Socioeconomic inequalities in attitudes towards cancer: an international cancer benchmarking partnership study

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Socioeconomic status (SES) differences in attitudes towards cancer have been implicated in the differential screening uptake and the timeliness of symptomatic presentation. However, the predominant emphasis of this work has been on cancer fatalism, and many studies focus on specific community subgroups. This study aimed to assess SES differences in positive and negative attitudes towards cancer in UK adults. A population-based sample of UK adults ($n = 6965$, age ≥ 50 years) completed the Awareness and Beliefs about Cancer scale, including six belief items: three positively framed (e.g. 'Cancer can often be cured') and three negatively framed (e.g. 'A cancer diagnosis is a death sentence'). SES was indexed by education. Analyses controlled for sex, ethnicity, marital status, age, self-rated health, and cancer experience. There were few education-level differences for the positive statements, and overall agreement was high (all > 90%). In contrast, there were strong differences for negative statements (all Ps < 0.001). Among respondents with lower education levels, 57% agreed that 'treatment is worse than cancer', 27% that cancer is 'a death sentence' and 16% 'would not want to know if I have cancer'. Among those with university education, the respective proportions were 34, 17 and 6%. Differences were not explained by cancer experience or health status. In conclusion, positive statements about cancer outcomes attract near-universal agreement. However, this optimistic perspective coexists alongside widespread fears about survival and treatment, especially among less-educated groups. Health education campaigns targeting socioeconomically disadvantaged groups might benefit from a focus on reducing negative attitudes, which is not necessarily achieved by promoting positive attitudes. *European Journal of Cancer Prevention* **24:253–260**

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Introduction

Inequalities in cancer survival by socioeconomic status (SES) are seen even in countries whose medical systems provide care without cost at the point of delivery (Jeffreys *et al.*, 2009; Booth *et al.*, 2010; Rachet *et al.*, 2010). Part of the survival gradient is explained by later-stage disease at diagnosis among lower SES groups (Woods *et al.*, 2006; Rutherford *et al.*, 2013).

Analyses of UK data suggest that SES differences in the stage at diagnosis tend to be highest for cancers with a clear 'symptom signature' (e.g. breast cancer) (Lyratzopoulos *et al.*, 2013). In these cancers, there is little or no SES difference in the number of medical contacts before diagnosis (Lyratzopoulos *et al.*, 2012), but there are differences in the time interval between the patient noticing the symptom and seeking medical help (Macleod *et al.*, 2009). Although this could be due to a lack of awareness of the implication of the symptom, SES differences in help-seeking intervals are seen for cancers for which public awareness is high. This suggests that other factors, which could include attitudes towards a cancer diagnosis, play a role in delayed help-seeking.

Fatalistic attitudes (the belief that cancer risk is predetermined and invariably fatal) have been reported to be more common in lower SES groups (Niederdeppe and Levy, 2007; Beeken *et al.*, 2011; Espinosa de los Monteros and Gallo, 2011; Miles *et al.*, 2011). Qualitative analyses implicate a more general pessimism about cancer outcomes (Balshem, 1991; Peek *et al.*, 2008), and some quantitative studies support this idea. For example, levels of cancer worry have been found to be higher in lower SES groups (Wardle *et al.*, 2004; Byrne *et al.*, 2008) and the value of early detection lower (Beeken *et al.*, 2011). One US survey found educational differences in

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endorsing myths about cancer surgery (Gansler *et al.*, 2005), and in a sample of British women, those in manual (vs. professional) occupations were more concerned that breast cancer surgery would lead to disfigurement (Grunfeld *et al.*, 2002). However, in the same sample, there were no differences in attitudes towards breast cancer patients' quality of life, and women from manual backgrounds were more likely to believe that treatment would be beneficial, indicating that attitudes of women from lower SES backgrounds are not entirely negative.

Qualitative studies have also found some evidence of positive and negative attitudes coexisting. Adults from deprived areas in Scotland expressed despair about cancer, but also acknowledged the benefits of early detection (Rowa-Dewar *et al.*, 2007). A similar observation was made within a socioeconomically diverse sample, suggesting that coexisting positive and negative cancer beliefs could characterize public discourse more generally (Robb *et al.*, 2014). These findings suggest that SES inequalities in cancer attitudes may be more nuanced; perhaps they are overlooked owing to the predominant focus on negative attitudes in previous research. There is a need to understand the balance of both positive and negative cancer beliefs across socioeconomic groups to direct campaigns that engage hard-to-reach groups effectively. We provide the first population-based quantitative study to examine this issue specifically.

Materials and methods

Data were collected in 2011 as part of the International Cancer Benchmarking Partnership (ICBP; CR-UK, 2010). The present analyses use respondents from the UK (England, Wales and Northern Ireland). Landline telephone numbers were sampled from electronic listings using random probability sampling methods. The final two digits of each telephone number were exchanged for two random digits, to include unlisted numbers. For households with two or more eligible adults, the 'Rizzo' method was used to select one adult at random (Rizzo *et al.*, 2004). Ethical approval was sought within each jurisdiction.

Measures

Telephone interviewers administered the Awareness and Beliefs about Cancer Measure (ABC: Simon *et al.*, 2012). Cancer beliefs were assessed with six items: three were positively framed items (P1: These days, many people with cancer can expect to continue with normal activities and responsibilities; P2: Cancer can often be cured; P3: Going to the doctor as quickly as possible after noticing a symptom of cancer could increase the chances of surviving) and three were negatively framed items (N1: A cancer diagnosis is a death sentence; N2: I would not want to know if I have cancer; N3: Most cancer treatment is worse than cancer itself). The item order was rotated to minimize response bias. Respondents were asked: 'Can you tell me how much you agree or disagree with each item', with response categories of strongly disagree, tend to disagree, tend to agree, strongly agree and don't know. Responses were combined into strongly disagree/agree versus disagree/strongly disagree/don't know because we were specifically interested in the predictors of agreement, and excluding cases who responded 'don't know' would have inflated the apparent percentage agreeing. However, we also carried out a sensitivity analysis, repeating the analyses after excluding cases with 'don't know' responses for any item.

Information was collected on age, sex, marital status and ethnicity. Marital status was grouped into 'single, divorced or widowed' and 'married or cohabiting'. Because of the low number of respondents in any one ethnic subgroup, ethnicity was grouped into 'White' and 'non-White'. As a marker of SES, respondents reported their highest level of education (left school at or before the age of 15 years; Certificate of Secondary Education, O-levels or equivalent, A-levels or equivalent, university degree). We used a single item measure of self-rated health (very good, good, fair, poor, very poor), common in previous studies (e.g. DeSalvo *et al.*, 2006). Cancer experience was assessed by asking respondents, 'Have you, or any friends or family members that are close to you, ever been diagnosed with cancer?' For analyses, responses were dichotomised as yes (self, someone close, both or prefer not to say who) or no.

Analyses

To correct for over-representation and under-representation of particular demographic groups, cases were weighted to reflect the distribution of demographic characteristics of adults over 50 years of age in the UK. A design weight was also applied that adjusted for the number of eligible adults in each household and the relative sizes of each country's population. For further information regarding data sources and weighting methods, see the online supplementary information in the ICBP report (Forbes *et al.*, 2013).

Associations between demographic variables and beliefs were explored using χ^2 analyses. Multivariable logistic regression analyses were used to assess the independent effects of age, sex, marital status, ethnicity and education, adjusted for UK region, self-rated health and cancer experience. For the main analyses, six regression models were computed, predicting agreement with each belief.

Results

The target sample was 6000 adults aged at least 50 years across England, Wales and Northern Ireland. A total of 24 231 households were successfully contacted and assessed for eligibility, from which 10 977 individuals aged at least 50 years were identified, and 6965 completed the interview, giving a response rate of 19.4% (response rate type 3; The American Association of Public Opinion

Table 1 Participant characteristics ($n = 6965$)[a]

	Raw data [*n* (%)]	Weighted data [*n* (%)]
Sex		
Female	4330 (62.2)	4330 (53.6)
Male	2635 (37.8)	2635 (46.4)
Age (years)		
50–59	2333 (33.5)	2333 (34.3)
60–69	2519 (36.2)	2519 (30.9)
70 +	2048 (29.4)	2048 (34.8)
Marital status		
Married/cohabiting	3787 (54.4)	3787 (64.1)
Single/divorced/widowed	3144 (45.1)	3144 (35.9)
Region		
England	2360 (33.9)	2360 (91.4)
Wales	2298 (33.0)	2298 (5.8)
Northern Ireland	2307 (33.1)	2307 (2.9)
Ethnic group		
White	6830 (98.1)	6830 (96.8)
Not White	117 (1.7)	117 (3.2)
Highest education		
Finished school at/before age 15	2140 (30.7)	2140 (51.0)
Certificate of Secondary Education, O-levels or equivalent	1453 (20.9)	1453 (15.2)
A-levels or further education	1631 (23.4)	1631 (18.5)
University degree	1569 (22.5)	1569 (15.3)

[a]Totals may not sum due to missing data.

Research, 2011). This type of response rate was used because the denominator of eligible individuals was unknown (see the ICBP report: Forbes *et al.*, 2013).

Table 1 shows raw and weighted sample characteristics. Respondents' average age was 63 years (SD = 18.3). The majority were White (98.1% in the unweighted sample and 96.8% after weighting) and female (62.2 and 53.2%, respectively). A minority had university level education (22.5 and 15.2%). The majority (69%) rated their health as good or very good, and most (80.1%) had experienced cancer personally or in close others.

Positive beliefs

On the basis of endorsement of the positive beliefs, attitudes towards cancer were strongly optimistic, with 90% agreeing that 'cancer can often be cured', 98% that 'going to the doctors quickly can increase the chance of surviving', and 88% that you can 'continue with normal activities and responsibilities' after a cancer diagnosis (Table 2).

Demographic differences were small (Table 3). There were some differences by education, with 97% of those with basic education agreeing that going to the doctor early increases the chance of surviving, as compared with 99% of those with a university education, 85 versus 92% for 'continue with normal activities', and 88 versus 92% for 'cancer can often be cured'. There were no significant differences by sex or country. Older respondents were slightly less positive about the value of early presentation (95% in ≥ 70 years vs. 99% in 50–59 years), cure (87 vs. 93%) and continuing with normal activities (84 vs. 91%), with all effects significant in multivariable analyses. Unmarried individuals were slightly less positive than married individuals (87 vs. 92% for cure; 84 vs. 90% for 'continue with normal activities'), which was also significant in multivariable analyses. The only significant ethnic difference was a slightly lower endorsement of the value of early diagnosis in ethnic minority respondents (93 vs. 98%).

Respondents who rated their health as poor or very poor were less likely to believe that someone with cancer can continue as normal (78 vs. 90%), but there were no significant differences by health status for other positive items. Cancer experience was not significantly associated with any of the positive statements.

Analyses were repeated excluding all cases with 'don't know' responses for any of the belief items ($n = 5139$). The pattern of results remained the same although the absolute differences were smaller and some of the associations were no longer significant.

Negative beliefs

The picture that emerged from the negative beliefs was far from the mirror image of the positive beliefs, either in terms of the numbers endorsing each item (Table 2) or

Table 2 Frequencies describing the pattern of responses to each belief item ($n = 6965$)[a]

	Agree [*n* (%)]	Disagree [*n* (%)]	Don't know [*n* (%)]
Positive			
P1			
These days, many people with cancer can expect to continue with normal activities and responsibilities	6128 (88.0)	566 (7.9)	260 (4.1)
P2			
Cancer can often be cured	6242 (89.9)	569 (7.6)	146 (2.5)
P3			
Going to the doctor as quickly as possible after noticing a symptom of cancer could increase the chances of surviving	6827 (97.6)	104 (1.7)	34 (0.7)
Negative			
N1			
A diagnosis of cancer is a death sentence	1749 (23.5)	4895 (71.6)	300 (4.9)
N2			
I would not want to know if I have cancer	858 (11.7)	5898 (85.8)	204 (2.5)
N3			
Most cancer treatment is worse than cancer itself	3521 (50.4)	2335 (31.9)	1088 (17.7)

[a]Participants who refused were excluded. Small discrepancies in figures compared with the international ICBP report (Forbes *et al.*, 2013) are explained by our inclusion of 'don't know' responders and a difference in weighting methods.

Table 3 Frequencies and multivariable logistic regression models predicting agreement (agree or strongly agree) with positively framed cancer beliefs[a]

	P1 'continue with normal activities'				P2 'cancer can often be cured'				P3 'going to the doctors quickly increases chances of surviving'			
	Agree	(*N* = 6679)			Agree	(*N* = 6681)			Agree	(*N* = 6688)		
	[*n* (%)]	OR	95% CI	*P*	[*n* (%)]	OR	95% CI	*P*	[*n* (%)]	OR	95% CI	*P*
Total sample	6128 (88.0)	–	–	–	6242 (89.9)	–	–	–	6827 (97.6)	–	–	–
Age												
50–59	2080 (91.5)**	1.00	–	–	2117 (93.1)*	1.00	–	–	2295 (99.3)**	1.00	–	–
60–69	2251 (88.3)	0.81	0.57–1.15	0.239	2273 (89.6)	0.73	0.50–1.05	0.087	2485 (98.3)	0.44	0.18–1.06	0.065
70 +	1744 (84.3)	0.68	0.48–0.96	0.028	1796 (87.1)	0.62	0.43–0.89	0.009	1984 (95.3)	0.18	0.09–0.39	0.000
Sex												
Male	2323 (87.6)	1.00	–	–	2332 (89.2)	1.00	–	–	2586 (97.8)	1.00	–	–
Female	3805 (88.2)	1.17	0.87–1.56	0.304	3910 (90.5)	1.25	0.93–1.68	0.149	4241 (97.5)	1.14	0.61–2.14	0.675
Marital status												
Married/cohabiting	3429 (90.3)**	1.00	–	–	3465 (91.7)**	1.00	–	–	3731 (98.3)	1.00	–	–
Single/divorced/widowed	2671 (83.9)	0.65	0.48–0.88	0.005	2752 (86.9)	0.63	0.46–0.86	0.004	3067 (96.4)	0.62	0.33–1.16	0.137
Ethnicity												
White	6008 (87.9)	1.00	–	–	6125 (90.0)	1.00	–	–	6698 (97.8)	1.00	–	–
Not White	108 (93.3)	1.62	0.55–4.80	0.385	102 (89.8)	0.76	0.30–1.90	0.558	112 (93.1)	0.14	0.04–0.58	0.006
Highest education												
Degree	1441 (92.0)**	1.00	–	–	1437 (92.4)	1.00	–	–	1554 (99.2)**	1.00	–	–
A-levels/further	1456 (91.3)	1.03	0.67–1.59	0.901	1488 (90.7)	0.81	0.52–1.25	0.340	1604 (98.8)	0.71	0.26–1.96	0.506
Certificate of Secondary Education/O-levels/ equivalent	1296 (90.7)	0.91	0.58–1.42	0.666	1317 (92.3)	1.00	0.63–1.57	0.992	1432 (98.8)	0.60	0.19–1.89	0.382
Left school at/before age 15	1790 (84.8)	0.67	0.45–0.98	0.037	1859 (88.4)	0.78	0.52–1.16	0.219	2076 (96.6)	0.31	0.11–0.82	0.018
Self-rated health												
Good/very good	4391 (90.0)**	1.00	–	–	4396 (90.5)	1.00	–	–	4778 (97.7)	1.00	–	–
Fair	1282 (84.8)	0.69	0.49–0.96	0.029	1352 (89.9)	1.02	0.71–1.46	0.927	1489 (97.8)	1.59	0.73–3.44	0.241
Poor/very poor	441 (77.6)	0.43	0.27–0.68	0.000	479 (86.4)	0.77	0.44–1.34	0.348	540 (96.6)	0.77	0.26–2.28	0.636
Cancer experience												
None	1214 (85.7)	1.00	–	–	1221 (87.0)	1.00	–	–	1352 (97.0)	1.00	–	–
Self/close other	4912 (88.6)	1.20	0.84–1.70	0.317	5020 (90.7)	1.39	0.97–2.00	0.077	5473 (97.8)	1.23	0.59–2.57	0.573

CI, confidence interval; OR, odds ratio.
[a]Adjusting for region (England, Wales, Northern Ireland).
*χ^2, $P < 0.01$.
**χ^2, $P < 0.001$.

the demographic associations (Table 4). Almost a quarter (24%) of the participants thought that a 'cancer diagnosis is a death sentence', half of them thought that 'most cancer treatment is worse than cancer' and 12% 'would not want to know if I have cancer'.

Respondents with basic education were substantially more likely to endorse each of the negative beliefs than those with a university education: 27 versus 17% for 'cancer is a death sentence', 57 versus 34% for most 'cancer treatment is worse than cancer' and 16 versus 6% for 'would not want to know if I have cancer', with all effects graded across levels of education. More women than men felt negative about treatment (57 vs. 42%), but there were no other sex differences. There were no significant differences by marital status, age, ethnicity, UK nation or self-rated health.

In terms of cancer experience, those with experience were less likely to say that they wouldn't want to know (11 vs. 15%), which was significant in the multiple regression ($P = 0.04$). There were no other significant associations.

The analyses were repeated excluding cases responding 'don't know' to any item ($n = 5139$). The pattern of associations was unchanged, and most effects remained significant (data not shown).

Coexisting beliefs

As is apparent from the percentages, many respondents simultaneously held opposing positive and negative cancer beliefs. For example, a fifth agreed that 'a cancer diagnosis is a death sentence', but also that 'cancer can often be cured'. The demographic characteristics associated with endorsing both beliefs were inevitably largely the same as for the negative beliefs, because endorsement of positive beliefs was consistently high. More respondents from the lowest education group therefore held both positive and negative beliefs than those with a university education (23 vs. 15%).

Discussion

This is the first large-scale study to explore the sociodemographic patterning of attitudes towards different cancer outcomes using both negatively and positively framed belief items. On the basis of the responses to the positively framed items, attitudes towards cancer were almost universally optimistic, with between 88 and 98% of the respondents endorsing the value of early diagnosis,

Table 4 **Frequencies and multivariable logistic regression models predicting agreement (agree or strongly agree) with negatively framed cancer beliefs[a]**

	N1 'cancer diagnosis is a death sentence'				N2 'not want to know if I have cancer'				N3 'cancer treatment worse than cancer'			
	Agree		(*N* = 6671)		Agree		(*N* = 6683)		Agree		(*N* = 6669)	
	[*n* (%)]	OR	95% CI	*P*	[*n* (%)]	OR	95% CI	*P*	[*n* (%)]	OR	95% CI	*P*
Total sample	1749 (23.5)	–	–	–	858 (11.7)	–	–	–	3521 (50.4)	–	–	–
Age												
50–59	609 (23.4)	1.00	–	–	232 (8.3)**	1.00	–	–	1155 (48.2)	1.00	–	–
60–69	629 (24.4)	0.94	0.72–1.25	0.683	307 (11.1)	1.09	0.73–1.63	0.666	1316 (52.9)	1.06	0.84–1.35	0.617
70+	497 (22.6)	0.77	0.57–1.05	0.100	313 (15.7)	1.47	0.97–2.23	0.068	1015 (50.1)	0.84	0.65–1.10	0.206
Sex												
Male	646 (22.1)	1.00	–	–	359 (11.9)	1.00	–	–	1100 (42.3)**	1.00	–	–
Female	1103 (24.7)	1.16	0.92–1.46	0.208	499 (11.5)	0.92	0.68–1.25	0.593	2421 (57.3)	1.79	1.47–2.18	0.000
Marital status												
Married/cohabiting	914 (23.1)	1.00	–	–	421 (10.1)*	1.00	–	–	1883 (50.4)	1.00	–	–
Single/divorced/widowed	822 (23.8)	1.03	0.82–1.28	0.825	433 (14.5)	1.22	0.89–1.67	0.227	1621 (49.9)	0.88	0.72–1.07	0.193
Ethnicity												
White	1704 (23.3)	1.00	–	–	837 (11.6)	1.00	–	–	3452 (50.4)	1.00	–	–
Not White	39 (29.4)	1.30	0.73–2.30	0.377	16 (13.3)	0.98	0.41–2.34	0.958	60 (50.1)	1.21	0.71–2.05	0.481
Highest education												
Degree	308 (17.3)**	1.00	–	–	110 (5.5)**	1.00	–	–	587 (33.5)**	1.00	–	–
A-levels/further	321 (18.6)	1.16	0.85–1.59	0.345	139 (5.9)	1.01	0.61–1.69	0.962	811 (46.6)	1.72	1.34–2.20	0.000
Certificate of Secondary Education/O-levels/equivalent	395 (24.9)	1.66	1.22–2.25	0.001	172 (10.8)	2.12	1.28–3.50	0.004	767 (51.3)	1.94	1.49–2.51	0.000
Left school at/before age 15	673 (26.7)	1.94	1.43–2.63	0.000	402 (15.6)	2.66	1.69–4.18	0.000	1267 (56.7)	2.64	2.04–3.43	0.000
Self-rated health												
Good/very good	1163 (23.4)	1.00	–	–	550 (10.5)	1.00	–	–	2390 (49.0)	1.00	–	–
Fair	414 (22.9)	0.89	0.67–1.18	0.409	213 (13.5)	1.15	0.81–1.63	0.447	803 (54.7)	1.22	0.96–1.55	0.111
Poor/very poor	166 (26.6)	1.12	0.75–1.68	0.580	93 (18.0)	1.57	0.94–2.61	0.083	322 (50.0)	0.90	0.62–1.32	0.587
Cancer experience												
None	366 (25.8)	1.00	–	–	220 (15.4)	1.00	–	–	663 (45.6)	1.00	–	–
Self/close other	1382 (22.8)	0.86	0.66–1.14	0.294	638 (10.7)	0.70	0.50–0.98	0.040	2858 (51.7)	1.19	0.93–1.51	0.163

CI, confidence interval; OR, odds ratio.
[a]Adjusting for region (England, Wales, Northern Ireland).
*χ^2, $P < 0.01$.
**χ^2, $P < 0.001$.

the chance of cure and the prospect of a normal life after a cancer diagnosis. The value attached to early detection has been observed previously, with these studies also reporting high percentages (e.g. 91%, Beeken *et al.*, 2011; 85%, National Cancer Institute, 2007). Combined with the widespread belief that cure and a normal life are possible after cancer, this suggests that the public recognizes that cancer outcomes are improving. There was slightly lower agreement by people with less education, but absolute differences were very small.

A completely different perspective emerged from the negatively framed items. Notwithstanding the near-unanimity on positive items, almost a quarter of respondents saw cancer as a death sentence, 50% thought that treatment is worse than cancer and 12% wouldn't want to know if they had cancer. Those with basic education were substantially more likely to endorse each item. This effect was graded across levels of education and not explained by differences in health status or cancer experience.

This finding is consistent with evidence for a pessimistic outlook about cancer among lower SES groups (Grunfeld *et al.*, 2002; McCaffery *et al.*, 2003; Wardle *et al.*, 2004) and a higher prevalence of fatalistic beliefs (Ramirez *et al.*, 2000; Niederdeppe and Levy, 2007; Peek *et al.*, 2008; Beeken *et al.*, 2011; Espinosa de los Monteros and Gallo, 2011). We had speculated that because the more fatal cancers (e.g. lung, head and neck, pancreas) are more common in lower SES groups (Clegg *et al.*, 2009), this could cause more pessimistic cultural narratives (Balshem, 1991; Shahid and Thompson, 2009; von Wagner *et al.*, 2011). However, there were few associations between cancer experience and beliefs, and controlling for cancer experience did not diminish the educational differences. Interestingly, people with experience of cancer were less likely to 'not want to know'; perhaps contact with the disease alerts people to the value of a proactive approach. Nevertheless, we did not collect data on the type and the valence of these experiences, which may better predict attitudes, or on the experience and knowledge garnered through wider social networks. Previous experience of interactions with healthcare may also help inform expectations of cancer outcomes, as these have been implicated in engagement with cancer screening (Ekberg *et al.*, 2014). Research examining the influence of particular aspects of cancer experience on attitudes is needed.

Clearly, respondents with less education were more likely to be simultaneously hopeful and fearful about cancer outcomes. This largely reflects their greater likelihood of holding negative beliefs. Taking the two most opposing beliefs as an example, believing that cancer is both a 'death sentence' and 'can often be cured,' was most common among individuals with lower education. We cannot infer that holding both beliefs is contradictory. Respondents may have drawn on different scenarios when responding to each statement in light of the diversity of the disease and their experiences. Previously, we showed that the public are aware that survival varies by cancer type (Whitaker *et al.*, 2012). Furthermore, because cancer outcomes are worse in lower SES groups, a mismatch between widely promoted positive cancer messages and negative experiences of cancer is more likely. Perhaps a more conflicting opinion is to be expected from lower SES groups; although they hear wider evidence that cancer outcomes are improving, this may not be borne out within their own social networks. A recent qualitative study suggested that the public discourse around cancer more generally is mixed (Robb *et al.*, 2014), and our present findings extend these results by suggesting that the likelihood of holding conflicting beliefs increases with socioeconomic deprivation. This mirrors the observations of a qualitative study which found that people from disadvantaged neighbourhoods recognize the potential of modern medicine, but also express pessimism (Rowa-Dewar *et al.*, 2007). It also supports the finding that while negatively framed (pessimistic) attitudes in general are strongly graded by SES, the SES gradient for positively framed (optimistic) attitudes is marginal (Robb *et al.*, 2009); hence, this phenomenon may extend beyond cancer-specific attitudes. Together, these findings support our approach of measuring positive and negative beliefs simultaneously.

That one in two respondents perceived cancer treatment to be worse than cancer echoes results from qualitative studies highlighting fear of cancer treatments (Smith *et al.*, 2005). The absolute difference between the numbers of participants with basic education compared with university education agreeing with this belief was very high (57 and 34%), suggesting that fear of cancer treatment is a particular issue in socioeconomically disadvantaged communities, an observation reported by Gansler *et al.* (2005). It is also of note that more women (57%) than men (42%) held this view, which could help explain their higher levels of cancer worry (Wardle *et al.*, 2005; Sach and Whynes, 2009; Keeney *et al.*, 2010). One contributing factor may be the association with disfigurement, which could be more threatening to a woman's identity. Public views of cancer treatment deserve further exploration.

The relative importance of positive and negative beliefs in individuals' decisions to seek medical help or engage in cancer prevention behaviours has not been explored directly. However, studies assessing negative beliefs alone have found higher healthcare avoidance (Moser *et al.*, 2013), lower cancer screening uptake (Miles *et al.*, 2011; Wardle *et al.*, 2004) and fear of help-seeking (Beeken *et al.*, 2011). One implication of these findings is that pessimistic beliefs could maintain social inequalities in cancer outcomes. Despite near-universal recognition that early detection can, in principle, save lives,

this belief may not be powerful enough to counter deep-seated fatalistic beliefs in groups who experience poorer cancer outcomes as their reality. More generally, Nettle (2010) proposes that lower SES individuals perceive less control over their risk of mortality; this results in a more pessimistic outlook, less invested effort in prevention and, consequently, even poorer health outcomes. A concerted effort is needed to address this self-perpetuating and cyclic pessimistic cultural narrative, of which changing attitudes will be a fundamental part.

The study had several limitations. Interviewing by telephone and using only 'landline' numbers excluded individuals without landline telephones. Just 6% of the older adults in the UK are in 'mobile-only' households, but this figure is likely to be higher among lower SES groups (Ofcom, 2013), resulting in their under-representation. Ethnic minority groups were also under-represented and so the null findings should be treated cautiously. We used single items to keep the participant burden low, which reduces reliability, but this was likely to be offset by the large sample size. Again, to reduce participant burden, the only individual-level marker of SES was education. This was selected as appropriate for an older population for whom current income and employment status may be less valid, but alternative markers could produce different results.

Conclusion

We found that older adults in the UK almost unanimously endorse positive statements about improving cancer outcomes and the value of early detection, but many, particularly those with lower levels of education, simultaneously hold negative beliefs. If negative beliefs play an important role in decisions about screening and early presentation, this needs to be considered in designing targeted educational materials about early detection. In particular, health education campaigns targeting socioeconomically deprived groups might benefit from a focus on reducing negative attitudes, not necessarily achieved by promoting positive attitudes. A better understanding of attitudes towards cancer and its associations with cancer control behaviours will help to ensure that cancer control programmes are not only effective but equitable.

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Conflicts of interest

There are no conflicts of interest.

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