Socioeconomic status and subjective social status measurement in KiGGS Wave 2

Abstract
This article describes the method applied to measure socioeconomic status (SES) and subjective social status (SSS) in the current wave of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS Wave 2), which was conducted over three years between 2014 and 2017. The composite multidimensional SES index was calculated as a sum of point scores for the parents’ education level, occupational status and equivalised disposable income. SSS was assessed in the 11 to 17 year age group using a German version of the MacArthur Scale for children and adolescents. To demonstrate the use of both instruments, we present examples that highlight the association between SES and SSS with the general health of children and adolescents in the 3 to 17 and/or 11 to 17 age groups. Over 95% of parents rated the general health of their children as ‘very good’ or ‘good’. However, the analyses clearly reveal that children and adolescents from families with low SES and SSS have poorer general health than their better-off peers. Even when mutually adjusted, both low SES and SSS are independently associated with poorer general health. In addition to the SES index, studies on the health of children and adolescents should therefore also consider SSS. In this way, additional aspects of the socioeconomic conditions of families can be taken into account.

1. Introduction
Numerous national and international studies have shown the close link between child and adolescent health and the socioeconomic status of the families they grow up in [1-6]. Data from the baseline study of the German Health Interview and Examination Survey for Children and Adolescents (2003-2006) and the subsequent KiGGS Wave 1 (2009-2012) [7-9] conducted by the Robert Koch Institute (RKI) have also highlighted this fact. As these studies indicate, children and adolescents from low socioeconomic status backgrounds have significantly poorer health compared to their peers from socioeconomically more affluent families. This fact reveals itself in the general state of health and in psychosocial health, for example with regard to behavioural problems, attention deficit hyperactivity disorder (ADHD) and eating disorders [6, 7, 9-11]. Furthermore, social differences in health behaviours are evident, for example regarding tobacco consumption, physical activity and dietary habits. The same applies to healthcare system utilisation, as much regarding the use of medical services, as also preventive healthcare and health promotion services [6, 9, 12-14].

In the KiGGS study, a composite index is used to measure socioeconomic status, which is based on information
KiGGS Wave 2
Second follow-up to the German Health Interview and Examination Survey for Children and Adolescents
Data owner: Robert Koch Institute
Aim: Providing reliable information on health status, health-related behaviour, living conditions, protective and risk factors, and health care among children, adolescents and young adults living in Germany, with the possibility of trend and longitudinal analyses
Study design: Combined cross-sectional and cohort study

Cross-sectional study in KiGGS Wave 2
Age range: 0-17 years
Population: Children and adolescents with permanent residence in Germany
Sampling: Samples from official residency registries - randomly selected children and adolescents from the 167 cities and municipalities covered by the KiGGS baseline study
Sample size: 15,023 participants

KiGGS cohort study in KiGGS Wave 2
Age range: 10-31 years
Sampling: Re-invitation of everyone who took part in the KiGGS baseline study and who was willing to participate in a follow-up
Sample size: 10,853 participants

KiGGS survey waves
- KiGGS baseline study (2003-2006), examination and interview survey
- KiGGS Wave 1 (2009-2012), interview survey
- KiGGS Wave 2 (2014-2017), examination and interview survey

More information is available at www.kiggs-studie.de/english

regarding the parents’ education, occupational status and income [15]. This ‘index of socioeconomic status’ (SES index) is used in a comparable manner in all of the established health monitoring surveys at the RKI [16]. The only difference is that in the KiGGS study, the status determining data is collected from the participants’ parents, whereas in the RKI’s surveys among adults, participants self-report this data. The comparable and consistent construction of the SES index in the surveys conducted at the RKI make it possible to relate the results of the surveys and to analyse trends over time. Meanwhile, many other epidemiologic studies in Germany have been applying the SES index, as much to study child and adolescent health as well as the health of middle-aged and elder adults [17].

In addition to the SES index, the health surveys conducted at the RKI will in future also assess subjective social status (SSS), which measures a participant’s subjective perception and assessment of their socioeconomic situation [18-20]. SSS can have independent health implications above and beyond the effects of objective SES, which can be observed not only in adulthood, but also in adolescence [21-23].

In the following sections, we provide a detailed description of how the socioeconomic variables were operationalised in the KiGGS Wave 2 study and how the SES index was designed and generated. Moreover, we describe how SSS was measured in this survey. Subsequently, we provide examples of results that reveal the association of both, SES index and SSS with general health among children and adolescents aged 3 to 17 and 11 to 17 years. The results aim to show the extent of socioeconomic differences in general health among children and adolescents in Germany. Moreover, they provide insights regarding whether the SES index and SSS are each independently associated with child and adolescent health.

2. Methods
2.1 Data basis and statistical analysis

As part of health monitoring at the RKI, KiGGS is a central source of information to assess the health of the adolescent generation in Germany [24, 25]. For the 0 to 17 age group, KiGGS regularly provides representative cross-sectional data. Furthermore, the KiGGS cohort, which has been designed as a longitudinal follow-up study, interviews and examines the participants in the KiGGS baseline study repeatedly up to adult age.

The KiGGS baseline study (2003-2006) consisted of interviews, examinations and laboratory analyses. In KiGGS Wave 1 (2009-2012), data was collected by telephone interviews [26]. 17,641 children and adolescents aged 0 to 17 from 167 locations in Germany took part in the KiGGS baseline study. The response rate was 66.6% [27]. The KiGGS Wave 2 (2014-2017) sample consisted of a new sample from the population registry of the original 167 KiGGS baseline study sample points (Infobox). KiGGS Wave 2 therefore comprises a new nationwide cross-sectional survey for 0 to 17 year-old children and adolescents in Germany and the second follow-up of the KiGGS cohort [28]. A total of 15,023 children and adolescents (7,538 girls, 7,485 boys) aged 0 to 17 took part in the KiGGS Wave 2 cross-sectional survey (response rate 40.1%) [29].

All surveys at the Robert Koch Institute are subject to strict compliance with the data protection regulations of
Children and adolescents from socially disadvantaged families are more likely to have health problems and unfavourable health behaviours.

Germany’s Federal Data Protection Act. The Hannover Medical School ethics committee has considered and approved the survey under ethical guidelines (No. 2275-2014). The Federal Commissioner for Data Protection and Freedom of Information in Germany had no objections to the study. Participation in the study was voluntary. Participants, their parents and/or legal guardians were informed about the objectives and content of the study and data protection, and provided their informed consent in writing.

The analyses of the relationship between socioeconomic status and/or subjective social status and the general health of children and adolescents are based on parents’ assessment of the health of their children [30]. As recommended by the World Health Organization, parents were asked [31]: ‘How would you rate your child’s health in general?’ (Answer categories: very good, good, fair, bad and very bad). The results concern children and adolescents aged 3 to 17 (n=13,568). For subjective social status, the results concern participants aged 11 to 17 (n=6,599), because SSS was not assessed in younger children. The results reflect prevalence rates, as well as, through binary logistic regression, age-adjusted odds ratios. The odds ratios presented express the degree to which a specific group has a higher statistical odds of fair, bad or very bad health compared to the defined reference group.

Weighting factors are used to account for unequal sampling probabilities and to adjust the distribution of the sample by age, gender, region, nationality and level of parental education to match the official German population statistics for 2014/2015 and the 2013 microcensus. Additionally, the weighting factor adjusts for differences in the rate of participants in the KiGGS baseline study and KiGGS Wave 1, who took part again [28]. To account for weighting and correlation of participants within one municipality, confidence intervals and logistic regression models are calculated using procedures for complex samples. Differences are considered statistically significant when p-values are lower than 0.05. All analyses are conducted with the statistics software Stata 14.2 SE.

2.2 Operationalisation of the SES index

In KiGGS Wave 2, the three dimensions education, occupation and income, which are generated as household characteristics based on the data provided by parents, are used to determine SES. Operationalisation of the index is comparable to the method first used in KiGGS Wave 1 (on the operationalisation of the three status dimensions see Annex Table 1). In the KiGGS baseline study, the index was initially developed differently, but was later re-calculated based on the new template, so that the results from KiGGS Wave 1 and KiGGS Wave 2 are now comparable to baseline study results [15].

For indexing, point scores are calculated for each status dimension (see Annex Table 2). Regarding education and occupation, the SES index registers the highest point score a child’s parents provide. Only children who lived in exclusively single-parent households without their partner are assigned the score of their single parent directly. Scores for each dimension ranged from 1 to a maximum of 7. The sum of point scores from the individual dimensions become equal parts of the SES index.

As the first SES dimension, levels of education are assigned based on the international CASMIN (Compara-
The socioeconomic status (SES) index is generated as a household characteristic based on parental levels of education, occupational status and income.

Socioeconomic status and subjective social status measurement in KiGGS Wave 2

The SES index is generated as a household characteristic based on parental levels of education, occupational status and income. This classification distinguishes nine levels of education, which are defined as distinct combinations of school degrees and vocational qualifications. The standardised point scores used in the SES index range between 1 and 7. Income as the third dimension of SES is measured by needs-adjusted net household income (equivalised disposable income) as an indicator in accordance with the guidelines of Germany’s federal reporting on poverty and wealth and the recommendations for reporting on social cohesion in Europe [17, 35]. In cases where parents did not provide exact salary amounts but a salary range, these salaries are evenly distributed across the corresponding interval analogous to the German Microcensus [36]. For income categories such as a range from €2,000–2,500, we assume the mean value of €2,125, but take distribution-based random values within this interval. Missing values for net household income are imputed through regression imputation [16]. To estimate missing values for income, data on the age of parents, their levels of education and occupational status, as well as regional information of the German Federal Statistical Office on mean net household income in the participants’ residential area is used.

2.3 Calculation of the multidimensional SES index and delimitation of socioeconomic groups

The SES index is calculated as a sum of point scores based on the values assigned to the three dimensions of education, occupational status and income. It is used as a household characteristic, which means that all participants in one particular household are assigned the same index.
Socioeconomic status and subjective social status measurement in KiGGS Wave 2

Table 1
Family socioeconomic status in KiGGS Wave 2
(n=7,426 girls, n=7,381 boys)
Source: KiGGS Wave 2 (2014-2017)

| Name of category | Quintile of SES | Lowest point score | Highest point score | Weighted percentage |
|------------------|-----------------|--------------------|---------------------|-------------------|
| Low | 1st quantile | 3.2 | 8.7 | 20.1% |
| Medium | 2nd quantile | 8.8 | 11.3 | 20.1% |
|   | 3rd quantile | 11.4 | 13.7 | 20.5% |
|   | 4th quantile | 13.8 | 16.9 | 19.4% |
| High | 5th quantile | 17.0 | 21.0 | 20.0% |

SES = socioeconomic status

Table 2
Correlation coefficients for the relationship between the SES index score and the education, occupation and income subscores
(n=7,426 girls, n=7,381 Boys)
Source: KiGGS Wave 2 (2014-2017)

| Indicator | (1) | (2) | (3) | (4) | (5) | (6) |
|-----------|-----|-----|-----|-----|-----|-----|
| (1) SES index score | 1.00 |    |     |     |     |     |
| (2) SES quintile | 0.97 | 1.00 |     |     |     |     |
| (3) SES groups | 0.89 | 0.90 | 1.00 |     |     |     |
| (4) SES subscore education | 0.85 | 0.82 | 0.77 | 1.00 |     |     |
| (5) SES subscore occupation | 0.85 | 0.82 | 0.76 | 0.64 | 1.00 |     |
| (6) SES subscore income | 0.83 | 0.82 | 0.74 | 0.52 | 0.54 | 1.00 |

SES = socioeconomic status

affluent families, with a broadly defined medium segment comprising the other 60% of children and adolescents. Table 1 shows the categories, cut-off points and corresponding share of participants in KiGGS Wave 2. The share of missing values was less than 1.5%.

Table 2 shows the statistical association between the SES index and its three dimensions based on correlation coefficients. The values for the overall SES index correlated with the individual dimensions between r=0.83 and r=0.85. The correlations are comparable to KiGGS Wave 1 [15], as well as to the correlations among adult participants in the German Health Update (GEDA) study [16].

2.4 Operationalisation of subjective social status

In health research and epidemiology, the definition of SES based on ‘objective’ status indicators such as education, occupation and income is more and more often supplemented by subjective status indicators. Whereas objective status indicators assign people to the ‘upper and lower rungs’ of society, subjective status indicators capture how people themselves view their social standing and the status group that they feel they belong to [18-20]. Objectively assigned and subjectively perceived status do not always have to coincide.

The additional collection of data on subjective social status (SSS) in epidemiologic studies adds a subjective dimension to the measurement of socioeconomic status and grants the individual perception of living conditions and relative social standing a role in health opportunities and disease risks. In recent years, evidence has been accumulated suggesting an independent effect of SSS on health
and disease above and beyond the effects of objective SES [18, 19, 37-39]. The effect is thereby visible not only at adult age, but already at adolescent age [21-23, 40]. For example, it is assumed that perceptions of relative disadvantage can evoke feelings of shame, injustice or envy that cause stress and can therefore increase the risk of physical and mental health problems [41-44]. To a certain degree, a person’s subjectively perceived social status is likely to reflect aspects of their socioeconomic situation such as wealth, over-indebtedness or social security, which the traditional indicators of education, occupation and income do not capture.

Adolescence is a phase in life in which young people increasingly make their own experiences with social inequality [21, 45]. The radius of interaction with society and the contact with diverse social groups outside the family increase. Adolescents therefore increasingly compare their social situation to that of others and their perception of social disparities and the advantages and disadvantages in accessing wealth, consumption, education opportunities, power and social recognition grows. Adolescents then increasingly develop their own perception and understanding of their social status and that of their families. Subjective indicators of social status can capture these perceptions, which objective status indicators cannot account for.

In KiGGS Wave 2, SSS was measured using a German version of the MacArthur Scale for children and adolescents. Initially, the MacArthur Scale was developed to record SSS for adults in the US [18]. Recently, the Robert Koch Institute developed a German version of this scale for adults [20, 46]. The instrument uses the image of a ladder with ten rungs that represent society as a visual analogue scale. Respondents mark their subjectively felt position on this ‘social ladder’. Goodman et al. [21] have developed a version for adolescents, as the original instrument asks adults where they see themselves compared to other people from their country regarding levels of education, occupation and income. Adolescents, however, mostly still go to school, have not yet embarked on their career and are not financially independent so their status is defined by the status of their families. The version for adolescents therefore asks where adolescents would position their family on the ladder. For KiGGS Wave 2 the English language scale was translated into German and adapted for use with a German sample. The scale became part of the questionnaires for the 11 to 17 age group. The German question wording can be found in Annex Table 3.

Table 3 shows the mean MacArthur Scale values of responses in KiGGS Wave 2. The self-assessments of 11 to 17 year-olds show that the girls and boys in this age group on average position themselves slightly above the middle of the ten-rung scale. Girls mark a mean value of 6.2 and boys 6.3. The mean value for girls in the 11 to 13 age group are higher than in the 14 to 17 age group (p=0.041), a difference not observable for boys (p=0.672). More pro-

| Objective SES | Girls (M (SD)) | Boys (M (SD)) |
|---------------|----------------|---------------|
| Low           | 5.52 (1.52)    | 5.41 (1.47)   |
| Medium        | 6.24 (1.24)    | 6.32 (1.26)   |
| High          | 7.04 (1.16)    | 7.16 (1.12)   |

M = mean; SD = standard deviation; SES = socioeconomic status
bad general health is 4.5% for children in the lowest socioeconomic group, whereas it is 2.6% for those from medium and 0.9% for those from high socioeconomic backgrounds. For girls in the 11 to 17 age group, health differences related to SES are 8.8% for the low, 5.3% for the medium and 1.2% for the high socioeconomic group. Similar SES-related differences in general health are observed for boys in both age groups (Figure 2).

When the age of children and adolescents is statistically controlled for in logistic regression models, the results indicate an approximately six times increased odds of only fair to very bad general health for children and adolescents from low SES families compared to those from high SES families. For children and adolescents from the medium socioeconomic group, the odds is about three times as high compared to those from a high socioeconomic group (Table 5). However, in the high socioeconomic group, the prevalence of fair to very bad general health is very low.

3. Links between socioeconomic status, subjective social status and general health

According to the parent ratings, 2.7% of 3 to 10 year-old and 5.4% of 11 to 17 year-old girls have fair to very bad general health. The figures for boys are 4.2% of 3 to 10 year-olds and 5.0% of 11 to 17 year-olds (Figure 1) [30]. When controlled for age, no statistically significant differences are discernible between girls and boys.

When comparing children and adolescents against the backdrop of the socioeconomic status of their families, clear differences in general health become evident. Children and adolescents from low SES family backgrounds are more likely to have only fair to very bad general health. The share of girls in the 3 to 10 age group with fair to very bad general health is 4.5% for children in the lowest socioeconomic group, whereas it is 2.6% for those from medium and 0.9% for those from high socioeconomic backgrounds. For girls in the 11 to 17 age group, health differences related to SES are 8.8% for the low, 5.3% for the medium and 1.2% for the high socioeconomic group. Similar SES-related differences in general health are observed for boys in both age groups (Figure 2).

When the age of children and adolescents is statistically controlled for in logistic regression models, the results indicate an approximately six times increased odds of only fair to very bad general health for children and adolescents from low SES families compared to those from high SES families. For children and adolescents from the medium socioeconomic group, the odds is about three times as high compared to those from a high socioeconomic group (Table 5). However, in the high socioeconomic group, the prevalence of fair to very bad general health is very low.

| Indicator                | Girls (SSS) | Boys (SSS) |
|--------------------------|-------------|------------|
| SES index score          | 0.39        | 0.42       |
| SES subscore education   | 0.30        | 0.29       |
| SES subscore occupation  | 0.28        | 0.32       |
| SES subscore income      | 0.36        | 0.42       |

SES = socioeconomic status (objective); SSS = subjective social status

Table 4: Correlation coefficients for the relationship between subjective social status and objective indicators of socioeconomic status in the 11 to 17 age group (n=3,105 girls, n=2,822 boys)

Source: KiGGS Wave 2 (2014-2017)
Socioeconomic status and subjective social status measurement in KiGGS Wave 2

The SES index and SSS each are individually associated with the general health of children and adolescents.

Subjective social status (SSS) too shows a close association with the general health of children and adolescents. The prevalence of only fair to very bad general health for 11 to 17 year-old girls and boys with low SSS (scale values of 1–4) is also clearly higher than the prevalence for those with high SSS (scale values of 7–10, Figure 3). Controlled for age, the odds of fair to very bad general health in the low SSS group is five and a half times higher than in the high SSS group. In the medium SSS group, the odds is about two and half times higher (Table 6).

Figure 4 shows the odds ratios for fair to very bad general health by objective and subjective status. SES and SSS are simultaneously added to the regression models. As the results show, both a low SES and a low SSS remain independently associated with fair to very bad general health.

| SES | Low SES | OR (95%-CI) | p-value | Medium SES | OR (95%-CI) | p-value | High SES |
|-----|---------|-------------|---------|------------|-------------|---------|----------|
| Girls* | | | | | | | |
| 3 – 10 | | 5.14 (2.19-12.09) | 0.00 | 2.88 (1.35-6.13) | 0.01 | Ref. |
| 11 – 17 | | 7.15 (3.35-15.25) | 0.00 | 4.27 (1.98-9.21) | 0.00 | Ref. |
| Total | | 6.28 (3.71-10.62) | 0.00 | 3.61 (2.13-6.14) | 0.00 | Ref. |
| Boys* | | | | | | | |
| 3 – 10 | | 5.97 (3.10-11.50) | 0.00 | 3.00 (1.72-5.25) | 0.00 | Ref. |
| 11 – 17 | | 5.17 (2.17-12.30) | 0.00 | 2.34 (1.09-5.02) | 0.03 | Ref. |
| Total | | 5.57 (3.18-9.76) | 0.00 | 2.65 (1.60-4.42) | 0.00 | Ref. |
| Total* | | | | | | | |
| 3 – 10 | | 5.68 (3.22-10.02) | 0.00 | 2.96 (1.88-4.66) | 0.00 | Ref. |
| 11 – 17 | | 5.89 (3.25-10.69) | 0.00 | 3.05 (1.77-5.24) | 0.00 | Ref. |
| Total | | 5.83 (3.87-8.78) | 0.00 | 3.01 (2.10-4.32) | 0.00 | Ref. |

SES = socioeconomic status; OR = odds ratio; CI = confidence interval; Ref. = reference group
* adjusted for age; ** adjusted for age and gender
after mutual adjustment. The associations are slightly weaker than when considering them separately (Table 5 and Table 6). Although the two status indicators correlated with one another, both show independent associations with the general health of girls and boys in the 11 to 17 age group.

4. Discussion

Health monitoring at the Robert Koch Institute regularly provides data on the health of children, adolescents and adults and has in the past few years contributed significantly to improving the data basis for epidemiologic research and health reporting in Germany. This also applies to social epidemiological research and its focus on the relationship between socioeconomic status and health [47]. The conceptual development and use of an index that serves to measure socioeconomic status (SES index) across all health surveys, are therefore important elements considering the future challenges for the analysis of trends over time and longitudinal analyses on the effects of socioeconomic status on health and the course of diseases. To increase the index’s international comparability, the measurement of socioeconomic variables and their categorisation apply internationally established methods and instruments such as the CASMIN classification for school education and occupational qualifications [32] or the ISEI index for occupational status [33]. Using equivalised disposable income instead of household net income takes account of national and international recommendations to consider household size and member structure when assessing the income level of study participants [35].

Data on education, occupation and income was converted to metric scales. By dividing the SES index into quintiles, this allows for a distribution-based delimitation of socioeconomic groups. For health monitoring, the groups were split into high and low (20%, i.e. first and fifth quintile) and the medium status group (second to fourth quintile) comprising of 60% of the population. An

Table 6

|                      | Girls (11-17) | Boys (11-17) | Total (11-17) |
|----------------------|---------------|--------------|---------------|
|                      | OR (95%-CI) p-value | OR (95%-CI) p-value | OR (95%-CI) p-value |
| Low SSS (1-4)        | 4.99 (2.30-10.87) 0.00 | 6.02 (2.84-12.78) 0.00 | 5.57 (3.15-9.85) 0.00 |
| Medium SSS (5-6)     | 3.55 (2.07-6.07) 0.00 | 1.86 (1.12-3.11) 0.02 | 2.57 (1.74-3.79) 0.00 |
| High SSS (7-10)      | Ref.           | Ref.         | Ref.          |

SSS = subjective social status; OR = odds ratio; CI = confidence interval; Ref. = reference group
* adjusted for age; ** adjusted for age and gender
A composite multidimensional SES index is suitable for describing the extent and development of health inequalities. An index based on a clear concept and simple operationalisation through three socioeconomic groups makes an analysis of the relationship between socioeconomic status and health understandable to a broad audience. Analyses based on the SES index therefore fulfil an important function in transferring the results to the realms of politics and practice. On the other hand, SES index-based analyses of health inequalities have only limited explanatory power regarding broader explanations or the definition of specific target groups for interventions. To this end, analyses based on the individual indicators education, occupation and income are more informative. They provide better conclusions for example on material living conditions, social participation or health-relevant attitudes and behaviours [17, 48].
An analysis of subjective social status, which was first surveyed in KiGGS Wave 2, can provide further insights. In line with international research, the results presented as examples for general health, reveal the clear association between SSS and child and adolescent health [21-23, 40, 49]. This relationship remains evident even when the SES index is also taken into account in multivariate analysis. This points to the need to assess SSS in addition to objective SES indicators in surveys on child and adolescent health. This would create a perspective on aspects of the socioeconomic conditions of families that a mere look at objective indicators such as education, occupation and income cannot provide.

Income says nothing about whether a family is over-indebted, which is, nonetheless, a dimension of socioeconomic status. However, children and adolescents from these families probably experience the financial difficulties daily, and this then will reflect in their subjective perception of the family’s social status. Moreover, this can make the beliefs, values and attitudes of adolescents about social inequalities and the socioeconomic situation of their families come into effect. For example, children and adolescents may give greater weight to particular socioeconomic factors than others, if they consider them to be particularly important for the living conditions of their families. Surveys limited to traditional objective SES indicators are blind to such subjective factors. Nonetheless, these subjective factors may be related to feelings of shame, injustice, envy or a sense of inferiority, disadvantage and deprivation that can impact on health and well-being. Hence, the concept of SSS opens up a number of new perspectives for advances in research into health inequality and is a promising extension to objective SES indicators in epidemiological studies.
References

1. Starfield B, Riley AW, Witt WP et al. (2002) Social class gradients in health during adolescence. J Epidemiol Community Health 56(5):354-361

2. West P (1997) Health inequalities in the early years: is there equalisation in youth? Soc Sci Med 44(6):833-858

3. Richter M (2005) Gesundheit und Gesundheitsverhalten im Jugendalter: Der Einfluss sozialer Ungleichheit. VS Verlag für Sozialwissenschaften, Wiesbaden

4. Lampert T, Richter M (2009) Gesundheitliche Ungleichheit bei Kindern und Jugendlichen. In: Richter M, Hurrelmann K (Eds) Gesundheitliche Ungleichheit Grundlagen, Probleme, Perspektiven. VS Verlag für Sozialwissenschaften, Wiesbaden, P. 209-230

5. Elgar FJ, Pfortner TK, Moor I et al. (2015) Socioeconomic inequalities in adolescent health 2002-2010: a time-series analysis of 34 countries participating in the Health Behaviour in School-aged Children study. Lancet 385(9982):2088-2095

6. Lampert T, Hoebel J, Kuntz B et al. (2017) Gesundheitliche Ungleichheit in verschiedenen Lebensphasen. Beiträge zur Gesundheitsberichterstattung des Bundes. Gemeinsam getragen von RKI und Destatis, RKI, Berlin. http://edoc.rki.de/documents/rki_fy/releGa3LoQGE/GE/PDF/25x1_YIGIDo6xzw.pdf (As at 24.01.2018)

7. Lampert T (2011) Soziale Ungleichheit und Gesundheit im Kindes- und Jugendalter. Paediatrie up2date 6(2):119-142

8. Lampert T, Hagen C, Heizmann B (2010) Gesundheitliche Ungleichheit bei Kindern und Jugendlichen in Deutschland. In: Robert Koch-Institut (Ed) Beiträge zur Gesundheitsberichterstattung des Bundes. RKI, Berlin. http://edoc.rki.de/documents/rki_fy/reQXTR7OSGFyj/PDF/29llS_lUWVs.pdf (As at 24.01.2018)

9. Lampert T, Kuntz B, KiGGS Study Group (2015) Gesund aufwachsen - Welche Bedeutung kommt dem sozialen Status zu? GBE kompakt 6(1). http://edoc.rki.de/series/gbe-kompakt/2015-1/PDF/1.pdf (As at 24.01.2018)

10. Hölling H, Schlack R, Petermann F et al. (2014) Psychische Auffälligkeiten und psychosoziale Beeinträchtigungen bei Kindern und Jugendlichen im Alter von 3 bis 17 Jahren in Deutschland – Prävalenz und zeitliche Trends zu 2 Erhebungszeitpunkten (2003–2006 und 2009–2012). Ergebnisse der KiGGS-Studie – Erste Folgebefragung (KiGGS Welle 1). Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz 57(7):807-819. http://edoc.rki.de/oa/articles/regwG5x8bbfM/PDF/23snYHyPgg-8SpO.pdf (As at 24.01.2018)

11. Schlack R, Mauz E, Hebebrand J et al. (2014) Hat die Häufigkeit elternberichteter Diagnosen einer Aufmerksamkeitsdefizit-/Hyperaktivitätsstörung (ADHS) in Deutschland zwischen 2003–2006 und 2009–2012 zugenommen? Ergebnisse der KiGGS-Studie – Erste Folgebefragung (KiGGS Welle 1). Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz 57(7):820-929. https://edoc.rki.de/handle/176904/1839 (As at 24.01.2018)

12. Rattay P, Starker A, Domanska O et al. (2014) Trends in the Inanspruchnahme ambulant-ärztlicher Leistungen im Kindes- und Jugendalter. Ergebnisse der KiGGS-Studie – Ein Vergleich von Basiserhebung und erster Folgebefragung (KiGGS Welle 1). Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz 57(7):878-891. http://edoc.rki.de/oa/articles/reGzZKvQ6fW/PDF/20S45baVD-QPGs.pdf (As at 24.01.2018)

13. Kuntz B, Giese L, Varnaccia G et al. (2017) Soziale Determinanten des täglichen Frühstücksverzehrs bei Schülern in Deutschland. Ergebnisse aus KiGGS Welle 1. Prävention und Gesundheitsförderung 13:53-62

14. Kuntz B, Lampert T (2016) Smoking and passive smoke exposure among adolescents in Germany. Prevalence, trends over time, and differences between social groups. Dtsch Arztebl Int 113(3):23-30

15. Lampert T, Müters S, Stolzenberg H et al. (2014) Messung des sozioökonomischen Status in der KiGGS-Studie. Erste Folgebefragung (KiGGS Welle 1). Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz 57(7):762-770. http://edoc.rki.de/oa/articles/reXPlrLy4LMJM/PDF/28BoRAY-rgXdWs.pdf (As at 10.02.2018)

16. Lampert T, Kroll LE, Müters S et al. (2013) Messung des sozioökonomischen Status in der Studie „Gesundheit in Deutschland aktuell“ (GEDA). Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz 56(1):131-143

17. Lampert T, Kroll LE (2009) Die Messung des sozioökonomischen Status in sozialepidemiologischen Studien. In: Richter M, Hurrelmann K (Eds) Gesundheitliche Ungleichheit Grundlagen, Probleme, Perspektiven 2, aktualisierte Auflage. VS Verlag für Sozialwissenschaften, Wiesbaden, P. 309-334
18. Adler NE, Epel ES, Castellazzo G et al. (2000) Relationship of subjective and objective social status with psychological and physiological functioning: preliminary data in healthy women. Health Psychol 19(6):586–592

19. Hegar R, Mielck A (2010) „Subjektiver sozialer Status“ – Stellenwert für die Untersuchung und Verringerung von gesundheitlicher Ungleichheit. Prävention und Gesundheitsförderung 54(4):389–400

20. Hoebel J, Mütters S, Kuntz B et al. (2015) Messung des subjektiven sozialen Status in der Gesundheitsforschung mit einer deutschen Version der MacArthur Scale. Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz 58(7):749-757

21. Goodman E, Adler NE, Kawachi I et al. (2001) Adolescents' perceptions of social status: development and evaluation of a new indicator. Pediatrics 108(2):E31

22. Goodman E, Huang B, Schafer-Kalkhoff T et al. (2007) Perceived socioeconomic status: a new type of identity that influences adolescents' self-rated health. J Adolesc Health 41(5):479-487

23. Elgar F, McKinnon B, Torsheim T et al. (2016) Patterns of socioeconomic inequality in adolescent health differ according to the measure of socioeconomic position. Social indicators research 127(3):1169–1180

24. Hölling H, Schlack R, Kamtsiuris P et al. (2012) Die KiGGS-Studie. Bundesweit repräsentative Längs- und Querschnittsstudie zur Gesundheit von Kindern und Jugendlichen im Rahmen des Gesundheitsmonitorings am Robert Koch-Institut. Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz 55(6-7):836-842

25. Kurth BM, Kamtsiuris P, Hölling H et al. (2016) Strategien des Robert Koch-Instituts zum Monitoring der Gesundheit von in Deutschland lebenden Kindern und Jugendlichen. Kinder- und Jugendmedizin 16(3):1176 -1173

26. Lange M, Butschalowsky HG, Jentsch F et al. (2014) Die erste KiGGS-Folgebefragung (KiGGS Welle 1). Studiendurchführung, Stichprobendesign und Response. Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz 57(1):747-761. http://edoc.rki.de/oa/articles/reyweWnR6XrSw/PDF/20B6fVTP-Fldw.pdf (As at 24.01.2018)

27. Kamtsiuris P, Lange M, Schaffrath Rosario A (2009) Der Kinder- und Jugendgesundheitssurvey (KiGGS): Stichprobendesign, Response und Nonresponse-Analyse. Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz 50(5-6):547-556.

http://edoc.rki.de/oa/articles/reeMwKaQj7IM/PDF/2428sbCK-oM3ys.pdf (As at 24.01.2018)

28. Mauz E, Gößwald A, Kamtsiuris P et al. (2017) New data for action. Data collection for KiGGS Wave 2 has been completed. Journal of Health Monitoring 2(S3):2-27.

29. Hoffmann R, Lange M, Butschalowsky H et al. (2018) KiGGS Wave 2 cross-sectional study – participant acquisition, response rates and representativeness. Journal of Health Monitoring 3(1):78-91.

30. Poethko-Müller C, Kuntz B, Lampert T et al. (2018) Results of the cross-sectional KiGGS Wave 2 study and trends. Journal of Health Monitoring 3(1):8-14.

31. De Bruin A, Picavet HSJ, Nosikov A (Eds) (1996) Health interview surveys: towards harmonization of methods and instruments. WHO Regional Publications. European Series No. 58. WHO, Copenhagen

32. Brauns H, Scherer S, Steinmann S (2003) The CASMIN Educational Classification in International Comparative Research. In: Hoffmeyer-Zlotnik JHP, Wolf C (Eds) Advances in Cross-National Comparison. Kluwer, New York, P. 221-244

33. Ganzeboom HGB, Treimann DJ (2003) Three Internationally Standardized Measures for Comparative Research on Occupational Status. In: Hoffmeyer-Zlotnik JHP, Wolf C (Eds) Advances in Cross-National Comparison. Kluwer, New York, P. 159-193

34. International Labour Office (2012) International Standard Classification of Occupations, ISCO-08. Volume 1: Structure, group definitions and correspondence tables. International Labour Organization, Geneva

35. Bundesministerium für Arbeit und Soziales (2017) Lebenslagen in Deutschland. Der 5. Armuts- und Reichtumsbericht der Bundesregierung. BMAS, Berlin

36. Stauder J, Hüning W (2004) Die Messung von Äquivalenzeinkommen und Armutsquoten auf der Basis des Mikrozensus. Statistische Analysen und Studien Nordrhein-Westfalen Bd. 13:9-31

37. Euteneuer F (2014) Subjective social status and health. Curr Opin Psychiatry 27(5):337–343
38. Tang KL, Rashid R, Godley J et al. (2016) Association between subjective social status and cardiovascular disease and cardiovascular risk factors: a systematic review and meta-analysis. BMJ Open 6:e010137

39. Cundiff JM, Matthews KA (2017) Is subjective social status a unique correlate of physical health? A meta-analysis. Health Psychol 36(12):1109-1125

40. Quon EC, McGrath JJ (2014) Subjective socioeconomic status and adolescent health: a meta-analysis. Health Psychol 33(5):433-447

41. Wilkinson RG (1999) Health, hierarchy, and social anxiety. In: Adler NE, Marmot M, McEwen B et al. (Eds) Annals of the New York Academy of Sciences, Vol 896 Socioeconomic status and health in industrial nations: social, psychological, and biological pathways. New York Academy of Sciences, New York, P. 48–63

42. Cundiff JM, Smith TW, Uchino BN et al. (2013) Subjective social status: construct validity and associations with psychosocial vulnerability and self-rated health. Int J Behav Med 20(1):148–158

43. Goodman E, Adler NE, Daniels SR et al. (2003) Impact of objective and subjective social status on obesity in a biracial cohort of adolescents. Obes Res 11(8):1018-1026

44. McEwen BS, Gianaros PJ (2010) Central role of the brain in stress and adaptation: links to socioeconomic status, health, and disease. Ann N Y Acad Sci 1186:190-222

45. Hurrelmann K, Quenzel G (2012) Lebensphase Jugend: Eine Einführung in die sozialwissenschaftliche Jugendforschung. Beltz Juventa, Weinheim/München

46. Hoebel J, Maske UE, Zeeb H et al. (2017) Social Inequalities and Depressive Symptoms in Adults: The Role of Objective and Subjective Socioeconomic Status. PLoS One 12(1):e0169764

47. Müters S, Lampert T (2017) Datengrundlagen für gesundheitssoziologische und sozialepidemiologische Analysen. In: Jungbauer-Gans M, Kriwy P (Eds) Handbuch Gesundheitssoziologie. Springer, P. 1-23

48. Jöckel K-H, Babitsch B, Bellach B-M et al. (1998) Messung und Quantifizierung soziodemographischer Merkmale in epidemiologischen Studien. RKI-Schriften 11/1998:7-38

49. Pálma K, Bettina P, Eszter K (2014) Mental health of youth in light of objective and subjective social status. Tarsadalomkutatas 32(2):85-98
### Annex Table 1 (in German)

**Questions on the operationalisation of socioeconomic status in KiGGS Wave 2 – parent questionnaire**

Source: KiGGS Wave 2 (2014-2017)

| Bereich | Frage | Antwortkategorien |
|---------|-------|-------------------|
| **Bildung** | Welchen höchsten allgemeinbildenden Schulabschluss haben Sie? | Noch keinen Abschluss (noch Schüler)  
Abschluss nach höchstens 7 Jahren Schulbesuch  
Haupt-/Volksschule  
Realschule/Mittlere Reife/Mittlerer Schulabschluss (MSA)/Polytechnische Oberschule (POS)  
Abitur, allgemeine oder fachgebundene Hochschulreife, erweiterte Oberschule (EOS), Fachhochschulreife/Fachhochschule  
Anderer Schulabschluss (z. B. im Ausland erworben) |
| | Welchen höchsten beruflichen Abschluss haben Sie? | Keinen Abschluss, noch in beruflicher Ausbildung, z. B. Student/in, AZUBI, Berufsvorbereitungsjahr, Praktikant/in  
Keinen Berufsabschluss und nicht in Ausbildung  
Lehre, also beruflich-betriebliche Ausbildung  
Ausbildung an Berufsfachschule, Handelsschule, also beruflich-schulische Ausbildung  
Fachschule, z. B. Meister-, Technikerschule, Berufs- oder Fachakademie  
Fachhochschule, Ingenieurschule  
Universität oder Hochschule  
Anderen Ausbildungsabschluss (z. B. im Ausland erworben) |
| **Beruf** | Sind Sie derzeit... | ...Vollzeit erwerbstätig  
...Teilzeit erwerbstätig  
...Geringfügig erwerbstätig |
| | Welche berufliche Stellung haben Sie in Ihrer Haupterwerbstätigkeit? Wenn Sie derzeit nicht oder nicht mehr berufstätig sind, nennen Sie bitte die berufliche Stellung, die Sie zuletzt innehatten. | Angestellte/r  
Arbeiter/in  
Beamtein/Beamter (auch Anwärter/in)  
Landwirt/in im Haupterwerb  
Selbstständiger erwerbstätig mit Mitarbeitern  
Selbstständig erwerbstätig ohne Mitarbeiter  
Mithelfende/r Familienangehörige/r (unbezahl)  
Auszubildende/r (auch Praktikant/in, Volontär/in)  
Freiwillige Wehrdienst- oder Bundesfreiwilligendienstleistende/r  
Freiwilliges soziales, ökologisches/kulturelles Jahr  
Noch nie erwerbstätig gewesen |
| **Beruf** | Nehmen Sie eine Führungsaufgabe wahr, d. h. sind Sie Mitarbeiter/innen gegenüber weisungsbefugt, die keine Auszubildenden sind? | Ja, als Führungskraft (mit Entscheidungsbeugnis über Personal, Budget und Strategie)  
Ja, als Aufsichtskraft (Anleiten und Beaufsichtigen von Personal, Verteilen und Kontrollieren von Arbeit)  
Nein |
## Annex Table 2 (in German)

**Basis to calculate the SES index in KiGGS Wave 2**

Source: KiGGS Wave 2 (2014-2017)

| Bereich       | Frage                                                                 | Antwortkategorien                                                                 |
|---------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| **Einkommen** | **Wie hoch ist in etwa das monatliche Netto-Einkommen Ihres Haushalts insgesamt?** | **Betrag als offene Angabe in EURO**                                               |
|               | **Bitte zählen Sie die monatlichen Einkommen aller Haushaltsmitglieder (einschließlich Elterngefühl, Kindergeld usw.) nach Abzug von Steuern und Sozialabgaben zusammen.** | **(Bei Verweigerung) Einkommen in Kategorien erfassen**                          |
|               | **Wie viele Personen leben ständig in Ihrem Haushalt, Sie selbst mit eingerechnet?** | **Anzahl der Personen**                                                           |
|               | **Wie viele Personen in Ihrem Haushalt sind jünger als 14 Jahre?** | **Anzahl der Personen unter 14 Jahren**                                          |

| Punkte von bis unter | Bildung Schulische und berufliche Qualifikation nach CASMIN-Klassifikation | Beruf Berufliche Stellung nach EHIS (Berufl. Stellung, Führungsaufgaben) | Einkommen Nettoäquivalenzeinkommen |
|----------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------|
|                      |                                                                               |                                                                        |                                  |
| 1,0                  | 1a (Kein schulischer Abschluss und kein beruflicher Abschluss) 1,0 Pkt.      | Landwirt im Haupterwerb: 1,0 Pkt.                                       | 78 EUR – 609 EUR: 1,0 Pkt.        |
| 1,5                  | 1b (Abschluss nach höchstens 7 Jahren Schulbesuch/Haupt-/Volksschule und kein beruflicher Abschluss) 1,7 Pkt. | –                                                                       | 610 EUR – 821 EUR: 1,5 Pkt.       |
| 2,0                  | 2b (Realschule/Mittlere Reife/Mittlerer Schulabschluss/Polytechnische Oberschule und kein beruflicher Abschluss) 2,8 Pkt. | Arbeiter o. Führungs-/Aufsichtstätigkeit: 1,9 Pkt.                      | 822 EUR – 960 EUR: 2,0 Pkt.       |
| 2,5                  | 1c (Kein Abschluss von Realschule/Mittlere Reife/ Mittlerer Schulabschluss/Polytechnische Oberschule und abgeschlossene Lehre, also berufliche-betriebliche Ausbildung) 3,0 Pkt. | Arbeiter o. n. A.: 2,0 Pkt.                                             |                                  |
| 3,0                  | 2a (Realschule/Mittlere Reife/Mittlerer Schulabschluss/Polytechnische Oberschule und abgeschlossene Lehre, also berufl.-betriebl. Ausbildung) 3,6 Pkt. | Arbeiter Aufsichtskraft/ Führungskraft: 2,7 Pkt.                       | 961 EUR – 1.091 EUR: 2,5 Pkt.     |
| 3,5                  | 2c-gen (Abitur, allgemeine/fachgebundene Hochschulreife, Erweiterte Oberschule, Fachhochschulreife/Fachoberschule und kein beruflicher Abschluss) 3,7 Pkt. | Sonstige: 3,8 Pkt.                                                      | 1.092 EUR – 1.221 EUR: 3,0 Pkt.   |
|                      |                                                                             |                                                                        |                                  |
| 4,0                  |                                                                             |                                                                        | 1.222 EUR – 1.344 EUR: 3,5 Pkt.   |

**Annex Table 1 continued**

**Socioeconomic status and subjective social status measurement in KiGGS Wave 2**

---

**Note:**

- **SES (Socioeconomic Status):**
  - **Schulische und berufliche Qualifikation:**
    - CASMIN-Klassifikation
    - EHIS (Berufliche Stellung, Führungsaufgaben)
  - **Einkommen:**
    - Nettoäquivalenzeinkommen

---

**Source:**

KiGGS Wave 2 (2014-2017)
### Annex Table 3 (in German)

Questions to operationalise subjective social status in KiGGS Wave 2 – questionnaire for children and adolescents aged 11 to 17

Source: KiGGS Wave 2 (2014-2017)

| Bereich               | Frage                                                                 | Antwortkategorien |
|-----------------------|-----------------------------------------------------------------------|-------------------|
| Subjektiver           | Wie siehst du die Situation deiner Familie?                          | [Bild einer Leiter mit 10 Sprossen, die den Werten 1–10 zugeordnet werden] |
| Sozialstatus          | Stelle dir bitte vor, dass diese Leiter den Aufbau der Gesellschaft in Deutschland darstellt. |                   |
|                       | Ganz oben stehen die Menschen mit dem meisten Geld, der höchsten Bildung und den besten Jobs. |                   |
|                       | Ganz unten stehen die Menschen mit dem wenigsten Geld, der niedrigsten Bildung und den schlechtesten Jobs oder ohne Job. |                   |
|                       | Nun denke an deine Familie. Was denkst du, auf welcher Sprosse würde deine Familie stehen? Bitte kreuze einen Kreis neben der Leiter an. |                   |

### Table 3: Socioeconomic status and subjective social status measurement in KiGGS Wave 2

| Punkte von | Punkte bis unter | Schulische und berufliche Qualifikation nach CASMIN-Klassifikation | Bildung Berufliche Stellung nach EHIS (Berufl. Stellung, Führungsaufgaben) | Einkommen Nettoäquivalenzeinkommen |
|------------|------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------|
| 4,5        | 5,0              | 2c-voc (Abitur, allg./fachgebundene Hochschulreife, Erweiterte Oberschule, Fachhochschulreife/Fachoberschule und beruflicher Abschluss) 4,8 Pkt. | Angestellter o. Führungsaufs.-Aufsichtsleiter: 4,4 Pkt. | 1.455 EUR – 1.600 EUR: 4,5 Pkt. |
| 5,0        | 5,5              | –                                                                | Angestellter o. n. A.: 4,7 Pkt.                                           |                                   |
| 5,5        | 6,0              | –                                                                | Selbstständig ohne Mitarbeiter: 5,1 Pkt.                                  | 1.601 EUR – 1.762 EUR: 5,0 Pkt.   |
| 6,0        | 6,5              | 3a (Abschluss Fachhochschule, Ingenieurschule) 6,1 Pkt.          | Angestellter Führungskraft: 6,1 Pkt.                                     | 1.972 EUR – 2.260 EUR: 6,0 Pkt.   |
| 6,5        | 7,0              | –                                                                | Selbstständig mit Mitarbeitern: 5,5 Pkt.                                  | 2.261 EUR – 2.833 EUR: 6,5 Pkt.   |
| 7,0        | 3b (Abschluss Universität oder Hochschule) 7,0 Pkt.              | Beamte (alle Gruppen) 7,0 Pkt.                                         | 2.834 EUR u. m.: 7,0 Pkt.                                                  |

CASMIN = Comparative Analyses of Social Mobility in Industrial Nations; o. = ohne; o. n. A. = ohne nähere Angabe; u. m. = und mehr; Pkt. = Punkte; EUR = Euro
