



Age Differences in Material Deprivation in Finland: How do Consensus and Prevalence-Based Weighting Approaches Change the Picture?

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Abstract

While material deprivation is often used to measure poverty, analyses focusing on the measurement of material deprivation are scarce. This study provides new information on material deprivation by analyzing how differences in the considerations of necessities and possession of deprivation items among all respondents and within population subgroups affect group-level differences in material deprivation in Finland. In line with many previous studies on material deprivation, this study focused on age groups. There is a significant age gradient regarding considerations of necessities, possession, and deprivation of many deprivation items. On average, younger adults experience material deprivation more often than older adults do. This study considers the differences in the considerations of necessities and possession of deprivation items using different weighting approaches. The study found that these differences are not largely transmitted to deprivation indices. Two causes of this finding were found: (1) individuals, on average, are not deprived of items in which there are differences between age groups regarding consensus and prevalence and (2) in those items in which deprivation is high, the consensus and the prevalence rates are often lower compared to other items. The results provide new information on which factors are important when using weighting approaches to measure material deprivation.

Keywords Material deprivation · Poverty measurement · Preferences · Age · Finland

1 Introduction

It has been widely agreed that poverty is a multidimensional concept (Nolan and Whelan 2007; 2010; Atkinson, Cantillon, Marlier and Nolan 2002). Nonetheless, in most cases, poverty is analyzed using monetary measures of poverty, such as the well-known at-risk-of-poverty indicator. As the ability of this indicator to identify households in poverty has

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been questioned (see Penne et al. (2016) for discussion), there is also a need for non-monetary indicators of poverty, such as material deprivation. Material deprivation refers to a lack of material goods, financial difficulties, and inability to live a decent life; for this reason, material deprivation can measure living standards more directly than income (Boarini and D'Ercole 2006)

Material deprivation plays an important role in the measurement of poverty; for instance, at the European Union (EU) level (e.g. Nolan and Whelan 2011). The EU is using material deprivation as one of the key indicators of the poverty and social exclusion target of the EU2020 strategy.¹ One of the reasons the EU also uses a material deprivation indicator is that it illustrates the differences in the standard of living between the member states more accurately than the poverty measure based on national median incomes (Guio 2005). The material deprivation indicator used by the EU is based on a selection of items considered necessary for people to have an “acceptable” standard of living (Nolan and Whelan 2011).²

Despite material deprivation being a widely recognized and used approach for measuring poverty, there are many more studies related to income-based measures. It has been argued that the measurement of material deprivation should receive more attention (Hick 2014). Since the role of measures of material deprivation seems to be increasing, it is vital to gain more information on how sensitive they are for different measurement approaches. Typically, material deprivation is analyzed as an index of various so-called deprivation items. In the standard practice, each item has equal importance. Treating each item equally can be difficult to justify since individuals and population subgroups have been found to have rather different opinions on whether a specific item should be considered a necessity (e.g. Van den Bosch 1998; McKay 2004; Mäkinen 2018). Additionally, some items are likely to be more common than others, as households may prioritize different items. Yet, there have been arguments for taking into account these differences by means of weighted deprivation indices (e.g. Halleröd 1995; Guio 2009; Gutfleisch and Andress 2020). When using weighting, the relative importance of different items can vary on the index. Studies comparing different weighting approaches are, however, scarce; especially regarding within-country analyses (for studies analyzing the effects on between-country differences see e.g. Guio 2009; Nolan and Whelan 2011). More information is needed about how different weighting approaches affect the picture of material deprivation.

This study analyzed material deprivation in Finland. The dataset ($n = 1\,739$) was based on a postal survey from 2015. The differences in the considerations of necessities and possession of items among survey respondents were also studied and, by utilizing item-specific weights, the study investigated how these differences affect the picture of material deprivation. Weights based on considerations of necessities and possession of deprivation items both among all respondents and within population subgroups were used. The focus of the study was on age groups. Overall, aging during the life course and societies and groups

¹ The target is to have 20 million less people living in poverty or social exclusion in 2020 compared to 2008 (European Commission 2010).

² According to the indicator, a household is defined as living in severe material deprivation if it cannot afford four out of nine deprivation items. The deprivation items are (1) ability to face unexpected expenses, (2) one week annual holiday away from home, (3) ability to pay for arrears (mortgage or rent, utility bills, or hire purchase instalments), (4) a meal with meat, chicken, or fish every second day, (5) ability to keep the home adequately warm, (6) a washing machine, (7) a color TV, (8) a telephone, and (9) a personal car. Based on this measure, 2.8 per cent of individuals in Finland lived in material deprivation in 2015 (Eurostat 2020).

being stratified by age are important social processes (Riley 1987). Moreover, previous research has found that consumption patterns (e.g. Purhonen, Gronow and Rahkonen 2011; Ahonen and Vaittinen 2015), consumption-related attitudes (e.g. Kuoppamäki, Wilska and Taipale 2017), the association between income and financial satisfaction (Hansen, Slagsvold and Moum 2008), and perceptions of necessity vary by age (e.g. Pantazis, Gordon and Townsend 2006; Mack et al. 2013). These findings imply that the standard (unweighted) approach considering all items equally important can be problematic when analyzing material deprivation by age. Even though there are studies that have weighted material deprivation indices based on age differences in the possession of the deprivation items (see e.g. Halleröd, Larsson, Gordon and Ritakallio 2006), this study provides new information as it compared different weighting approaches. In addition, the findings of this study will increase our understanding of the age differences in terms of material deprivation.

The results of this study highlight interesting patterns. While there is a significant age gradient in terms of the consensus and prevalence rates of various deprivation items, these differences are largely not transmitted to the weighted deprivation indices and differences between age groups. Two reasons for this result were found: (1) individuals do not, on average, experience deprivation regarding specific items in which there are large differences in the consensus and/or prevalence rates, and (2) in terms of those items with high deprivation rates, the consensus and prevalence rates are often lower compared to other items. This study provides new information on the measurement of material deprivation and suggests that treating deprivation items equally is likely to be a rather robust approach with respect to within-country differences, at least in the context of a country with low material deprivation levels.

2 Measurement of Material Deprivation

Measurements of material deprivation have a long history (Townsend 1979; Mack and Lansley 1985). These indicators are typically based on survey questions on whether an individual or a household cannot afford various so-called deprivation items. In other words, the calculations of material deprivation are based on subjective considerations of enforced lack of different kinds of deprivation items. It can be argued that a material deprivation indicator might be a better proxy for a household's resources since income-related measures do not typically take into account savings, inter-household cash transfers, or public services (Fusco et al. 2011).

A measure for whether an individual or a household experiences material deprivation is usually calculated using a deprivation index, which is a sum of different deprivation items that are not afforded. Usually, these indexes include a list of dichotomically coded variables (value 1 indicating deprivation) that make it possible to calculate a summary score for each individual or household. Finally, a dichotomic measure of material deprivation ("poor" and "non-poor") is categorized based on the summary score. However, there are no clear criteria to set the threshold for distinguishing the "poor" from the "non-poor" (Guio 2009). Another limitation of this kind of deprivation score approach is that the closer an individual's consumption preferences correspond to the list of items chosen, the less likely that person will appear to be deprived (Halleröd 1995).

There are different ways to select the deprivation items used. First, the items can be selected based on their prevalence in society. This way, the items should represent what is common in a given society and the lack of the items entails the exclusion of the customary

lifestyles (Townsend 1979). Second, the items could be selected consensually based on the public's perceptions of necessity. This approach for selecting the items was made famous by Mack and Lansley (1985), who argued that items become necessities when they are socially perceived as necessary. The item was regarded as necessary when more than half of the respondents perceived so. The Townsendian approach on material deprivation focuses more on the consumption behavior of the citizens, whereas Mack and Lansley have adopted a consensual approach (Piachaud 1987).³ The ability of the consensual approach to reflect the views of the general population has been questioned. Setting the threshold for an item to be a necessity has been claimed to be somewhat arbitrary (Halleröd 1995; Saunders, Naidoo and Griffiths 2007).

As only the majority is needed for items to be necessary in the approach developed by Mack and Lansley (1985), the approach has been described as majoritarian and not fully consensual (Veit-Wilson 1987; Van den Bosch 1998). This study, however, follows a notion that both necessary and less necessary items should be used to reflect the whole distribution of possible standard of living perceptions (Gutfleisch and Andress 2020).

When there is some kind of agreement on what the items to be used in the deprivation index are, the next choice is related to the relative importance of each item. In the typical approach, the items in the index are treated equally. Since this means that the weight for each item is 1, this is described as an unweighted approach. However, in this way, much information on deprivation items is lost since the importance of items varies (e.g. Nolan and Whelan 2007; Ravallion 2011). One possible way to take into account the differences between different items of deprivation indexes is to use weighting (e.g. Tsakoglou and Papadopoulos 2002; Halleröd et al. 2006; Guio 2009). First, it can be argued that the weight of items should reflect their necessity in society. In this approach, the items that are considered necessary by the larger percentage of the population receive greater weight (see also Mack and Lansley 1985; Halleröd 1995; Guio 2009). Second, the items can be weighted according to their prevalence in society (Tsakoglou and Papadopoulos 2002; Guio 2009). The rationale behind this is that the more prevalent the item is in society, the more likely it is for a person who cannot afford it to feel deprived (Guio 2009). The effects of weighting are related to the resemblance of the possession and consensus patterns in the society: if the views of the people are heterogeneous, the weights will vary significantly, making the weighted index different from the unweighted approach (Fusco, Guio and Marlier 2013).

3 Age Differences Related to Material Deprivation

It has been emphasized that the validity of standard material deprivation indicators relies on the condition that there are no significant differences between people from different groups in the perception of necessity (Gordon and Pantazis 1997; Pantazis et al. 2006; Kelly et al. 2012). Several studies have found that this might not be the case because attitudes toward the necessities of life depend on the person's circumstances (e.g. Van den Bosch 1998; Mäkinen 2018). This has led researchers to conclude that consensus on the necessities is not strong (McKay 2004; Mäkinen 2018). This, in reality, means that people in different circumstances find some

³ Another difference between the pioneering studies is that, unlike Townsend (1979), Mack and Lansley (1985) considered poverty as an *enforced* lack of an item.

items more important for the minimum standard of living. The general conclusion seems to be that age is one of the most important factors that shape people's perception of necessity. A study conducted using Finnish data concluded that age is associated with the perception of necessity in 10 out of 23 items, when controlling for gender, poverty status, place of residence, and personal want for the item (Mäkinen 2018). In general, it seems that older people are more likely to regard certain items as necessary compared to younger people (Pantazis et al. 2006; Saunders et al. 2007; Mack et al. 2013; Mäkinen 2018). According to a recent study conducted in the UK, the differences in the perception of necessity between the young and the old age groups have become more marked in the twenty-first century (Mack et al. 2013). The results illustrated by Patsios (2014) using data from the UK also suggest that different age groups hold different views regarding the necessity of items. Several items did not reach the 50% threshold in the survey but were above the threshold either in the older age group or among the working-aged individuals (Patsios 2014).

In addition, the older age groups are more likely to claim that they do not need the item they are lacking (McKay 2004; Halleröd 2006). This is referred to as "adaptive preferences" (a result of a long period of hardship, in which the respondent opts out of the need for certain items as a way to accepting not being able to achieve a certain living standard (Halleröd 2006)). However, Hick (2013) argues that the enforced criterion for lack, which is usually used when studying material deprivation, helps to distinguish between poverty and preferences. In any case, it is useful to take this into consideration when interpreting material deprivation statistics. According to the Eurostat (2020), severe material deprivation rate in 2018 in Finland was lower among those over 65 years old (1.3%) than in the active age group (18–64) (3.4%); even though the median income was lower in the older group. However, the age differences in material deprivation are also affected by savings and wealth. For example, home ownership is typical among the old-age population and reduces their risk of poverty (Ritakallio 2003). Especially possession of durable items that might have been acquired in the past can be associated with age.

A comparison of consumption and income indicates that the relationship (consumption divided by income) decreases throughout the life course in Finland (Hiilamo et al. 2012). However, this does not tell anything about the consumption patterns of individuals. Based on the Finnish Household Budget Survey, Ahonen and Vaittinen (2015) suggest that over the past 30 years, the aggregate consumption patterns have converged across the age groups. Their results imply that the older age groups still consume relatively more in terms of food-related items, health care, and housing than the working-age group. The working-age individuals, instead, consume more in terms of residual consumption (such as communications, hotels, restaurants and cafes, and household goods).

These results and notions suggest that age differences in consumption patterns and perceptions of necessity should be taken into account in studies analyzing material deprivation. As the older age groups have a lower level of material deprivation than the younger, but define more items as necessary and possess more items, it is expected that both consensus weighting and prevalence weighting will compress the age differences in material deprivation and decrease the gap between the youngest and the oldest individuals.

4 Data and Methods

The analyses were carried out using the Finnish postal survey from 2015 (response rate was 40%). The survey was based on a random sample of 5000 Finnish individuals aged 18 to 70 by the Population Register Centre. Two thousand individuals answered the survey. From these respondents, 242 did not answer at least one of the deprivation item questions. Nineteen respondents did not indicate their age and were, therefore, excluded from the final analyses. Thus, only information on the remaining 1 739 respondents was used.

The information on age referred to the age of the individual whom the survey was assigned to. "Age" was categorized into four groups: 18–35, 36–49, 50–59, and 60–70. One of the aims of the categorization of age groups was to have groups with a relatively similar number of observations. The data included 404 (23.2%) individuals aged 18–35 years, 337 (19.4%) aged 36–49 years, 411 (23.6%) aged 50–59 years, and 587 (33.8%) aged 60–70 years. The analyses were also carried out using five age groups (18–29, 30–39, 40–49, 50–59, and 60–70) but the results did not affect the main conclusions.⁴

In this study, information on the considerations of necessity and prevalence of the items was from the same dataset. This made it possible to analyze both the prevalence of various items and whether these items were considered necessities by the same respondents. This study analyzed 23 different kinds of deprivation items (see Table 4 in the Appendix). For each item the survey had 2 types of questions: 1) one related to the consideration of necessity and 2) the other related to possession and enforced lack of deprivation items. The survey also included 3 deprivation items that were targeted on individuals with children. These variables were not used in the analyses.

The following questions were used in the survey:

- (A) "Which of the following items do you think are necessary/unnecessary for an adult in contemporary Finland?" The three answer choices were: (1) Necessary, everyone should afford it; (2) Not necessary, but desirable; and (3) Unnecessary for everyone.
- (B) "Which of the following [deprivation items] ..." (with four answer choices): (1) You have, and can't do without; (2) You have, but could do without; (3) You do not have, and do not need; (4) You would like to have, but cannot afford.

First, in this study, the prevalence, consensus, and deprivation rates of deprivation items were calculated for all survey respondents and for each age group. In the study, *consensus rate* referred to the proportion of respondents who described the item as necessary. For calculating the consensus rate, Question A was recoded to a dummy-variable, in which Category 1 (necessary) received the value "1" and Categories 2 and 3 received the value "0." *Prevalence rate* referred to the share of respondents who possessed a given item and it was calculated based on a dummy-variable recoded from Question B. In this variable, Categories 1 and 2 from Question B were given the value "1" and Categories 3 and 4 were given the value "0." Deprivation rates were also calculated based on Question B. These dummy-variables received the value "1" if a respondent would have liked to have the deprivation item but could not afford it (Category 4). Otherwise, the variable had the value "0."

Second, a deprivation index was created. The statistical reliability of the index was tested using the Cronbach alpha coefficient. The Cronbach alpha coefficient was 0.89. This indicates

⁴ The main difference was that the 18–29 age group was more deprived than the 18–35 age group.

that the reliability of the index was good and it was meaningful to sum up the values of different deprivation items. Each individual had a summary score of the number of items that they could not afford. To avoid the problems related to the arbitrary choice of deprivation threshold, summary statistics for deprivation indices were used (see Guio 2009). Thus, it was possible to use the full set of information.

Without any modifications or transformations, all items receive equal weight (equal to 1). However, in this study, the deprivation index was also weighted using the consensus rates and the prevalence rates. The weights were created using the information on all survey respondents and also using group-level information of the considerations of necessities and the prevalence of the items. Group-level weights were utilized since previous research suggests that consumption patterns and views about the necessities differ across different age groups (see the previous section).

The difference between the approaches is that when weights are based on all survey respondents, the item-specific weight is the same for all individuals, and when weights are based on age groups, each individual belonging to the same age group has the same item-specific weight. Thus, the differences in the consensus and prevalence rates between deprivation items and between age groups can be taken into account. In total, four types of weights were used. The weights were normalized such that the sum of weights across the items was equal to 1. The normalized weights were calculated by dividing each weight by the sum of all the weights (among all respondents or respondents in the same age group). Thus, the other items also affected the weights of single items (Guio 2009). The weights were used to measure the relative importance of the item in the deprivation index (relative to other items in the index) (Guio 2009). The applied weighting approach is formalized below.

(a) Weights based on information on all survey respondents:

$$u_j = \sum_{i=1}^I w_i X_{ij}$$

In the formalization, the value of the deprivation index (u_j) for each individual (j) in the sample was equal to the sum over the deprivation status (X) of each item (i) weighted with w_i , where w_i represented the normalized weight, which was the same for each individual with respect to specific items. The calculation of the weight (w_i) was formalized as follows:

$$w_i = \frac{h_i}{\sum_{i=1}^I h_i}$$

where h_i represented the initial weight before normalization.

(b) Weights based on information on a given age group:

The formalization of the weighting scheme was otherwise similar compared to the previous example but, in this approach, w_i was the normalized weight, which was the same for each individual in a given age group (k).

$$u_j = \sum_{i=1}^I w_{ik} X_{ij}$$

The formalization of the weight w_{ik} : $w_{ik} = \frac{h_{ik}}{\sum_{i=1}^I h_{ik}}$.

Table 1 The consensus and prevalence rates for all survey respondents and age groups (in percentage)

	Consensus rate					Prevalence rate				
	All respondents	18–35	36–49	50–59	60–70	All respondents	18–35	36–49	50–59	60–70
	Health service	96.9	96.8	96.7	97.3	96.8	97.6	98.0	96.4	97.1
Dentist	96.3	96.0	95.9	97.3	95.9	95.0	95.3	93.5	94.2	96.3
Warm food	94.5	95.1	94.7	94.9	93.7	99.0	99.0	97.9	99.0	99.5
Telephone	87.7	93.1	90.8	84.9	84.2	99.9	100.0	99.7	100.0	99.8
Fruits	83.2	82.9	83.7	80.1	85.2	95.9	95.3	95.0	95.1	97.4
Up-to-date apartment	83.0	86.9	87.2	80.5	79.6	99.4	99.5	99.7	99.3	99.2
Home Insurance	66.1	71.0	63.2	59.9	68.8	94.1	92.1	92.0	93.9	96.9
Clothing	60.2	61.4	57.9	60.8	60.3	90.1	88.9	85.5	89.8	93.9
Spacious apartment	51.2	47.3	44.5	51.1	58.1	93.8	90.8	92.6	92.5	97.6
Haircut	50.4	30.0	42.4	54.5	66.1	89.7	82.9	86.1	91.5	95.2
Internet	47.6	60.4	59.4	45.0	33.9	95.1	99.5	97.6	95.6	90.1
TV	35.1	14.1	29.4	37.7	50.9	95.5	88.9	95.3	98.1	98.3
Hobby	33.2	37.4	35.3	28.7	32.4	81.1	77.7	78.3	80.8	85.4
Bicycle	33.1	27.0	36.2	34.6	34.8	89.9	91.1	90.2	90.0	88.8
Presents	27.0	25.7	26.4	27.5	28.1	89.0	89.9	87.8	87.4	90.3
Newspaper	23.2	7.7	18.4	21.7	37.8	70.4	46.5	63.5	75.2	87.6
Driver's license	22.9	9.9	18.4	24.1	33.6	92.2	89.9	95.6	95.4	90.0
Savings	22.1	20.5	17.5	22.4	25.7	70.1	60.6	65.6	71.8	80.1
Party clothing	20.4	24.0	19.9	15.8	19.1	86.4	88.6	83.1	85.9	87.1
Party	18.0	22.5	14.0	16.6	18.2	84.6	85.2	83.1	84.9	84.8
Holiday	15.4	16.3	13.1	11.4	18.7	78.9	74.0	76.0	76.6	85.5
Movies or theater	15.1	14.9	10.4	14.6	18.4	82.5	82.9	80.1	80.8	84.8
Car	13.5	2.7	11.3	14.4	21.6	81.1	66.6	85.2	88.3	83.8

The order of the items is based on the consensus rate among all survey respondents

5 Results

5.1 Consensus, prevalence, and deprivation rates

The analyses began with the examination of consensus and prevalence of various deprivation items. The consensus and prevalence rates are illustrated in Table 1. No general pattern of rates could be found. The rates of many items were very similar across age groups, but some items were characterized by substantial differences between the groups. Furthermore, there were differences between the items in terms of how typically they were considered as necessities or how a large number of individuals possessed the item.

In Table 1, the first set of columns show the considerations of necessities (consensus rates). Overall, there was significant variation between the deprivation items. Telephone, up-to-date apartment, warm food, fruits, health services, and dentist were regarded as necessities by over 80% of the respondents. Thus, people were almost unanimous that everyone should be able to have these items, with no significant differences across the age groups. Meanwhile, car, driver's license, newspaper, 1-week holiday in Finland, ability to go to movies or theater, clothing for parties, ability to arrange parties, ability to buy presents, and ability to save were infrequently regarded as necessities. Less than 30% of the respondents regarded these items as necessities. Additionally, differences between age groups were found with respect to the considerations of necessities. Older individuals considered more often than younger individuals that a TV, a car, a driver's license, a spacious apartment, a newspaper, and a haircut or a hairdresser were necessities. The differences were especially stark for a TV and a newspaper. These age-related differences are somewhat problematic in the light of the typically used consensual approach (see Mack and Lansley 1985); for example, a haircut would be selected as a necessity as it exceeded the 50% threshold, even though less than a third of the youngest age group regarded it as necessary. Conversely, younger respondents considered more often than older respondents that a telephone and Internet equipment were necessities. There were also differences with regard to many other items between age groups but these differences were less striking. Similar patterns have also been found in other countries (Mack et al. 2013; Kelly et al. 2012; Saunders et al. 2007).

The second set of columns in Table 1 shows the prevalence rates. Overall, the items were typical among survey respondents and there were smaller differences between the age groups compared to the consensus rates. A telephone, a TV, Internet, an up-to-date apartment, warm food, fruits, health services, and dentist services were possessed by more than 95% of the respondents. The lowest prevalence rates were related to a newspaper and ability to save money (around 70% of individuals possessed these items). Differences between age groups were found. A TV, a car, 1-week holiday in Finland, a newspaper, a haircut or hairdresser, and ability to save money were possessed more typically among older respondents than by younger respondents. The Internet was more prevalent among younger respondents than among older respondents.

Table 2 shows the proportion of individuals who were deprived with regard to each item. Overall, the rates were small, which also is associated with the finding that the prevalence rates were rather high (cf. Table 1). The deprivation rates for a telephone, a TV, Internet equipment, a driver's license, an up-to-date apartment, and warm food were less than two percent. Since none of the individuals experienced deprivation with respect to a telephone, this item was excluded from the analyses, which utilized deprivation indices. Ability to save money, one-week holiday in Finland, ability to go to

Table 2 The deprivation rates for all survey respondents and age groups (%)

	All respondents	18–35	36–49	50–59	60–70
Savings	26.1	37.6	32.9	23.6	16.0
Holiday	15.8	19.6	19.9	17.0	10.1
Movies or theater	12.5	14.4	16.3	12.4	9.2
Hobby	11.4	14.6	14.0	10.5	8.5
Party	8.9	10.2	10.1	8.8	7.5
Presents	8.6	8.7	10.7	9.5	7.0
Clothing	8.4	9.9	13.4	8.3	4.6
Party clothing	7.9	7.9	10.7	8.3	6.1
Car	7.0	16.8	6.5	4.9	2.2
Haircut	6.8	11.1	9.2	6.1	3.1
Newspaper	5.7	5.9	8.9	6.1	3.4
Dentist	4.8	4.7	6.5	5.8	3.1
Spacious apartment	4.4	6.7	5.9	5.1	1.4
Fruits	3.5	4.5	4.8	4.1	1.7
Home insurance	3.4	4.2	5.9	3.7	1.2
Bicycle	2.4	3.0	3.9	3.2	0.7
Health service	2.4	2.0	3.6	2.9	1.7
Driver's license	1.6	3.7	1.8	0.7	0.9
Internet	1.3	0.3	1.2	1.2	2.0
Warm food	0.9	1.0	1.2	1.0	0.5
Up-to-date apartment	0.5	0.3	0.3	0.7	0.7
TV	0.4	1.5	0	0	0.2
Telephone	0	0	0	0	0

The order of the items is based on the deprivation rate among all survey respondents

Table 3 Descriptives on material deprivation

	All respondents	18–35	36–49	50–59	60–70
Mean of the deprivation index (No. of items)	1.5	1.9	1.9	1.4	0.9
Deprived of at least one item (%)	33.1	50.7	39.5	28.2	20.6
Deprived of at least three items (%)	18.3	26.0	22.3	17.5	11.4

movies or theater, and a regular hobby were the items that had the highest deprivation rates. More than 10% of individuals experienced deprivation with regard to these items and more than a quarter of respondents were not able to save money. With regard to the items with the highest deprivation rates among all respondents, the young age group had the highest deprivation rates. In addition, with respect to a newspaper, a haircut or hairdresser, and ability to buy clothing, the deprivation rates were smaller among older individuals. However, the age gradient found in the deprivation rates was not as clear as the age gradients in the consensus and prevalence rates. For example, the highest deprivation rate for most items was found in the 36–49 age group.

Median, 75th and 90th percentile, five different measurement approaches (scale 0-1)

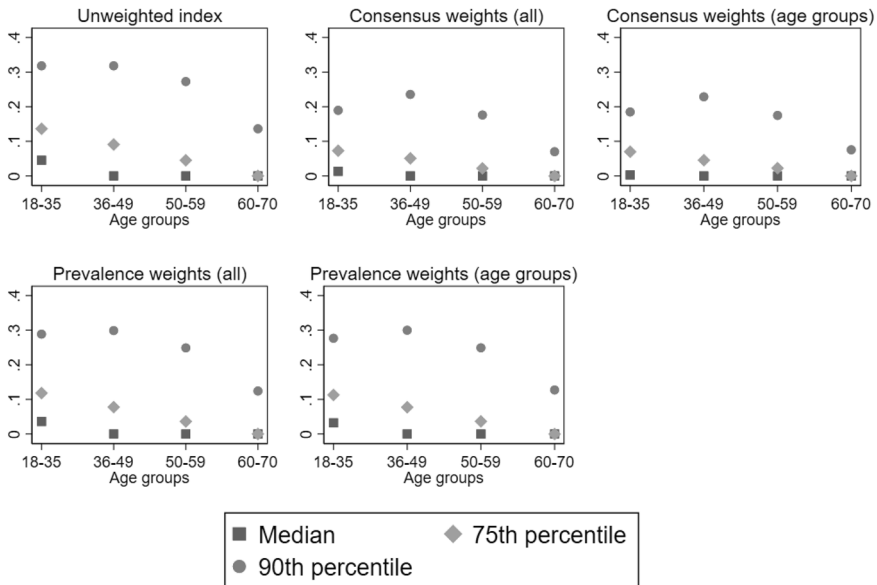


Fig. 1 The median, the 75th percentile, and the 90th percentile of the deprivation index among age groups (an unweighted index and four weighted indices)

Next, material deprivation was examined more closely (Table 3). A deprivation index was created based on dummy variables measuring deprivation of different items. The mean value of this index was 1.5 in the population (the lowest possible value on the index was 0 and the highest was 22). Most individuals either did not experience material deprivation at all (66.9%) or experienced deprivation of only one item (9.4%) (not shown). Overall, the younger age groups experienced material deprivation more often. This is illustrated by both the mean and the proportion of those experiencing deprivation of at least one or three items. Moreover, deprivation seemed to decrease by age. Among the 18–35 age group, approximately half experienced deprivation in terms of at least one item and one quarter in terms of at least three items. The corresponding proportions among all survey respondents were 33 and 18 per cent.

5.2 A comparison of unweighted and weighted deprivation indices

The main interest of this study was to analyze how the differences in the perception of necessity and prevalence of the deprivation items (see Table 1) shape the conclusions to be made about material deprivation between age groups. For this purpose, four different types of weights were used. The deprivation index was weighted using the prevalence and consensus rates both among all survey respondents and among the age groups. To compare different indices, normalized indices were used. Thus, each index ranged from 0 to 1.

As many individuals did not experience material deprivation, the mean was not the optimal measure for analyzing deprivation. This is also illustrated in Table 3, which shows that while the youngest and second-youngest age group had the same mean value for the

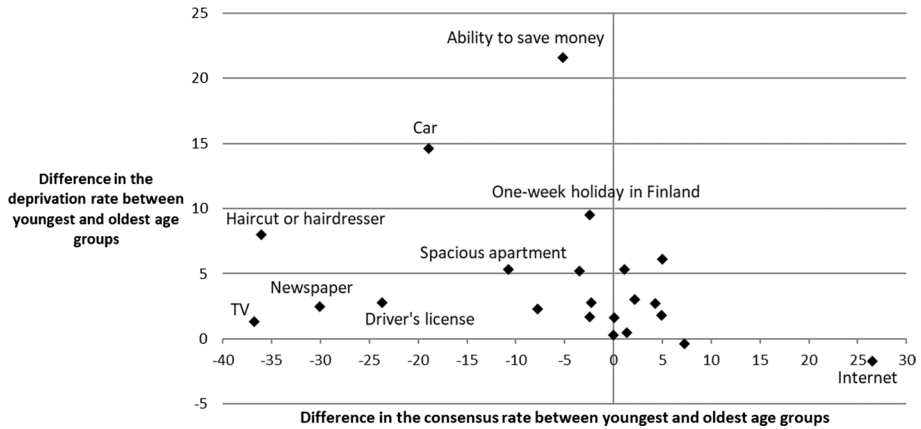


Fig. 2 The relationship between differences in deprivation and in consensus rates among the youngest (18–35) and the oldest (60–70) age groups (in percentage points)

deprivation index, the share of individuals experiencing material deprivation differed significantly. To get a more accurate picture of deprivation in different age groups, the values for the median, the 75th percentile, and 90th percentile are shown in Fig. 1. The 90th percentile was chosen since, when using the median or the 75th percentile, some age groups had no individuals who experienced material deprivation (for example, among the 60–70 age group, around 80% of individuals did not experience material deprivation, see Table 3). The graph illustrating mean values is included in the Appendix (Fig. 4). The general conclusions are similar if the mean values are used.

Figure 1 shows that consensus weights, especially, compress the levels of material deprivation and, thus, as expected, the absolute differences between age groups decrease. Due to the non-normality of deprivation indices,⁵ Wilcoxon's matched-pairs signed-rank tests were estimated to analyze whether the estimates for weighted indices were statistically significantly different from the unweighted index. These comparisons were calculated for each age group separately. According to the test, all differences between the unweighted index and other indices were statistically significant ($p < 0.001$). In the unweighted index, the point estimate for the 90th percentile was similar for the two youngest age groups. In the weighted deprivation indices, the point estimate for the second-youngest age group was the highest when analyzing the 90th percentile (the mean values illustrated a similar pattern (Fig. 4 in the Appendix)). However, the absolute difference between the 18–35 and 36–49 age groups was rather small.⁶ The effect of prevalence weights seemed to be somewhat smaller than the effect of consensus weights. Contrary to the expectation, the difference between the youngest and the

⁵ The Shapiro–Wilk test was utilized to test whether the indices are normally distributed. The test showed that the null hypothesis that a variable is normally distributed should be rejected with respect to each of the used deprivation indices ($p < 0.001$).

⁶ Since the deprivation indices had a skewed distribution, the non-parametric Kruskal–Wallis test was estimated to test group differences. According to the test (post-estimation using Bonferroni correction), all group differences were statistically significant ($p < 0.05$). In other words, there was a statistically significant difference even between the youngest and the second-youngest group. However, the interpretation is similar if the unweighted or weighted indices are used.

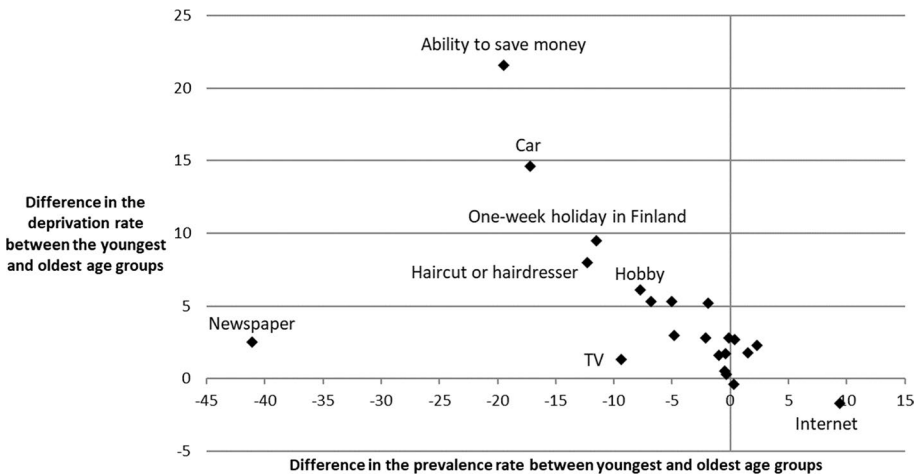


Fig. 3 The relationship between differences in deprivation and in prevalence rates among the youngest (18–35) and the oldest (60–70) age groups (in percentage points)

oldest age group did not seem to decrease significantly. Overall, the results illustrate that while weighting has an impact on material deprivation, the impact seems to be limited. Next, the reasons for this finding are analyzed in more detail.

5.3 Relationships Between Consensus, Prevalence, and Deprivation Rates

Finally, the relationship between consensus, prevalence and deprivation rates was analyzed more closely. This analysis was conducted to obtain more information on why age differences in the considerations of necessities and prevalence of deprivation items (Tables 1 and 2) were not largely transmitted into the weighted deprivation indices. Figures 2 and 3 illustrate the items which age-specific weights had the most significant potential impact on deprivation indices. The main conclusions are similar if differences in the normalized age-specific consensus and prevalence weights are illustrated in the figures instead of differences in consensus and prevalence rates. Since the largest difference in the rates, on average, was found between the youngest and oldest age group, the analysis focused on these groups. The differences above zero indicate that the rate was higher among young individuals. The weight of a specific item should differ between age groups for the weighting to affect age group differences in material deprivation. In Figs. 2 and 3, the items that are furthest away from the x-axis and the y-axis differed most with respect to both consensus/prevalence rates and deprivation rates.

While Figs. 2 and 3 explain, especially, the impact of age group-specific weights, the general conclusions would be similar if the association between consensus or prevalence weights based on all survey respondents and deprivation rates was analyzed. These associations are illustrated in Fig. 5 (see Appendix), which shows a significant negative correlation between consensus or prevalence weights and deprivation rates. In other words, the items with the highest weights were items that had, on average, lower deprivation rates. In the weighting scheme, the relative role of these items was higher, thus reducing the impact of weighting approaches that were based on information on all survey respondents.

Figure 2 illustrates the relationship between differences in deprivation and in consensus rates between the youngest and the oldest age groups. The figure shows that, for most of the items (those items close to the intersection of the y-axis and the x-axis), the consensus rates and deprivation rates were close to each other between the youngest and the oldest age groups. Additionally, for items such as a TV, a newspaper, a driver's license, and Internet, there were significant differences in the consensus rates between the age groups but since the deprivation rates for these items were close to each other between the youngest and the oldest age groups, the effect of weights for these items was limited. The main reason for the deprivation rates for these items being close to each other between age groups was that only a small share of survey respondents experienced deprivation regarding these items (a newspaper being somewhat of an exception (see Table 2)). On the other hand, while there were significant differences in terms of deprivation rates in the ability to save money or 1-week holiday in Finland between the youngest age group and the oldest, the consensus rates were close to each other. Although in the weighting schemes the other items also affect the weights of single items (Guio 2009), the consensus rates resembling each other between age groups are nevertheless likely to produce rather similar results than would be produced when using the unweighted approach. Figure 2 shows significant differences between the youngest and the oldest age group at both dimensions, only with respect to a car and a haircut or hairdresser (and a spacious apartment, to a smaller extent). However, the figure also illustrates that these differences, to some extent, cancelled each other out. In other words, while the deprivation rates were high among young adults, the consensus rates were lower within the same age group.

Figure 3 shows the relationship between differences in deprivation and in prevalence rates between the youngest and the oldest age groups. A rather similar pattern was found in the relationship between deprivation and consensus rates. However, with regard to prevalence and deprivation rates, the youngest and the oldest age groups had even more often rates resembling each other (items located near the intersection of the y-axis and the x-axis). The effect of a newspaper, a TV, and the Internet was limited, even though the differences regarding the prevalence rate were high due to the deprivation rate being rather similar in the two age groups—mainly because only a small share of respondents experienced deprivation regarding these items. Ability to save money, a car, 1-week holiday, a haircut or hairdresser, and a regular hobby were the items in which the youngest and the oldest age groups had significant differences with regard to both dimensions. However, again, the effects partially cancelled each other out.

One possible factor explaining why weights and deprivation rates with regard to some items partially cancel each other out is some kind of selfishness (Mack and Lansley 1985; Mäkinen 2018). With respect to a car, one-week holiday, ability to save, and a spacious apartment of those individuals who did not consider the items a necessity, a higher proportion of younger adults experienced deprivation in terms of the same item compared to other age groups (not shown). This may be an indication that the respondents might have had different standards for themselves and the public. At the aggregate level, the most conspicuous example was a car. Even though only a small group considered it a necessity, many young people would have wanted it and claimed an “enforced lack”.

6 Discussion and Conclusions

This study analyzed the kinds of differences that can be found in the consensus, prevalence, and deprivation rates between age groups in Finland. Furthermore, using weighting approaches, the study analyzed how differences in prevalence and consensus rates among all survey respondents and between age groups affect the picture of material deprivation. Typically, each item has equal importance in the deprivation index. If there are large differences in which items are, for instance, regarded as necessities by the population, this would be problematic for the standard approaches of the measurement of material deprivation. Age was chosen as the variable of interest since previous research had shown differences in consumption attitudes and patterns, preferences, and deprivation between age groups. Many recent studies have sought to understand how different items and choices affect the picture of material deprivation (e.g. Deutsch, Guio, Pomati, and Silber 2015; Gutfleisch and Andress 2020; Bailey 2020). Yet, this study was the first to analyze how consensus or prevalence-based weighting approaches affect the picture of age differences in material deprivation.

While no differences were found with respect to all deprivation items, many items showed differences between age groups. There were significantly larger differences regarding consensus rates than prevalence rates among all respondents and different age groups. This suggests that different age groups view the minimum acceptable living standards differently. In general, the prevalence rates of deprivation items were high, while the deprivation rates were either small or very small for many items. Often, the pattern of the consensus or prevalence rates resembled an age gradient. With regard to deprivation rates and indices, two youngest age groups (18–35 and 36–49) had the highest deprivation rates.

According to this study, using weights based, particularly, on the considerations of necessity compress the levels of material deprivation and, thus, the absolute differences between age groups decrease. Furthermore, statistically significant differences were found when weighted indices were compared to the unweighted index. However, generally, the effects of weighting schemes on the overall picture of material deprivation were modest. For example, the difference between the youngest and the oldest age group did not seem to decrease significantly when weighting schemes were applied. The finding that weighting does not affect the general picture of material deprivation was in line with some previous notions from cross-country analyses. For example, Anne-Catherine Guio (2009: 21) states, “*in the less deprived countries, the use of weights has little incidence on the mean indexes, (whatever the methodology), as the weights of items are close to equal weighting.*”

This study, however, revealed additional factors and specified why weighting schemes may not affect the picture of material deprivation. The findings indicate that even though there are differences in the consensus and prevalence rates between population subgroups, the effect of weighting schemes can be reduced by the fact that the number of individuals being deprived on specific deprivation items is small. Additionally, with regard to items with high deprivation rates, the consensus and prevalence rates were often lower compared to other items. Thus, the impact of weighting schemes is reduced by a somewhat paradoxical pattern.

With respect to the age differences in this study, it is important to note that this study could not consider cohort or period effects. The considerations of necessities and items that are possessed can change over time. Thus, despite the age differences found in this study, it is unclear whether the individuals included in the younger age groups would illustrate similar patterns compared to older individuals, when the younger individuals become older.

Yet, most studies on material deprivation are conducted using cross-sectional data. Like many other studies, the results of this study might have been affected by the non-response of most disadvantaged individuals. This might have contributed to the lower deprivation rates and, consequently, reduced the impact of weighting schemes.

The findings of this study have some implications for future research. First, researchers should acknowledge that when utilizing a standard approach in which each deprivation item is treated equally, a strong assumption, that there are no differences between the items in terms of how important they are considered among survey respondents, is applied (e.g. Gordon and Pantazis 1997; Pantazis et al. 2006). Indeed, ideally the material deprivation indicator should be comprised of items that are equally important through all stages of life. However, this study—as well as previous studies (e.g. Saunders et al. 2007; Mack et al. 2013; Mäkinen 2018)—illustrate that a significant proportion of items is unlikely to fulfil this criterion. Especially there were differences among survey respondents and age groups in which items were considered as necessities. Besides age, differences are likely to exist between different household types, places of residence, and income groups. Researchers should always consider whether the assumption related to the standard approach is meaningful in their study.

Despite that the standard approach can be problematic, as this study shows, adjusting for differences in prevalence or considerations of necessities does not necessarily affect the picture of group-level differences in material deprivation. First, the study shows that at least in countries with a low level of material deprivation, such as Finland, each item having equal importance does not seem to be a particularly problematic practice. If the share of individuals experiencing deprivation on various items is small, weights cannot have an effect. While this is partially item-specific, it can be expected that weighting, on average, has stronger effects in the context of high levels of material deprivation. Second, there was a general pattern that the items receiving larger weights were characterized by lower deprivation rates. This results in that that these differences, to some extent, cancel each other out. One possibility is that respondent's consumption preferences have corresponded to the list of items chosen (cf. Halleröd 1995). However, there can be also subgroup-specific contributing factors. According to the findings, young individuals were more likely to experience enforced lack of some items, while simultaneously not considering these items as necessities. Third, since the prevalence rates do not, on average, vary that much between the items, the impact of prevalence weights can be modest. This can be also related to the context of a country with a low level of material deprivation in which the items included in the survey are possessed by a high share of respondents.

In any case, weighting schemes give a more nuanced picture of material deprivation and, thus, should be considered an option when analyzing deprivation indices. Additionally, weighting approaches enable the use of full information included in the survey (cf. Nolan and Whelan 2007; Ravallion 2011). As consensus rates vary more than prevalence rates, surveys should also include questions about the necessity of items more often. By analyzing only age groups, this study cannot distinguish the impact of weighting schemes when applying weights that are based on other possible important socio-demographic characteristics associated with preferences or material deprivation. Considering several factors simultaneously is especially difficult. Developing tools for this would be an important contribution to future research.

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Data Availability Data is administrated by the discipline of Social Policy at the Department of social research, University of Turku. To access the data, please contact Professor Veli-Matti Ritakallio (vemari@utu.fi).

Code Availability Stata code can be requested from the authors.

Compliance with Ethical Standards

Conflicts of interest The authors declare that they have no competing interest.

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Appendix

See Table 4 and Figs. 4 and 5

Table 4 The items used in the analyses

Ordinal number	Item description in the survey	Shortened version used in the article
1	Telephone	Identical to the survey
2	TV	Identical to the survey
3	Internet equipment	Internet
4	Car	Identical to the survey
5	Driver's license	Identical to the survey
6	Bicycle	Identical to the survey
7	Regular hobby	Hobby
8	Up-to-date apartment	Identical to the survey
9	Spacious apartment	Identical to the survey
10	Home insurance	Identical to the survey
11	Newspaper	Identical to the survey
12	Possibility to go to movies/theater	Movies
13	Warm food (such as meat, fish, vegetarian) every day	Warm food
14	Fruits or vegetables every day	Fruits
15	One-week holiday in Finland	Holiday
16	New clothing	Clothing
17	Clothing for parties	Party clothing
18	Possibility to arrange parties	Party
19	Ability to buy presents	Presents
20	Possibility to go to haircut or hairdresser	Haircut
21	Use of health services	Health service
22	Use of dental services	Dentist
23	Ability to save 100 €	Saving

Means of deprivation indices: five different measurement approaches (scale 0-1)

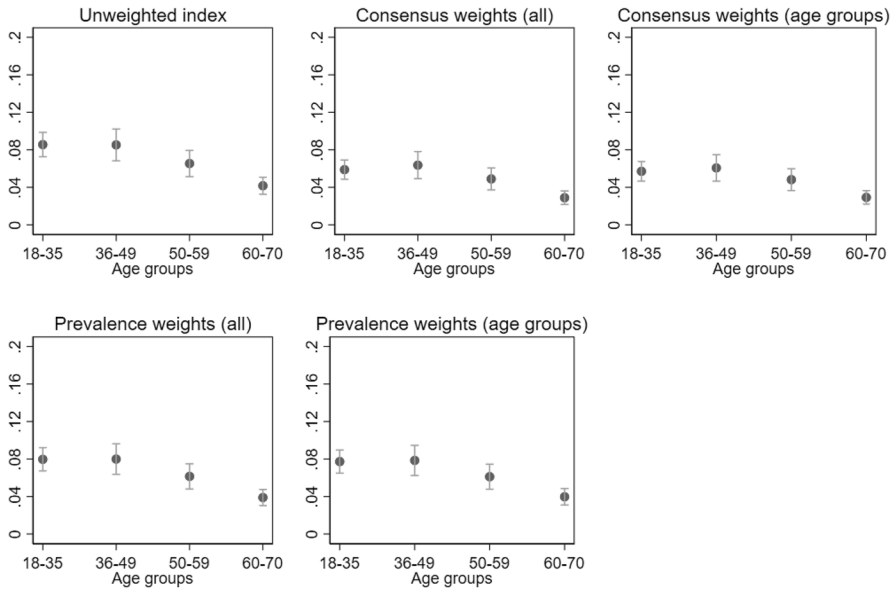


Fig. 4 The mean of the deprivation index among age groups: an unweighted index and four weighted indices (95 % confidence intervals)

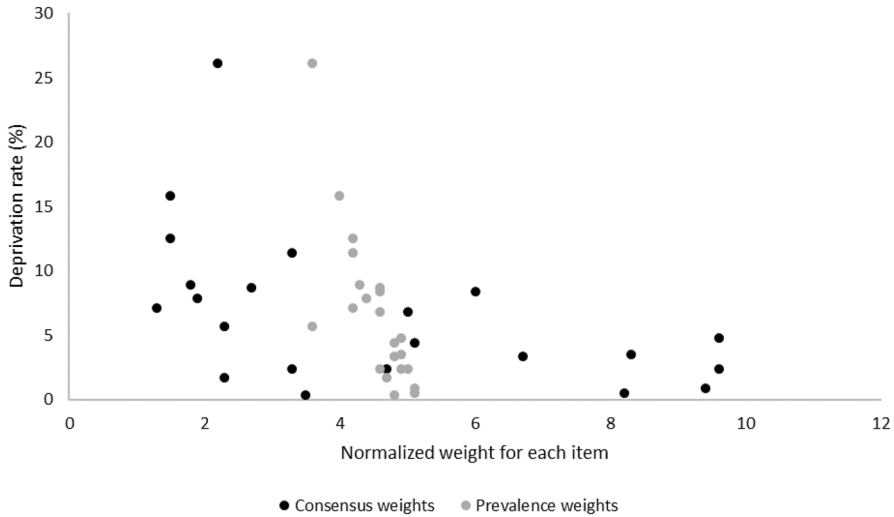


Fig. 5 The association between deprivation rate and normalized consensus weight, and deprivation rate and normalized prevalence weight of specific deprivation items (normalized weights have been multiplied by 100)

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