. We also checked for nonlinear age terms. Sex was included to investigate sex-specific differences in explaining subjective SEP.

2.3. Statistical analysis

2.3.1. Descriptive statistics

Descriptive statistics included means, proportions, and standard deviations reported by country and sex. Missing observations for subjective SEP were excluded from the analyses (N = 0 from the Australian sample; N = 6 from the Norwegian sample). In addition, N = 1 observation was deleted from each of the samples due to the reporting of unlikely high age. This left the Australian sample with N = 1422 respondents, and the Norwegian sample with N = 1393 respondents. The mean subjective SEP scores were presented by education level, income level, occupation category, CFC category and parents’ education level. The difference in subjective SEP scores between Australia and Norway was tested with independent sample t-tests, using 5% as the significance level. The distributions of subjective SEP were displayed using histograms.

2.3.2. Determinants of subjective SEP

Ordinary least squares regression analysis was conducted to assess how the three objective SEP indicators (education, occupation and income) and childhood SEP (CFC and parents’ education) predicted subjective SEP. All analyses were adjusted for age groups and sex. Tests of normally distributed residuals were conducted. Except for age, all other predictors were included as dummies.

We set up three regression models. Model A regressed education and income on subjective SEP, while Model B further included occupation. Model C further included childhood SEP (CFC and parents’ education), referred to as the full model. Wald tests were conducted to assess whether the model coefficients in the two samples were significantly different.

Education and income were analysed separately from occupation because these variables are arguably easier to interpret. As opposed to education (measured in years) and income (measured in money), not all occupation categories can be as easily ordered. Especially in the case of Norway, the various occupational categories are not as clearly linked to a hierarchical understanding of social class as, for example, in the UK. Moreover, the status associated with different occupations are likely to depend on age, since the labour market has radically changed over the past generation. Occupation is also presumably more sensitive to contextual differences. In a comparative setting, we deemed education and income more consistent variables.

We analysed the adult current SEP predictors in the first step because the MacArthur question is framed in terms of the three objective SEP indicators (education, occupation and income), which is in line with other literature studying the relationship between objective and subjective SEP (Andersson, 2018). We then added childhood SEP because we wanted to examine its added importance in explaining subjective SEP, after controlling for the three common SEP predictors.

We used Shapley value decomposition to determine the predictor that was the relatively most important for subjective SEP. This is a variance decomposition technique that measures the marginal contribution to the model’s explained variance, R², by adding any given predictor variable to the model, weighted by the number of permutations represented by a sub-model that does not contain this predictor (Shorrocks, 2013). The Shapley value therefore reports the value of adding any given predictor to the model as a proportion of R² (Huettner & Sunder, 2012); the larger the value, the greater that variable’s relative importance in explaining subjective SEP.

We ran analyses of sex and age interactions with the subjective SEP determinants, as well as sex-stratified analyses. We also tested for interactions between each of the SEP variables. Lastly, we checked whether having a higher education level than any of their parents mattered for their reporting of subjective SEP by adding a dummy for ‘educational mobility’ to Model C.

All statistical analyses were performed with Stata© version 15.1 (Stata Corporation, College Station, Texas). All analyses were conducted using sample weights.

3. Results

3.1. Descriptive statistics

The sample characteristics are reported in Table 1, with means and standard deviations for continuous variables, and categorical variables as proportions. The appendix Table A.1 provides descriptive statistics of the variables reported in their originally recorded categories.

Table 2 displays the mean values of subjective SEP scores for each SEP variable in Australia and Norway, together with the p value for the t-test of the difference between the two samples’ subjective SEP scores. There was a significant difference between the average subjective SEP score in Australia and Norway, as were the scores for sex. The subjective SEP mean scores were significantly different for nearly all the SEP indicator levels, except for education. For all significant differences, the Norwegian mean SEP scores were higher than the Australian ones.

The distribution of respondents across the subjective SEP ladder in Australia and in Norway is depicted in Fig. 1a and b respectively. The distribution of subjective SEP scores approximates the normal distribution.

3.2. Relative importance of objective indicators in predicting subjective SEP

Table 3 depicts the three regression models. First, education and income, adjusting for age and sex, were regressed on subjective SEP (Table 3, Model A). There was a nearly linear relationship between each increase in income level and subjective SEP, compared with the lowest income category. The association with subjective SEP indicated linearity also for education.

In Model B of Table 3, we added occupation, with other professions as the reference category. Most of the associations were attenuated compared to Model A. In the Australian sample, the category not in labour force was not significant at the 5% level. In the Norwegian sample, there was a strong negative association between being outside of the labour force and subjective SEP, and a strong positive association with subjective SEP for managers and professionals.

Including childhood SEP (Model C) slightly decreased the education coefficients in both samples, whereas income coefficients in the
Norwegian sample increased. CFC significantly contributed to the likelihood of reporting a higher subjective SEP in both samples compared to the reference (neither good nor bad). In the Norwegian sample, there was no difference in the reporting of subjective SEP for those who reported a high level of education, it was only the mother’s education that was significant; respondents whose mothers had university education reported 0.34 and 0.30 higher subjective SEP in Australia and Norway, respectively. Father’s education was not independently associated with subjective SEP. The reporting of subjective SEP increased with age in all models (Table 3), except for a slight decrease in early adulthood in the Australian sample when adding a quadratic age term (output not reported).

Shapley value decomposition run on the full model (Table 3, Model C) indicated that income was the most important determinant in the Australian and Norway the most important in the Norwegian. The relative importance of each predictor of subjective SEP is illustrated in Fig. 2, in which each predictor’s importance is depicted as a share of the model’s R². In this figure, a 100% corresponds to the percentage of total variance explained by the predictors in each country. Separate analyses conducted with only childhood SEP as predictors of subjective SEP indicated that CFC was independently associated with subjective SEP, as the coefficients were similar to those reported in Model C (output not shown).

Wald tests of the difference between coefficients in the two samples in the full model (Model C) indicated that it was only the coefficients of category not in labour force that was significantly different between Australia and Norway (output not shown).

Testing age and sex interactions in Model C identified several significant interaction terms. In the Norwegian sample, there were sex differences across all income levels, where men had an advantage in terms of income-related subjective SEP. The postgraduate education and very good CFC coefficients were also significant, favouring women. In the Australian sample, the upper-middle income category interacted with sex. There were significant, positive age interactions for all income levels, and negative age interactions for the two upper education levels and good CFC (Appendix Table A.2). Analyses stratified by sex indicated differences in especially the income levels (Appendix Table A.3), in line with the sex interactions from Table A.2. The ‘educational mobility’ dummy added to Model C was not significant (output not reported).

4. Discussion

Social inequalities in health are commonly measured using objective SEP indicators, such as individuals’ different levels of education, occupation and income. It is claimed that objective indicators ‘produce’ social status, and that people’s perceived social status is health-enhancing (Marmot, 2004). However, little is known about the relative importance of these indicators in the subjective assessment of individuals’ placement in the social hierarchy (Navarro-Carrillo et al., 2020). Furthermore, the literature has confirmed a lasting impact of childhood SEP on adult health and socioeconomic conditions (Case et al., 2005). It is nevertheless unclear how childhood SEP relates to subjective SEP. Could it be that childhood SEP also determines adult subjective SEP, through some sort of class consciousness?

In this paper, we have estimated respondents’ implicit importance...
We found support for the hypothesis that childhood SEP has a lasting impact on individuals and their perception of their own education, occupation and income, as also reported in Ferreira et al. (2018). Those who for whatever reason do not work are stigmatised, reflecting the relative importance of childhood SEP (CFC and parents’ education). We found support for the hypothesis that childhood SEP has a lasting impact on individuals’ subjective SEP, independent of their education, occupation and income, as also reported in Ferreira et al. (2018). Therefore, we theorise that the pathway from childhood SEP to adult health may pass through subjective SEP, independently of adult education, occupation and income in explaining subjective SEP, and compared two different countries to assess whether the relative importance of the determinants of subjective SEP vary with the institutional setting. We further expanded the analysis by assessing the relative importance of childhood SEP (CFC and parents’ education). We found support for the hypothesis that childhood SEP has a lasting impact on individuals’ subjective SEP, independent of their education, occupation and income, as also reported in Ferreira et al. (2018). Therefore, we theorise that the pathway from childhood SEP to adult health may pass through subjective SEP, independently of adult

Table 2

Comparisons on subjective SEP scores between Australia and Norway, mean (SD).

| Subjective SEP                        | Australia | Norway | T test | p value |
|---------------------------------------|-----------|--------|--------|---------|
| Total                                 | 5.8 (2.0) | 6.2 (2.1) |        | ***     |
| Sex                                   | 5.6 (1.9) | 6.0 (2.1) |        | ***     |
| Men                                   | 5.9 (2.1) | 6.4 (2.0) |        | ***     |
| Education                             |           |        |        |         |
| Primary education < 10 yrs            | 4.9 (2.0) | 4.8 (2.4) |        |         |
| Upper secondary                       | 5.6 (2.0) | 5.6 (2.1) |        |         |
| Undergraduate                         | 6.3 (1.7) | 6.3 (1.7) |        |         |
| Postgraduate                          | 6.8 (2.1) | 7.0 (1.9) |        |         |
| Household income                      |           |        |        |         |
| Low                                   | 4.8 (2.1) | 5.3 (2.6) |        | ***     |
| Lower middle                          | 5.3 (2.0) | 5.9 (2.0) |        | ***     |
| Middle                                | 5.9 (1.7) | 6.3 (1.7) |        | **      |
| Upper middle                          | 6.6 (1.8) | 6.7 (1.5) |        | *       |
| High                                  | 7.0 (1.7) | 7.3 (1.6) |        |         |
| Occupation                            |           |        |        |         |
| Not in labour force                   | 4.9 (2.1) | 4.9 (2.2) |        |         |
| Other professions                     | 5.7 (1.9) | 6.1 (1.9) |        | ***     |
| Managers & professionals              | 6.6 (1.8) | 7.3 (1.7) |        | ***     |
| Childhood financial circumstances     |           |        |        |         |
| Difficult                             | 5.2 (2.0) | 5.6 (2.3) |        | ***     |
| Neither good nor bad                  | 5.6 (1.9) | 5.9 (1.9) |        | ***     |
| Good                                  | 6.1 (1.8) | 6.3 (1.8) |        | *       |
| Very good                             | 6.7 (2.5) | 7.3 (2.1) |        | ***     |
| Parents’ education                    |           |        |        |         |
| Mother: Lower than tertiary           | 5.6 (2.0) | 6.0 (2.0) |        | ***     |
| Mother: Tertiary education            | 6.6 (2.1) | 6.6 (2.1) |        | ***     |
| Father: Lower than tertiary           | 5.5 (2.0) | 5.9 (2.0) |        | ***     |
| Father: Tertiary education            | 6.4 (2.1) | 6.6 (2.1) |        | *       |

Note: *** p < 0.01, ** p < 0.05, * p < 0.1. p values were calculated based on independent samples t-test, with a 5% significance level. Standard deviations (SD) in parentheses.

The comparison of Australia and Norway suggests some striking differences in the relative importance of subjective SEP determinants between the two countries. In the Australian sample, income was the most important determinant (Fig. 2), possibly attributed to institutional differences, such as income inequality, partly as a result of different redistributive policies. Income inequality is higher in Australia than in Norway, and it is especially the top share of Australian earners that has ‘taken off’ in the past few decades (OECD, 2018b). In Norway, the relatively small income inequalities can be partly explained by a system of collective bargaining between employers and labour unions, ensuring wage coordination and compression across the occupational hierarchy (Barth et al., 2014). The combination of these factors could imply that Australia has larger inequalities in what money do for people’s perception of their own SEP.

For example, it is more common in Australia that children from high-income families attend private schools, often associated with prestige and high-quality teaching. Income inequalities could, therefore, directly influence educational inequalities in Australia. This would suggest that the type of school seems to be more important than the number of years spent in school. In Norway, private schools are not common, and which school people went to is less likely to influence their subjective SEP. Rather, university-level education is a potential ticket to higher social standing. This is arguably due to Norwegian education policy that incentivises completing upper secondary school by offering universal access to higher education. This has led to an increased uptake of higher education by the population, which over time is likely to dilute the impact of higher education on subjective SEP. Additionally, this has created a highly merit-based education system that could make it increasingly difficult for those who do not have higher education to enter the labour market (Mackenbach, 2012).

In the Norwegian sample, occupation was the most important predictor of subjective SEP. The occupation variable indicated two things: those in managerial positions reported a significantly higher subjective SEP. Objective SEP.

Fig. 1a. Distribution of respondents across the rungs of the subjective SEP ladder, Australia.
negatively on people’s perceived SEP. In the Australian sample, those outside of the labour force also reported a lower subjective SEP, but of a smaller magnitude.

Analysing education, occupation and income as predictors of subjective SEP resulted in an R² smaller magnitude. - negatively on people outside of the labour force also reported a lower subjective SEP, but of a smaller magnitude.

Table 3
Ordinary least squares regression results explaining subjective SEP, Australia and Norway.

|                          | Australia | Norway | Australia | Norway | Australia | Norway |
|--------------------------|-----------|--------|-----------|--------|-----------|--------|
| **Education (ref. upper secondary)** |           |        |           |        |           |        |
| Primary education <10 yrs | -0.51***  | 0.14   | -0.86***  | 0.24   | -0.45***  | 0.14   | -0.66***  | 0.24   | -0.45***  | 0.13   | -0.63***  | 0.24   |
| Undergraduate            | 0.43***   | 0.13   | 0.58***   | 0.13   | 0.28***   | 0.13   | 0.49***   | 0.13   | 0.25***   | 0.13   | 0.42***   | 0.12   |
| Postgraduate             | 0.84***   | 0.17   | 1.15***   | 0.13   | 0.58***   | 0.17   | 0.65***   | 0.14   | 0.39***   | 0.17   | 0.44***   | 0.13   |
| **Household income (ref. low)** |           |        |           |        |           |        |
| Lower middle             | 0.45***   | 0.16   | 0.51***   | 0.17   | 0.41***   | 0.16   | 0.25**    | 0.17   | 0.47**    | 0.15   | 0.45***   | 0.16   |
| Middle                   | 0.90***   | 0.16   | 0.79***   | 0.19   | 0.77***   | 0.16   | 0.59***   | 0.19   | 0.81***   | 0.16   | 0.69***   | 0.18   |
| Upper middle             | 1.53***   | 0.16   | 1.16***   | 0.17   | 1.35***   | 0.17   | 0.92***   | 0.18   | 1.33***   | 0.17   | 1.04***   | 0.17   |
| High                     | 1.98***   | 0.19   | 1.64***   | 0.18   | 1.78***   | 0.20   | 1.27***   | 0.19   | 1.75***   | 0.19   | 1.28***   | 0.18   |
| **Occupation (ref. other professions)** |           |        |           |        |           |        |
| Not in labour force      | -0.24***  | 0.13   | -0.74***  | 0.16   | -0.21     | 0.13   | -0.71***  | 0.15   | -0.37***  | 0.13   | -0.62***  | 0.12   |
| Managers & professionals | 0.42***   | 0.13   | 0.79***   | 0.12   | 0.37***   | 0.13   | 0.62***   | 0.12   |           |        |           |        |
| Childhood financial circumstances (ref. neither good nor bad) |           |        |           |        |           |        |
| Difficult                |           |        |           |        | -0.26**   | 0.12   | -0.06     | 0.15   |           |        |           |        |
| Good                     |           |        |           |        | 0.39***   | 0.12   | 0.38***   | 0.11   |           |        |           |        |
| Very good                |           |        |           |        | 0.74***   | 0.20   | 1.18***   | 0.16   |           |        |           |        |
| Parents’ education (ref. lower than tertiary) |           |        |           |        |           |        |
| Mother’s tertiary education |           |        |           |        | 0.34**    | 0.15   | 0.30**    | 0.12   |           |        |           |        |
| Father’s tertiary education |           |        |           |        | -0.13     | 0.14   | -0.03     | 0.12   |           |        |           |        |
| Demographic characteristics |           |        |           |        |           |        |
| Age (yrs.)               | 0.02***   | 0.00   | 0.02***   | 0.00   | 0.01***   | 0.00   | 0.01***   | 0.00   | 0.02***   | 0.00   | 0.02***   | 0.00   |
| Male                     | 0.12      | 0.10   | 0.03      | 0.10   | 0.06      | 0.10   | -0.02     | 0.10   | 0.01      | 0.10   | -0.08     | 0.09   |
| Constant                 | 4.05***   | 0.22   | 4.23***   | 0.19   | 4.30***   | 0.24   | 4.73***   | 0.22   | 3.91***   | 0.25   | 3.97***   | 0.24   |
| Observations             | 1422      | 1393   | 1422      | 1393   | 1422      | 1393   | 1422      | 1393   | 1422      | 1393   | 1422      | 1393   |
| R²                       | 0.19      | 0.21   | 0.20      | 0.26   | 0.23      | 0.30   |

Note: *** p < 0.01, ** p < 0.05, * p < 0.1. The undergraduate and post-graduate education levels correspond to university education up to four years, and university education of four years or more, respectively. Robust standard errors in parentheses. Sampling weights in both countries included.
we found no systematic tendencies. Interaction analyses of dummy variables are challenging, especially with relatively small samples. Third, the occupation variable is somewhat difficult to interpret, particularly the not in labour force category, as it does not distinguish between different reasons for not working. Ideally, this would be split since as different groups as students and unemployed people were analysed in the same group. Fourth, institutional and cultural differences could lead to systematically different interpretations of the subjective SEP question, which we did not account for.

5. Conclusions

This study provides new insights into respondents’ implicit weighting of objective and childhood factors in predicting subjective SEP. We have estimated the contribution of each of the commonly used objective SEP indicators (education, occupation and income) in explaining subjective SEP. In addition, we have added childhood SEP as an important determinant of subjective SEP; while controlling for the objective SEP variables, we found that the influence of childhood SEP persisted into adulthood. We have further pointed to each of these components’ relative importance in explaining subjective SEP. Lastly, we have demonstrated how the relative contribution of each of these determinants differs between two countries.

As for policy implications, this paper has shed light on the need for intervention in policy areas that would affect subjective SEP, such as reduced income inequalities (Australia) and improved social inclusion policies (Norway). However, considering the ‘subjectiveness’ of the concept, the evidence base for any policy intervention would need to complement findings like these with research on other endpoints, such as well-being and health outcomes.

Future research should further investigate the inconsistency between reported subjective and objective SEP. This could provide information on the characteristics of those who overreport or underreport their subjective SEP, as well as illuminate how subjective SEP is a construct distinct from objective SEP. From a health perspective, more research is needed on the pathway from childhood SEP to health via subjective SEP. Moreover, we need a better understanding of the specific mechanisms between objective and subjective SEP on the one hand, and social inequalities in health on the other, to better grasp the role of subjective SEP as a determinant of health inequalities.

Financial disclosure statement

The funding sources had no influence on the conduct of this research.

CRediT authorship contribution statement

Marie Hella Lindberg: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Data curation, Roles/. Gang Chen: Conceptualization, Methodology, Formal analysis, Writing – review & editing, Resources. Jan Abel Olsen: Conceptualization, Writing – review & editing, Funding acquisition, Project administration, Resources, Supervision. Birgit Abelsen: Conceptualization, Methodology, Formal analysis, Writing – review & editing, Supervision.

Declaration of competing interest

None.

Acknowledgements

This project was part of the Tracing causes of inequalities in health and wellbeing project funded by the Research Council of Norway (RCN), grant 273812. This research was conducted at the Department of Community Medicine, UiT – Arctic University of Norway (UIT), and received funding from UiT and RCN. We are thankful to colleagues and
Table A.1
Descriptive statistics of original data of variables that were collapsed in the regression analyses.

| Variables                          | Female Mean/% N | Male Mean/% N | Total Mean/% N | Female Mean/% N | Male Mean/% N | Total Mean/% N |
|-----------------------------------|-----------------|---------------|----------------|-----------------|---------------|----------------|
| Mother’s education                |                 |               |                |                 |               |                |
| Primary education <10 yrs         | 60.5 442 56.4 390 58.5 832 | 35.0 198 37.6 313 36.5 511 |                 |                 |               |                |
| Upper secondary                   | 22.0 161 19.4 134 20.8 295 | 27.9 158 22.9 191 25.0 349 |                 |                 |               |                |
| Undergraduate                     | 9.9 72 13.9 96 11.8 168 | 15.2 86 17.4 145 16.5 231 |                 |                 |               |                |
| Postgraduate                      | 7.7 56 10.3 71 8.9 127 | 21.9 124 22.1 184 22.0 308 |                 |                 |               |                |
| Father’s education                |                 |               |                |                 |               |                |
| Primary education <10 yrs         | 56.1 410 46.9 324 51.6 734 | 31.3 177 28.9 241 29.9 418 |                 |                 |               |                |
| Upper secondary                   | 22.7 166 22.6 156 22.6 322 | 28.1 159 28.3 236 28.2 395 |                 |                 |               |                |
| Undergraduate                     | 13.1 96 17.2 119 15.1 215 | 14.8 84 18.6 157 17.2 241 |                 |                 |               |                |
| Postgraduate                      | 8.1 59 13.3 92 10.6 151 | 25.8 146 23.9 199 24.7 345 |                 |                 |               |                |
| Occupational category             |                 |               |                |                 |               |                |
| Not in labour force               | 39.1 286 20.7 143 30.2 429 | 26.1 148 15.6 130 19.9 278 |                 |                 |               |                |
| Machinery operators, drivers & labourers | 3.4 25 10.4 72 6.8 97 | 10.9 62 13.3 111 12.4 173 |                 |                 |               |                |
| Sales & service                   | 27.0 197 15.3 106 21.3 303 | 28.6 162 28.5 237 28.5 399 |                 |                 |               |                |
| Technicians & trade workers       | 3.6 26 15.6 108 9.4 134 | 10.2 58 11.0 92 10.7 150 |                 |                 |               |                |
| Managers & professionals          | 27.0 197 38.0 263 32.3 460 | 24.2 137 31.6 263 28.6 400 |                 |                 |               |                |
| Household income AUD              |                 |               |                |                 |               |                |
| Household income AUD per 1000 NOK | 13.8 101 10.0 69 12.0 170 | 170 <349 26.1 148 15.3 127 19.6 275 | 25,001-35,000 10.7 78 10.7 74 10.7 152 | 350-499 18.0 102 14.5 121 15.9 223 | 35,001-50,000 15.2 111 12.0 83 13.6 194 | 500-699 16.2 92 15.1 126 15.6 218 | 50,001-65,000 10.9 80 11.4 79 11.2 153 | 750-999 11.6 66 14.7 122 13.4 188 | 65,001-100,000 11.4 83 10.1 70 10.8 153 | 1500-1999 11.6 66 14.7 122 13.4 188 | 100,001-130,000 11.8 86 14.3 99 13.0 185 | 1200-1399 5.1 29 7.4 62 10.5 150 | 130,001-160,000 7.3 53 10.3 71 8.7 124 | <1400 4.2 24 9.8 82 7.6 106 | 160,001-220,000 6.6 48 7.8 54 7.2 102 | >220,001 2.5 18 3.3 23 2.9 41 | (continued on next page)

Table A.2
OLS analyses of Model C (Table 3) with age and sex interactions

| Education (ref. upper secondary) | Australia | Norway |
|----------------------------------|-----------|--------|
| Primary education <10 yrs        | -0.47*** (0.13) | -0.61*** (0.23) |
| Undergraduate                    | 0.96*** (0.33) | 0.42*** (0.13) |
| Postgraduate                     | 1.32*** (0.46) | 0.75*** (0.17) |
| Household income (ref. low)      |             |        |
| Lower middle                     | -0.80 (0.48) |        |
| Middle                           | -0.36 (0.46) |        |
| Upper middle                     | -0.31 (0.48) |        |
| High                             | -0.35 (0.54) |        |
| Occupation (ref. other professions) |         |        |
| Not in labour force              | -0.27 (0.13) |        |
| Managers & professionals         | 0.34*** (0.13) | 0.58*** (0.12) |
| Childhood financial circumstances (ref. neither good nor bad) | | |
| Difficult                        | -0.28 (0.12) | -0.03 (0.15) |
| Good                             | 1.43*** (0.32) | 0.36*** (0.11) |
| Very good                        | 0.78*** (0.20) | 1.67*** (0.22) |
| Parents’ education (ref. lower than tertiary) | | |
| Mother’s tertiary education      | 0.33*** (0.15) | 0.31*** (0.12) |
| Father’s tertiary education      | -0.20 (0.14) | -0.01 (0.12) |
| Demographic characteristics      |             |        |
| Age (yrs.)                       | 0.01* (0.01) | 0.02*** (0.00) |
| Male                             | -0.15 (0.12) | -0.51* (0.26) |
| Interactions                     |             |        |
| Age X Undergraduate education    | -0.02 (0.01) | -0.55*** (0.19) |
| Age X Postgraduate education     | -0.02* (0.01) | 0.63*** (0.31) |
| Age X Lower middle income        | 0.02*** (0.01) | 1.01*** (0.36) |
| Age X Middle income              | 0.02*** (0.01) | 1.01*** (0.31) |
| Age X Upper middle income        | 0.03*** (0.01) | 0.96*** (0.34) |
| Age X High income                | 0.03*** (0.01) | -0.91*** (0.27) |

(continued on next page)
### Table A.2 (continued)

|                     | Australia       | Education (ref. upper secondary) | Norway          |
|---------------------|-----------------|----------------------------------|-----------------|
| Age X Good CFC      | –0.02*** (0.01) |                                  |                 |
| Male X Upper middle income | 0.53** (0.22)  | Constant                         | 4.07*** (0.27)  |
| Observations        | 1422            | Observations                     | 1393            |
| R²                  | 0.25            | R²                               | 0.32            |

*Note: *** p < 0.01, ** p < 0.05, * p < 0.1. There were no significant interactions with age in the Norwegian sample. The undergraduate and post-graduate education levels correspond to university education up to four years, and university education of four years or more, respectively. CFC: childhood financial conditions. Robust standard errors in parentheses. Sampling weights in both countries included.*

### Table A.3

Ordinary least squares analyses of Model C (Table 3) stratified by sex

|                     | Female | Male | Female | Male |
|---------------------|--------|------|--------|------|
| Education (ref. upper secondary) |        |      |        |      |
| Primary education <10 yrs       | –0.42** (0.18) | –0.49** (0.21) | –0.53 (0.33) | –0.74** (0.32) |
| Undergraduate            | 0.38** (0.17)  | 0.17 (0.19)  | 0.61*** (0.20) | 0.20 (0.16)   |
| Postgraduate             | 0.20 (0.23)   | 0.54** (0.25) | 0.75** (0.21)  | 0.13 (0.17)   |
| Household income (ref. low)  |         |      |        |      |
| Lower middle             | 0.39** (0.20) | 0.57** (0.25) | 0.06 (0.22)   | 1.06*** (0.24) |
| Middle                  | 0.74*** (0.20) | 0.84*** (0.25) | 0.20 (0.27)   | 1.43*** (0.25) |
| Upper middle             | 1.03*** (0.22) | 1.60*** (0.26) | 0.52** (0.24) | 1.77*** (0.23) |
| High                    | 1.50*** (0.27) | 1.93** (0.29)  | 0.84** (0.25)  | 2.96*** (0.26) |
| Occupation (ref. other professions) |     |      |        |      |
| Not in labour force       | –0.05 (0.16)  | –0.41 (0.17)  | –0.86*** (0.23) | –0.41** (0.20) |
| Managers & professionals  | 0.60*** (0.19) | 0.20 (0.17)   | 0.71*** (0.18) | 0.51*** (0.16) |
| Childhood financial circumstances (ref. neither good nor bad) |         |      |        |      |
| Difficult               | –0.10 (0.16)  | –0.46** (0.19) | 0.06 (0.23)   | –0.08 (0.18)  |
| Good                    | 0.26 (0.17)   | 0.51*** (0.17) | 0.32** (0.17) | 0.39*** (0.15) |
| Very good               | 0.89*** (0.26) | 0.63** (0.30)  | 1.67*** (0.24) | 0.71*** (0.21) |
| Parents’ education (ref. lower than tertiary) |     |      |        |      |
| Mother’s tertiary education | 0.32 (0.20)  | 0.35 (0.21)   | 0.39** (0.18) | 0.28 (0.17)   |
| Father’s tertiary education | 0.04 (0.20)  | –0.30 (0.19)  | –0.12 (0.18)  | 0.09 (0.15)   |
| Age (yrs.)              | 0.02** (0.00) | 0.02** (0.00) | 0.02** (0.01) | 0.02 (0.00)   |
| Constant                | 3.67*** (0.32) | 4.13*** (0.39) | 3.98*** (0.38) | 3.66*** (0.29) |
| Observations            | 731     | 691   | 566    | 827   |
| R²                     | 0.22    | 0.25   | 0.38    | 0.27    |

*Note: *** p < 0.01, ** p < 0.05, * p < 0.1. The undergraduate and post-graduate education levels correspond to university education up to four years, and university education of four years or more, respectively. Robust standard errors in parentheses. Sampling weights in both countries included.*

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