Int J Public Health (2013) 58:513–520
DOI 10.1007/s00038-012-0429-y

ORIGINAL ARTICLE

Income-related health inequalities: does perceived discrimination matter?

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Received: 4 July 2012 / Revised: 28 September 2012 / Accepted: 12 November 2012 / Published online: 30 November 2012

Abstract
Objectives Because of their meritocratic ideology, Western countries might promote the belief that every individual is responsible for his or her socioeconomic position. These beliefs might enhance discrimination which, in turn, might affect health. Therefore, the aim of the study was to investigate the role of perceived discrimination within income-related health inequalities.
Methods Two-year follow-up data (2008–2010) from the Dutch Longitudinal Internet Studies for the Social sciences panel ($N = 2{,}139$) were used to examine the relation between income, perceived discrimination, and self-rated health and feeling hindered by health problems.
Results Results showed that poor health was more prevalent in the low income and in the discriminated group. Participants from the low income group were also more likely to perceive discrimination (OR = 1.57, 95 % CI = 1.03–2.42). However, there was no substantial evidence for a mediating effect of perceived discrimination on the income–health association.
Conclusions The results emphasise the importance of a more in-depth study of discrimination in relation to socioeconomic health inequalities. Since ethnicity was a major confounder, it is recommended to take account of the complex interplay between discrimination and both the socioeconomic and ethnic background.

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Keywords Income-related health inequality · Socioeconomic status · Discrimination · Ethnicity · Self-rated health · Meritocracy

Introduction

Health inequalities between people from lower and higher socioeconomic status (SES) groups are a persisting worldwide problem (Mackenbach et al. 2008; Bambra et al. 2010; Aldabe et al. 2011). Researchers have sought to explain the differences by studying the contribution of behavioural risk factors (e.g. smoking), psychosocial factors (e.g. perceived control), unfavourable material factors (e.g. housing conditions), and biological factors (e.g. inflammation markers). However, these factors cannot fully explain the health gap between low and high SES (Mackenbach 2006; Skalická et al. 2009). Given that lower SES groups might perceive themselves more stigmatised and discriminated against than higher SES groups, a largely neglected psychosocial pathway might be via discrimination and stigmatisation (Cozzarelli et al. 2001; Lott 2002; Reutter et al. 2009; Williams 2009; Ward et al. 2011; Fuller-Rowell et al. 2012).

Based on the premises that financial success go to the ones who demonstrate the largest efforts and capabilities (i.e. merits), living in Western meritocratic countries might promote the belief that people at the bottom of the socioeconomic hierarchy are themselves responsible for their adverse position: they just 'did not work hard enough' or 'did not have the personal skills' to climb up the social ladder (De Botton 2004; McCoy and Major 2007; Williams 2009; Kwate and Meyer 2010). Believing in such internal attributions might possibly enhance discrimination and stigmatisation of people at the bottom of the socioeconomic

hierarchy (Cozzarelli et al. 2001; Rüsch et al. 2010). Status anxiety which concerns the fear of what others think of us when we do not meet the ideal that is expected by society (e.g. to be successful, to have a good job or to earn enough money) is closely related to these discriminatory and stigmatising processes (De Botton 2004). Stigmatisation and discrimination are also ways of symbolic violence by demonstrating superiority and preventing people with lower financial resources from improving their situation (Wilkinson and Pickett 2010), thus contributing to a self-fulfilling prophecy by keeping people in stigmatised and discriminated positions (e.g. by withholding well-paid jobs to people from lower status groups); this, in turn, will further "confirm" their stigma (Kwate and Meyer 2010).

Discrimination and stigmatisation can cause serious physical and psychological health problems (Caputo 2003; Ahmed et al. 2007; Mickelson and Williams 2008; Krieger et al. 2011). One of the mechanisms through which perceived discrimination might affect health might be via chronic stress and its direct physiological consequences, such as increasing stress response hormones secretion ('allostatic load'), hypertension, impairing cognition, and inhibiting digestion, tissue repair, and immune function (Matthews et al. 2010; Liu 2010). Additionally or alternatively, perceived discrimination—perhaps because of reduced self-control and self-regulation (Inzlicht et al. 2006)—might promote poor health behaviours, such as smoking, overeating, physical inactivity, and severe alcohol consumption (Adler 2009; Baum et al. 1999; Liu 2010). These behaviours, in turn, can further promote stigmatisation and discrimination (e.g. stigmatisation of smokers and people with overweight) and result in a genuine negative spiral relating low socioeconomic status, discrimination, and poor health (behaviours) (Shaw et al. 2003).

For this study, longitudinal data from 2,139 Dutch participants from the Longitudinal Internet Studies for the Social sciences panel (LISS panel) were used to answer the following research questions: (1) do people with low incomes more often perceive themselves discriminated against? (2) do people with low incomes and people who perceived themselves discriminated against more often report poor health?, and (3) can perceived discrimination explain the health gap between the lowest and highest income group?

Methods

Study population

The LISS panel is the core element of the Measurement and Experimentation in the Social Sciences project (MESS) of CentERdata. This panel is a representative sample of Dutch individuals (age 16 years and older), who participate in monthly internet surveys (CentERdata 2011). More information about the LISS panel can be found on www.lissdata.nl. In November 2008, 5,961 LISS panel members, including members of the same household, completed a baseline questionnaire. In December 2008, one household member per household ($n = 4{,}788$) was randomly selected to participate in a questionnaire including questions about perceived discrimination. The questionnaire was completed by 3,217 participants (67.2 %). After 2 years of follow-up, 867 participants were lost to follow-up (27 %) and longitudinal data were available for 2,350 participants, of whom 211 participants (9 %) were excluded because of missing data on important variables. The final study population consisted of 2,139 participants (969 (45.3 %) men and 1,170 women). The mean age in the population was 50.45 years (SD = 15.28, range = 18–88 years), 57.5 % of the participants were married, and 1,905 (89.1 %) participants were of Dutch origin.

Measures

Health outcomes

In November 2008 and 2010 self-rated health was measured using a 5-point Likert scale with the question 'How would you describe your health, generally speaking?' (1 = poor, 5 = excellent). Self-rated health was dichotomised defining poor and moderate health as 'less than good health' (1). Three additional questions were 'To what extent did your physical health or emotional problems hinder your daily activities over the past month?', 'To what extent did your physical health or emotional problems hinder your social activities over the past month?', and 'To what extent did your physical health or emotional problems hinder your work over the past month, for instance in your job, the housekeeping, or in school?' (1 = very much, 5 = not at all). These variables were combined in a 'feeling hindered by health problems' scale (Cronbach's alpha = 0.88 in both 2008 and 2010). 'Feeling hindered by health problems', computed as the mean across the three items, was dichotomised by defining those scoring 3 or lower as feeling hindered by health problems (1).

Income

The net monthly household income was based on the sum of the personal net incomes of all household members (De Vos 2008). Equivalent net income, which takes account of the number of adults and children who had to live from the household income, was computed by dividing the net

household income by an equivalence factor (Vrooman et al. 2007). The equivalence factor was 1 (the first adult) + 0.5* the number of extra adults who had to live from the household income + 0.3* the number of children below the age of 18 who had to live from the household income. Equivalent net income was divided into three categories based on tertiles (<€1333.33 = low income group, €1333.33–€1937.83 = moderate income group, and > €1937.83 = high income group (reference category)).

Perceived discrimination

In 2008, participants were asked: 'Would you describe yourself as being a member of a group that is discriminated against in this country?' (yes = 1, no = 0).

Covariates

Potential confounders were: age as measured in November 2008 (in years), gender (0 = man, 1 = woman), ethnicity (Dutch (= reference category), immigrant with Western background, and immigrant with non-Western background) and marital status (1 = married, 0 = not married). Additional analyses were adjusted for smoking (1 = yes, 0 = no) and body mass index (BMI) calculated as weight (kg) divided by height (m) squared, and categorised into four categories (<18.5 = underweight, 18.5–24.9 = normal weight (reference category), 25–29.9 = overweight, and >30 = obese).

Statistical analysis

First, χ^2 tests were computed to examine differences in self-rated health and feeling hindered by health problems by income and perceived discrimination. Second, logistic regression was performed to examine the effect of income on perceived discrimination. To find out why perceived discrimination was more common in lower income groups, separate analyses were done to examine the separate contribution of age, gender, ethnicity, and marital status. This was done by looking at the extent to which the odds ratio for low and moderate income decreased after introducing these covariates into the model. Mediation was assessed by comparing the odds ratio before and after control for covariate of interest: $(OR_{Model1} - OR_{Model2})/(OR_{Model1} - 1) \times 100$. More than 10 % change in effect was used as a criterion for mediation (Baron and Kenny 1986). Additionally, separate analyses were done to examine the contribution of the health indicators, smoking and BMI to the income–perceived discrimination association. Thirdly, logistic regression analyses were done to estimate the effect of perceived discrimination on self-rated health and feeling hindered by health problems. Separate analyses were carried out to examine the contribution of income, age, gender, marital status and ethnicity to the perceived discrimination—health outcome association. Fourthly, the effect of income on self-rated health and feeling hindered by health problems, controlling for age, gender, ethnicity, and marital status was estimated, as well as the mediating effect by perceived discrimination. Finally, sensitivity analyses were performed by using five income groups based on quintiles instead of three (to create more extreme contrasts), by using linear regression analyses with continuous outcome measures, by examining the extent of mediation in 2008 cross-sectional data, by examining whether findings were similar when using persons' educational level instead of their income level, and—to test the robustness across sub-groups—by testing interactions between income, ethnicity, age, gender, and perceived discrimination. Statistical Package for the Social Sciences (SPSS) version 17 was used for the analyses.

Results

In the total sample, 135 (6.3 %) participants perceived themselves discriminated against (Table 1). Reports of perceived discrimination varied across income groups: 7.9 % of the low income group, 5.8 % of the moderate income group, and 5.2 % of the high income group (not tabulated). Participants from the low income group and participants who perceived themselves discriminated against were twice as likely to report less than good health and feeling hindered by health problems than participants from the high income group or participants who perceived no discrimination, respectively (all p values < 0.05).

The low income group had a 1.57 higher odds of perceiving discrimination (95 % CI 1.03–2.42) than the high income group (Table 2). The adverse effect of income on perceived discrimination was mainly due to the higher number of immigrants in the low income group. After control for ethnicity, the odds ratio for low income was still 1.33, but lost its significance (95 % CI 0.86–2.07). Detailed, not tabulated analyses revealed that there were more immigrants with non-Western backgrounds in the lower income groups and more perceived discrimination in immigrants compared to the non-immigrants. A higher prevalence of health problems, particularly feeling hindered by health problems, in the lower income group also contributed substantially to the relation between income and perceived discrimination (Table 2), even when corrected for ethnicity (not tabulated). Although smoking was more prevalent in the lower income group ($p = 0.010$), it did not contribute to more frequent reports of perceived discrimination in the low income groups. BMI was not associated with income

Table 1 Distribution of less than good health and feeling hindered by health problems within income groups and discriminated groups

	Total *N*	Less than good health		Feeling hindered by health problems	
		N	%	*N*	%
Total sample	2,139	387	(18.1)	333	(15.6)
Income (2008)					
High	713	91	(**12.8**)[a]	69	(**9.7**)
Moderate	720	135	(18.8)	109	(15.2)
Low	706	161	(22.8)	155	(22.0)
Perceived discrimination (2008)					
No	2,004	346	(**17.3**)	292	(**14.6**)
Yes	135	41	(30.4)	41	(30.4)

Longitudinal Internet Studies for the Social sciences panel, the Netherlands, 2008–2010

[a] Bold = *P* value < 0.05 (Pearsons χ^2)

Table 2 Odds ratios (95 % confidence interval) of perceived discrimination by income, additionally and separately controlled for covariates ($n = 2{,}139$)

	Perceived discrimination (2008)							
	Moderate income group[a]				Low income group[a]			
	OR	95 % CI		%[c]	OR	95 % CI		%
		Lower	Upper			Lower	Upper	
Income effect (unadjusted)	1.13	0.72	1.78		**1.57**	1.03	2.42	
Income effect (adjusted[b])	1.08	0.68	1.72	−42.4	1.33	0.85	2.08	−42.7
Income effect adjusted for gender	1.13	0.48	0.97	−5.3	**1.63**	1.06	2.50	8.9
Income effect adjusted for age	1.10	0.70	1.73	−25	1.49	0.96	2.29	−15.5
Income effect adjusted for marital status	1.12	0.71	1.77	−9.8	1.50	0.97	2.30	−13.6
Income effect adjusted for ethnicity	1.12	0.71	1.78	−9.1	1.33	0.86	2.07	−42.3
Income effect adjusted for BMI	1.11	0.70	1.75	−19.7	**1.58**	1.03	2.43	0.9
Income effect adjusted for smoking	1.13	0.72	1.78	–	**1.58**	1.03	2.42	0.5
Income effect adjusted for health 2008	1.07	0.68	1.69	−46.2	1.45	0.94	2.24	−21.4
Income effect adjusted for feeling hindered 2008	1.08	0.68	1.71	−40.2	1.38	0.89	2.12	−34.7

Longitudinal Internet Studies for the Social sciences panel, the Netherlands, 2008–2010. *Bold P* value < 0.05

[a] Reference category = high income group

[b] Adjusted for gender, age, marital status and ethnicity

[c] Percent change in income effect, compared with unadjusted model

group and thus could not "explain" why perceived discrimination was more prevalent in the lower income group.

Over a 2-year follow-up period, participants perceiving discrimination had a 1.58 higher odds (95 % CI 1.00–2.48) of feeling hindered by health problems (Table 3). For feeling hindered by health problems, controlling for covariates decreased the effect of perceived discrimination by more than 30 %. This decrease of effect was mainly due to the higher number of immigrants in the discriminated group: the effect of perceived discrimination decreased by 37.3 %. Perceived discrimination was not significantly related to self-rated less than good health.

Over a period of 2 years, participants from the low income group were significantly more likely to rate their health as less than good (OR = 1.56, 95 % CI 1.11–2.19) and to report feeling hindered by health problems (OR = 2.15, 95 % CI 1.52–3.04) (Table 4). Mediation as assessed by comparing the income effect before and after control for perceived discrimination was small. The income effect on self-rated health in the low income group decreased by 0.9 % and the effect of income on feeling hindered by health problems decreased by 0.3 %.

Using continuous health outcome measures in linear regression analyses showed similar results. Furthermore, the main finding of only minor evidence for mediation by

Table 3 Odds ratios (95 % confidence interval) of less than good health ($n = 2{,}139$) and feeling hindered by health problems ($n = 2{,}134$) in 2010 by perceived discrimination, additionally and separately controlled for covariates

	Less than good health 2010				Feeling hindered by health problems 2010			
	OR	95 % CI		%[c]	OR	95 % CI		%
		Lower	Upper			Lower	Upper	
Perceived discrimination effect (unadjusted[a])	1.37	0.84	2.25		**1.58**	1.00	2.48	
Perceived discrimination effect (adjusted[b])	1.39	0.83	2.32	3.8	1.36	0.84	2.18	−38.7
Perceived discrimination effect adjusted for income	1.35	0.82	2.22	−6.5	1.52	0.96	2.40	10.5
Perceived discrimination effect adjusted for gender	1.36	0.83	2.23	−3.5	**1.58**	1.00	2.48	**−0.5**
Perceived discrimination effect adjusted for age	1.54	0.94	2.52	44.6	**1.63**	1.03	2.57	**8.8**
Perceived discrimination effect adjusted for marital status	1.35	0.82	2.22	−5.9	1.54	0.98	2.43	−6.9
Perceived discrimination effect adjusted for ethnicity	1.33	0.80	2.22	−10.2	1.36	0.86	2.17	−37.3

Longitudinal Internet Studies for the Social sciences panel, the Netherlands, 2008–2010, *Bold P* value < 0.05

[a] Adjusted to health/hinder 2008

[b] Adjusted for health/feeling hindered 2008, income, gender, age, marital status, and ethnicity

[c] Percent change in discrimination effect compared with unadjusted model

Table 4 Odds ratios (95 % confidence interval) of less than good health ($n = 2{,}139$) and feeling hindered by health problems ($n = 2{,}134$) in 2010 by income, controlled for covariates and additionally by perceived discrimination

	Less than good health 2010								Feeling hindered by health problems 2010							
	Moderate income group[a]				Low income group[a]				Moderate income group[a]				Low income group[a]			
	OR	95 % CI		%[c]	OR	95 % CI		%	OR	95 % CI		%	OR	95 % CI		%
		Lower	Upper			Lower	Upper			Lower	Upper			Lower	Upper	
Income effect adjusted for covariates[b]	1.39	0.99	1.95		**1.56**	1.11	2.19		**1.64**	1.14	2.34		**2.15**	1.52	3.04	
Income effect adjusted for covariates[b] and perceived discrimination	1.39	0.99	1.95	0.8	**1.55**	1.11	2.18	−0.9	**1.64**	1.15	2.35	0.6	**2.14**	1.52	3.03	−0.3

Longitudinal Internet Studies for the Social sciences panel, the Netherlands, 2008–2010. *Bold P* value < 0.05

[a] Reference category = high income group

[b] Adjusted for health/feeling hindered 2008, income, gender, age, marital status and ethnicity

[c] Percent change in income effect after including perceived discrimination

perceived discrimination in the low-income–poor-health association was also substantiated when equivalent net income was divided into five categories based on quintiles, when education instead of income was used, and when models in 2008 cross-sectional data were estimated. Finally, no consistent statistically significant interactions between the main variables in the model were present, indicating similar findings across sub-groups. Hence, there was also no evidence for major mediation in either immigrants or non-immigrants.

Discussion

Even over a relatively short follow-up of 2 years, our study among Dutch men and women between 18 and 88 years of age was able to find evidence for income-related health inequalities, income-related perceived discrimination and perceived discrimination-related health inequalities. However, as immigrants were more common among the lower income groups, among the persons who perceived themselves discriminated against, and among those with poor health, ethnicity appeared an important confounder. After control for ethnicity, people from the lower income groups still had a 1.33 higher odds of perceiving discrimination, but this was no longer statistically significant. In addition, poor health partly "explained" why lower income groups were more likely to perceive discrimination. Possibly, these participants perceive themselves discriminated against because of their health status, and with perceived discrimination leading to poor health, this points to the possibility of a negative spiral between health and

perceived discrimination. Most importantly, however, there was no substantial evidence for a mediating effect of perceived discrimination on the relation between low income and poor health. Although we only found small effects, the results were in line with a small number of previous studies (Kessler et al. 1999, Fuller-Rowell et al. 2012; Gamarel et al. 2012).

Results of this study showed that ethnicity is strongly related to low income, perceived discrimination, and poor health reports. Previous studies on racial health inequalities and discrimination already emphasised the importance of unravelling how low socioeconomic position, perceived discrimination, and ethnic background hang together in their influence on health outcomes (Weeks and Lupfer 2004; D'Anna et al. 2010). Based on an extensive review, Myers (2009) describing the SES–ethnicity interaction and the complex relation with health, concluded that it is still unclear whether there are additive or synergistic effects of ethnicity: the health damage caused by SES-related stressors might or might not be exacerbated for individuals with different ethnic backgrounds (Myers 2009). Future studies should thus take account of the complex interplay between socioeconomic position and ethnic background underlying perceived discrimination and its consequences for health. The interplay even becomes more complex if one takes into account that adverse socioeconomic conditions (in the country of origin) might be the cause of being an immigrant in addition to the immigrant status influencing further socioeconomic attainment processes (in the country of destination).

Income-related perceived discrimination might vary between countries regarding its prevalence and impact on health and the socioeconomic differences therein. In more meritocratic countries, where there are many "objective" opportunities for upward (income) mobility, the stronger belief in such opportunities might also be related to stronger stigmatisation and discrimination of those who (still) end up in the lower economic ranks of society (Bosma et al. 2012). It would thus be interesting to study whether in countries with stronger meritocratic beliefs than the Netherlands, discrimination of lower income groups would be more common and would have more substantial consequences for health and income-related differences in health.

The precise processes that are involved in how society looks at people at the bottom of the social hierarchy probably deserve a much broader conceptualisation and operationalisation than the single item that we had to rely on. Asking participants whether or not they belong to a discriminated group might not fully correspond with the participants' perception of themselves being discriminated against. Neither did this single item specifically measure income-related perceived discrimination. Our findings, e.g. suggest that ethnicity and poor health might also be a reason why the lower income groups more often perceive discriminated against. Perhaps the concept should even be broadened to encompass social class-related discrimination, in which discrimination is also considered regarding the other aspects of social class, such as occupational and educational achievements and prestige. The 'Everyday Discrimination Scale' (Williams et al. 1997), e.g. allows the measurement of different reasons for discrimination. In adapted form, this questionnaire has been used to examine the role of perceived discrimination within socioeconomic health inequalities (e.g. Kessler et al. 1999; Fuller-Rowell et al. 2012). Furthermore, conceptually and empirically, the discriminatory processes could additionally be looked at from the perspective of stigmatisation. Stigmatisation more explicitly includes negative attitudes towards and stereotyping of people from lower social classes and can be conceptualised from the perspective of either the "subordinated" groups ("felt stigma") or the whole society ("enacted stigma"), or both (Phelan et al. 2008). In short, classism (class-related discrimination and stigmatisation) and its relation to socioeconomic differences in health need more theoretical consideration and better measurements.

Further methodological considerations

Because of the many self-reported measures, reporting bias could be a problem. Negative affectivity could have inflated our findings, although its bias would have been attenuated due to the longitudinal approach (controlling for baseline health). Furthermore, income has the drawback of being unreliable (Bradshaw and Finch 2003). By categorising income, however, the influence of (unreliable) extreme incomes was restricted. Finally, the LISS panel generally is a good representation of the Dutch society (De Vos 2010), e.g. participants without computer and internet connection received a computer and internet connection from CentERdata. However, the study population underrepresented immigrants: 19.9 % of the Dutch population had an immigrant status (45 % non-Western background) (Statistics Netherlands 2009), while only 10.9 % of the LISS panel members had an immigrant status (31.6 % non-Western background). Non-Western immigrants were also more likely to be lost during the two-year follow-up. Being younger, however, was the dominant predictor of dropout. Baseline self-reported health, income, and perceived discrimination were not independently related to drop-out (not tabulated). It is unclear how this pattern of attrition might have biased our findings.

Conclusions

Although the lower income groups perceived themselves more often discriminated against and perceived discrimination

heightened risks of poor health reports, perceived discrimination had only a small contribution to the higher risks of poor health reports in the lower income groups. This was mostly due to the complex interplay between socioeconomic status and ethnicity. By reflecting on possible between-country differences in meritocratic beliefs, this study emphasises the importance of a more in-depth study of stereotyping, stigmatisation, and discrimination in relation to socioeconomic health inequalities.

Acknowledgments This paper draws on data of the Longitudinal Internet Studies for the Social sciences (LISS) panel of CentERdata. The LISS panel data were collected by CentERdata (Tilburg University, The Netherlands) through its Measurement and Experimentation in the Social Sciences (MESS) project funded by the Netherlands Organisation for Scientific Research.

Conflict of interest The authors declare that they have no conflict of interest.

Contributors AS performed the statistical analyses and drafted the manuscript. AS and HB formulated the hypotheses. DG and HB helped to interpret the data. All authors (AS, DG, HB) edited and approved the final manuscript.

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