

Contents lists available at [ScienceDirect](http://ScienceDirect.com)

## Preventive Medicine

journal homepage: [www.elsevier.com/locate/ypmed](http://www.elsevier.com/locate/ypmed)

## Barriers to healthcare seeking, beliefs about cancer and the role of socio-economic position. A Danish population-based study



Line Hvidberg<sup>a,b,\*</sup>, Christian Nielsen Wulff<sup>c</sup>, Anette Fischer Pedersen<sup>a</sup>, Peter Vedsted<sup>a</sup>

<sup>a</sup> Research Centre for Cancer Diagnosis in Primary Care (CaP), Research Unit for General Practice, Department of Public Health, Aarhus University, Bartholins Allé 2, 8000 Aarhus C, Denmark

<sup>b</sup> Section for General Medical Practice, Department of Public Health, Aarhus University, Bartholins Allé 2, 8000 Aarhus C, Denmark

<sup>c</sup> Department of Oncology, Aarhus University Hospital, Noerrebrogade 44, 8000 Aarhus C, Denmark

## ARTICLE INFO

Available online 15 December 2014

## Keywords:

Denmark  
Cancer  
Barriers  
Beliefs  
Healthcare seeking  
Socio-economic position  
Inequality

## ABSTRACT

**Background.** Cancer-related health behaviours may be affected by barriers to healthcare seeking and beliefs about cancer. The aim was to assess anticipated barriers to healthcare seeking and beliefs about cancer in a sample of the Danish population and to assess the association with socio-economic position.

**Methods.** A population-based telephone interview with 3000 randomly sampled persons aged 30 years or older was performed using the Awareness and Beliefs about Cancer measure from 31 May to 4 July 2011. The Awareness and Beliefs about Cancer measure includes statements about four anticipated barriers to healthcare seeking and three positively and three negatively framed beliefs about cancer. For all persons, register-based information on socio-economic position was obtained through Statistics Denmark.

**Results.** Two anticipated barriers, worry about what the doctor might find and worry about wasting the doctor's time, were present among 27% and 15% of the respondents, respectively. Overall, a high proportion of respondents concurred with positive beliefs about cancer; fewer concurred with negative beliefs. Having a low educational level and a low household income were strongly associated with having negative beliefs about cancer.

**Conclusion.** The fact that worry about what the doctor might find and worry about wasting the doctor's time were commonly reported barriers call for initiatives in general practice. The association between low educational level and low household income and negative beliefs about cancer might to some degree explain the negative socio-economic gradient in cancer outcome.

© 2014 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

British and Danish cancer patients' survival rates lag behind cancer patients' survival rates in comparable countries and have done so for several decades (Coleman et al., 2011; Engeland et al., 1998). Moreover, the trend for people with lower socio-economic position (SEP) to have poorer cancer survival than people with higher SEP also appears to be more outspoken in Britain and Denmark than in other countries (Dalton et al., 2008; Ellis et al., 2012). For example for persons aged 30 years or more in Denmark the relative 5-year survival for all cancers of women with basic or high-school education is 50% compared with 62% for women with higher education (Dalton et al., 2008).

Attending screening programmes for cancer and timely healthcare seeking when experiencing a possible sign of cancer contribute to earlier detection of cancer (Arndt et al., 2002; Nystrom et al., 2002).

However, in Denmark, 20–25% of women invited for screening for breast cancer do not participate (Langagergaard et al., 2013), and especially women with a lower SEP are less likely to participate (Jensen et al., 2012). In addition, the patient interval (i.e. the time from the first symptom is experienced until healthcare is sought (Weller et al., 2012)) is more than two months for 25% of cancer patients (Hansen et al., 2011).

Studies have shown that healthcare seeking and screening attendance may be affected by anticipated barriers and beliefs about cancer (de Nooijer et al., 2001; Lagerlund et al., 2000; Simon et al., 2010). Studies of the patient interval have found that people who had experienced a possible cancer symptom and who anticipated more emotional and/or practical barriers to healthcare seeking were less likely to have seen a doctor (Simon et al., 2010). In a qualitative study, de Nooijer et al. (2001) found that beliefs that the general practitioner (GP) could be of assistance shortened the patient interval. A Swedish study found that women who believed that breast cancer is an incurable disease even if detected early and who stated emotional barriers such as 'consulting healthcare in general is unpleasant' were more likely not to attend screening (Lagerlund et al., 2000).

The assumption underpinning this study is that different anticipations of barriers to healthcare seeking and cancer-related beliefs may

\* Corresponding author at: Research Centre for Cancer Diagnosis in Primary Care (CaP), Research Unit for General Practice, Department of Public Health, Aarhus University, Bartholins Allé 2, 8000 Aarhus C, Denmark.

E-mail addresses: [LINE.HVIDBERG@PH.AU.DK](mailto:LINE.HVIDBERG@PH.AU.DK) (L. Hvidberg), [CHRIVULFF@RM.DK](mailto:CHRIVULFF@RM.DK) (C.N. Wulff), [AFP@PH.AU.DK](mailto:AFP@PH.AU.DK) (A.F. Pedersen), [P.VESTED@PH.AU.DK](mailto:P.VESTED@PH.AU.DK) (P. Vedsted).

be associated with SEP and that these factors affect cancer-related health seeking behaviours and ultimately explain some of the observed differences in stage at diagnosis and survival. Thus, the aim of this study was to access anticipated barriers to healthcare seeking and beliefs about cancer in a sample of the Danish population and to analyse the association with SEP.

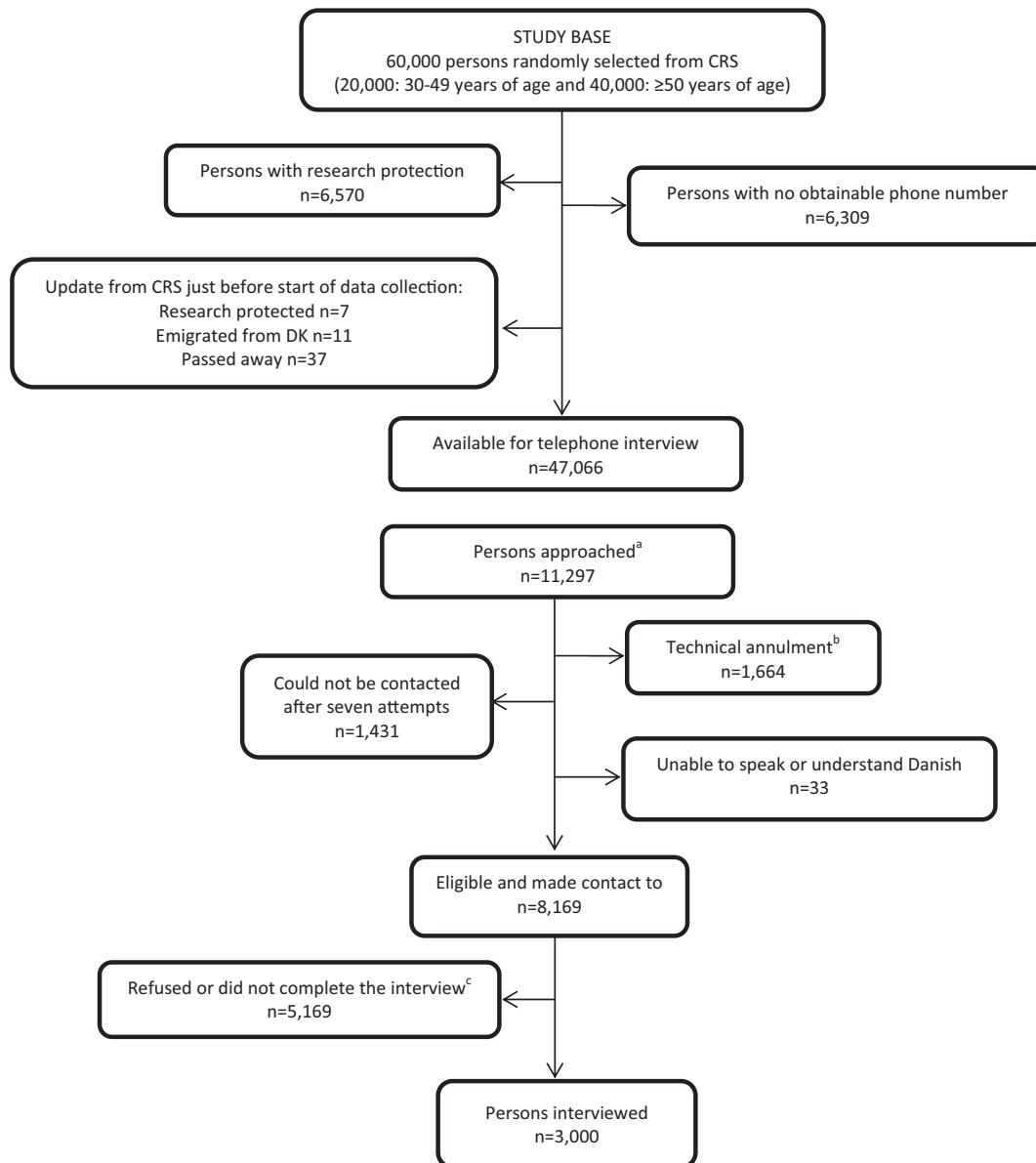
## Methods

### Study population and data collection

The study population consisted of adults 30 years of age and older residing in Denmark. A total of 20,000 residents 30–49 years of age and 40,000 residents 50 years of age and older were randomly selected through the Danish Civil Registration System (CRS) (Pedersen et al., 2006). The latter age group was

the primary target population for the ABC measure in ICBP, module 2 and the former was among other included in Denmark, because inclusion of a younger age group is important in terms of both cancer prevention and early detection of cancer. Persons who had disclaimed any contact for research purposes (Thorsted, 2007) were excluded ( $n = 6570$ , 11.0%). Landline and/or mobile phone numbers for the 53,430 persons left were retrieved from a national market research and consulting firm (NN Markedsdata).

For the purpose of the present study, we set a target population of 1000 respondents 30–49 years of age and 2000 respondents aged 50 years and older completing a computer-assisted telephone interview. Data were collected from 31 May to 4 July 2011 as part of the International Cancer Benchmarking Partnership (ICBP) Module 2 study (Butler et al., 2013). The interviews were conducted by trained native-speaking interviewers from the research company, Ipsos MORI (2013), who used the Awareness and Beliefs about Cancer (ABC) measure (Simon et al., 2012) which has been translated into Danish using the forward and backward translation procedure suggested by the de Vet et al.



**Fig. 1.** Flowchart of inclusion and exclusion to obtain the target sample size. <sup>a</sup> Data collection was continued until the target of 3000 respondents was reached. In order to reach this, 11,297 persons were approached out of 47,066 persons available. <sup>b</sup> Incomplete/unobtainable number ( $n = 1328$ ); wrong number ( $n = 326$ ); business/fax number ( $n = 8$ ) and number barred ( $n = 2$ ). <sup>c</sup> Refused to take part (before or after it was known whether or not it was the person eligible for study participation) ( $n = 4736$ ); stopped the interview ( $n = 154$ ); the person eligible for study participation asked to be called back at a later date, but could not be contacted again ( $n = 141$ ); the persons answering the phone did not want to speak to the interviewer ( $n = 92$ ); another stated that the person eligible for the study was not available during data collection period ( $n = 31$ ) and the person stated that he/she was not in the age group anyway ( $n = 15$ ). In total, 1456 and 3713 of people aged 30–49 years and 50 years and older, respectively, refused or did not complete the interview.

(2011). Each potential interviewee was contacted on up to seven occasions on different days and times of the day. An average interview lasted approximately 20 min. Interviews were not performed if the person was unable to speak or understand Danish. Fig. 1 shows the flowchart of inclusion and exclusion to obtain the target sample size. As can be seen, the study base consisted of 60,000 persons. This relatively large sample was among other chosen in order to be confident that the target population of overall 3000 respondents could be reached and moreover, persons from the study base were also used in a validation study (not yet published).

#### Dependent variables

Anticipated barriers to healthcare seeking and beliefs about cancer were assessed using items from the ABC measure. The two applied modules are described in detail below and the entire ABC measure is described elsewhere (Simon et al., 2012).

#### Anticipated barriers to healthcare seeking

These barriers included four items: too busy to make time to go to the doctor, worry about wasting the doctor's time, embarrassment, and worry about what the doctor might find. Respondents were asked whether any of these anticipated barriers might put them off going to the doctor when experiencing a symptom that might be serious. Response options were *yes often*, *yes sometimes* and *no*, which were dichotomised into *yes/no*. The answer was classified as missing if the respondent answered *don't know* or *don't want to answer*.

#### Beliefs about cancer

Three positively framed and three negatively framed statements examined respondents' beliefs about cancer. Response options were *strongly disagree*, *tend to disagree*, *tend to agree* and *strongly agree*, which were dichotomised into *disagree/agree*. Thus, for the three positively framed belief, the answer *agree* corresponds to a positive belief; whereas for the three negatively framed beliefs, *agree* corresponds to a negative belief. Again, *don't know* and *don't want to answer* were classified as missing.

#### Independent variables

Data on SEP indicators for each individual were collected through Statistics Denmark (Statistics Denmark, 2014). Data on seven different SEP indicators were obtained and categorised as follows: gender (male and female); age (30–49, 50–69 and  $\geq 70$  years); marital status (married/cohabiting and living alone); ethnicity (ethnic Dane and immigrant/descendant); level of education (low:  $\leq 10$  years, middle:  $> 10 \leq 15$  years and high:  $> 15$  years) according to the International Standard Classification of Education (UNESCO, 2014); occupation (in the labour force: employed and students; outside the labour force: unemployed, early retirement pensioner, people on disability retirement, personal leave or sick leave and retired: special and old-age pensioner); and, lastly, OECD-modified disposable household income (OECD, 2012), which was calculated as an average for the preceding three years in order to level out yearly variation. Income was categorised as low, middle and high income (low:  $\leq 16,536$  £/year, middle:  $> 16,536 \leq 33,095$  £/year and high:  $> 33,095$  £/year) based on the 20%, 60% and 20% income distribution in the study base of the 60,000 persons. In addition, the ABC measure included items regarding close relative(s) with cancer (dichotomised into *yes/no*) and self-rated health (dichotomised into *good* and *fair/poor*). Data regarding a respondent's previous cancer diagnosis within the past 10 years (*yes/no*) were retrieved from the Danish Cancer Registry (Storm et al., 1997).

#### Statistical analysis

To study whether barriers to healthcare seeking and beliefs about cancer were associated with SEP, we used generalised linear models (GLM) with log link for the Bernoulli family to model the prevalence ratios (PRs) with 95% confidence intervals (CI). In some cases where the adjusted GLM analyses could not converge with the Bernoulli family, we used robust Poisson regression instead. Both crude and adjusted PRs were estimated. In the adjusted model, the following a priori potential confounding variables were included: gender, age, marital status, ethnicity, educational level, cancer diagnosis within the past 10 years, close relative(s) with cancer and self-rated health. Data were analysed using Stata 13.1.

## Results

### Response

The interviews were completed by 3000 (36.7%) of 8169 persons eligible and made contact to (Fig. 1).

### Characteristics of respondents and study base

The respondents' mean age of was 55.9 years as compared with 56.7 years in the study base. Compared with the study base, the responder group was characterised by an overrepresentation of females, married/cohabiting persons, ethnic Danes, persons with a high-level education, persons who were in the labour force and persons who had the highest household income (Table 1).

### Anticipated barriers to healthcare seeking and associations with SEP

Table 2 shows barriers to healthcare seeking and associations with SEP indicators. A total of 26.7% of the respondents stated that worry about what the doctor might find and 14.8% expressed worry about wasting the doctor's time as possible barriers to healthcare seeking. A consistent finding across the four barriers was that the younger age group (30–49 years) was more likely than people in older age groups to report that the barriers could put them off going to the doctor with a symptom that might be serious.

**Table 1**

Socio-economic position (SEP) of the respondents and the study base.

	Respondents <i>n</i> = 3000	Study base <i>n</i> = 60,000	<i>P</i> value <sup>a</sup>
	% ( <i>n</i> )	% ( <i>n</i> )	
Gender			<0.01
Female	55.3 (1659)	51.5 (30,928)	
Male	44.7 (1341)	48.5 (29,072)	
Age group (years)			<0.01
30–49	33.3 (1000)	33.3 (20,000)	
50–69	50.3 (1510)	46.2 (27,711)	
$\geq 70$	16.3 (490)	20.5 (12,289)	
Age, mean (SD)	55.9 (13.3)	56.7 (15.1)	
Marital status			<0.01
Married/cohabiting	76.8 (2303)	67.5 (40,449)	
Living alone	23.2 (695)	32.5 (19,464)	
Ethnicity			<0.01
Ethnic Danes	95.9 (2876)	92.2 (55,215)	
Immigrant/descendant	4.1 (122)	7.8 (4698)	
Educational level			<0.01
High	32.3 (954)	22.5 (12,988)	
Middle	46.2 (1365)	47.1 (27,189)	
Low	21.5 (634)	30.4 (17,503)	
Occupation			<0.01
In the labour force	62.6 (1844)	56.5 (33,027)	
Outside the labour force	8.1 (238)	11.2 (6557)	
Retired	29.3 (864)	32.3 (18,844)	
OECD-modified household income			<0.01
High	25.2 (752)	20.0 (11,880)	
Middle	63.6 (1902)	60.0 (35,641)	
Low	11.2 (335)	20.0 (11,880)	
Cancer diagnosis within 10 years			0.066
Yes	8.6 (258)	7.7 (4636)	
No	91.4 (2742)	92.3 (55,364)	
Close relative(s) with cancer			
Yes	78.1 (2342)	-	
No	21.9 (656)	-	
Self-rated health			
Good	78.0 (2334)	-	
Fair/poor	22.0 (659)	-	

Note: Numbers vary due to missing data.

<sup>a</sup> Chi-square test. One of the assumptions for this test is that observations are independent of each other. Therefore, we tested the difference between respondents and the study base without the respondents i.e. 57,000 persons.

**Table 2**  
Anticipated barriers to healthcare seeking and associations with socio-economic position indicators.

Barrier	I would be too embarrassed		I would be worried about what the doctor might find		I would be worried about wasting the doctor's time		I am too busy to make time to go to the doctor	
	n = 198 (6.6%)		n = 797 (26.7%)		n = 443 (14.8%)		n = 731 (24.4%)	
Overall	PR <sub>unadj.</sub> (95% CI)	PR* <sub>adj.</sub> (95% CI)	PR <sub>unadj.</sub> (95% CI)	PR* <sub>adj.</sub> (95% CI)	PR <sub>unadj.</sub> (95% CI)	PR* <sub>adj.</sub> (95% CI)	PR <sub>unadj.</sub> (95% CI)	PR* <sub>adj.</sub> (95% CI)
<b>Gender</b>								
Female	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Male	0.91 (0.69–1.20)	0.98 (0.74–1.30)	<b>0.77 (0.68–0.87)</b>	<b>0.78 (0.69–0.88)</b>	0.86 (0.72–1.02)	0.90 (0.75–1.08)	1.13 (0.99–1.28)	<b>1.24 (1.10–1.40)</b>
<b>Age group (years)</b>								
30–49	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50–69	<b>0.70 (0.53–0.94)</b>	<b>0.64 (0.47–0.87)</b>	<b>0.78 (0.69–0.88)</b>	<b>0.74 (0.65–0.84)</b>	<b>0.57 (0.47–0.68)</b>	<b>0.54 (0.44–0.65)</b>	<b>0.53 (0.47–0.61)</b>	<b>0.54 (0.47–0.61)</b>
≥70	0.78 (0.52–1.17)	<b>0.59 (0.39–0.91)</b>	<b>0.68 (0.56–0.82)</b>	<b>0.61 (0.50–0.75)</b>	<b>0.56 (0.43–0.74)</b>	<b>0.51 (0.38–0.68)</b>	<b>0.18 (0.13–0.25)</b>	<b>0.18 (0.12–0.25)</b>
<b>Marital status</b>								
Married/cohabiting	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Living alone	<b>1.44 (1.08–1.93)</b>	<b>1.43 (1.06–1.93)</b>	0.99 (0.86–1.14)	0.97 (0.84–1.12)	1.02 (0.83–1.25)	1.04 (0.85–1.28)	0.89 (0.76–1.04)	1.06 (0.92–1.23)
<b>Ethnicity</b>								
Ethnic Danes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Immigrant/descendant	<b>1.93 (1.18–3.17)</b>	1.60 (0.90–2.85)	1.18 (0.90–1.55)	1.10 (0.82–1.48)	1.05 (0.69–1.61)	1.05 (0.68–1.62)	1.23 (0.93–1.63)	1.22 (0.93–1.59)
<b>Educational level</b>								
High	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Middle	0.81 (0.58–1.12)	0.79 (0.57–1.09)	0.99 (0.86–1.14)	1.02 (0.89–1.18)	0.94 (0.77–1.15)	0.97 (0.80–1.19)	<b>0.72 (0.62–0.82)</b>	<b>0.75 (0.66–0.85)</b>
Low	1.27 (0.90–1.80)	1.32 (0.92–1.90)	<b>1.28 (1.10–1.50)</b>	<b>1.44 (1.23–1.70)</b>	1.07 (0.84–1.35)	1.27 (0.99–1.62)	<b>0.57 (0.47–0.69)</b>	<b>0.79 (0.65–0.96)</b>
<b>Occupation</b>								
In the labour force	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Outside the labour force	<b>1.57 (1.04–2.40)</b>	1.42 (0.92–2.20)	0.96 (0.77–1.20)	0.89 (0.71–1.13)	1.30 (0.99–1.72)	1.21 (0.91–1.62)**	<b>0.41 (0.29–0.56)</b>	<b>0.43 (0.31–0.60)</b>
Retired	0.96 (0.70–1.31)	1.19 (0.74–1.90)	<b>0.83 (0.72–0.96)</b>	1.08 (0.88–1.33)	<b>0.78 (0.63–0.97)</b>	<b>0.78 (0.63–0.97)**</b>	<b>0.27 (0.21–0.34)</b>	<b>0.46 (0.35–0.61)</b>
<b>OECD-modified household income</b>								
High	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Middle	1.29 (0.91–1.82)	1.18 (0.83–1.69)	<b>1.19 (1.03–1.37)</b>	1.16 (1.00–1.35)	1.19 (0.96–1.48)	1.13 (0.91–1.40)	<b>0.73 (0.64–0.84)</b>	<b>0.69 (0.60–0.78)</b>
Low	<b>1.79 (1.14–2.81)</b>	1.55 (0.96–2.50)	0.99 (0.79–1.25)	1.00 (0.79–1.27)	1.31 (0.97–1.78)	1.37 (1.00–1.87)	<b>0.54 (0.41–0.70)</b>	<b>0.61 (0.47–0.78)</b>
<b>Cancer diagnosis within 10 years</b>								
Yes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
No	0.79 (0.51–1.22)	0.73 (0.47–1.14)	0.99 (0.80–1.23)	0.95 (0.77–1.18)	1.21 (0.86–1.69)	1.01 (0.72–1.41)	1.20 (0.94–1.55)	0.87 (0.68–1.10)
<b>Close relative(s) with cancer</b>								
Yes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
No	1.05 (0.76–1.45)	0.99 (0.71–1.39)	1.03 (0.89–1.19)	1.06 (0.91–1.22)	0.89 (0.70–1.14)	0.88 (0.70–1.10)	0.88 (0.75–1.03)	0.87 (0.75–1.02)
<b>Self-rated health</b>								
Good	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fair/poor	1.26 (0.93–1.71)	1.31 (0.96–1.78)	1.08 (0.94–1.24)	1.08 (0.94–1.24)	<b>1.23 (1.01–1.49)</b>	<b>1.28 (1.05–1.56)</b>	<b>0.81 (0.68–0.95)</b>	1.93 (0.79–1.09)

\* Adjusted for gender, age, marital status, ethnicity, educational level, cancer diagnosis within the past 10 years, close relative(s) with cancer and self-rated health. However, when using occupation and OECD-modified household income as the independent variables, we did not adjust for educational level due to intermediary associations between the variables.

\*\* Not adjusted for age because of collinearity and very few observations in the cells.

Especially people with a lower level of education stated that worry about what the doctor might find was a barrier to healthcare seeking compared with people with a high-level education. Persons with a high-level education, persons in the labour force and persons with a high household income more commonly concurred that being too busy to make time to go to the doctor could be a barrier than persons with a low-level education, persons outside the labour force and persons with a low household income.

Having close relative(s) with cancer or having had a cancer diagnosis within the past 10 years was not associated with any of the anticipated barriers for healthcare seeking. Self-rated health was associated with worry about wasting the doctor's time. Thus, people reporting fair or poor health were more likely to state this barrier than people reporting good health.

#### Beliefs about cancer and associations with SEP

The beliefs about cancer and their association with SEP are presented in Tables 3 and 4. Generally, respondents concurred with the positively framed beliefs about cancer and there were no strong associations with SEP (Table 3). For the negatively framed beliefs (Table 4), almost 60% believed that cancer treatment is worse than the cancer itself,

and 28.4% of the respondents agreed that a diagnosis of cancer is a death sentence. Several associations were consistent across the negatively framed beliefs. People with a low-level education and people with a low household income were significantly more likely to agree with all three negatively framed beliefs. For example, people with a low-level education were more likely to agree that most cancer treatment is worse than the cancer itself than people with a high-level education. The older age group (≥70 years) was less likely to believe that a diagnosis of cancer is a death sentence, but more likely than the younger age group (30–49 years of age) to state that most cancer treatment is worse than the cancer itself and that they would not want to know if they had cancer. People with close relatives with cancer were less likely to agree that most cancer treatment is worse than the cancer itself and that a diagnosis of cancer is a death sentence compared with people with no relatives with cancer.

#### Discussion

##### Main findings

In this population-based study, we found that approximately every fourth respondent stated that worry about what the doctor might find

**Table 3**  
Positive beliefs about cancer and associations with socio-economic position indicators.

Overall	People with cancer can expect to continue with normal activities		Cancer can often be cured		Going to the doctor as quickly as possible could increase the chances of surviving	
	Agree: n = 2.498 (83.3%)		Agree: n = 2.628 (87.6%)		Agree: n = 2.917 (97.2%)	
	PR <sub>unadj.</sub> (95% CI)	PR* <sub>adj.</sub> (95% CI)	PR <sub>unadj.</sub> (95% CI)	PR* <sub>adj.</sub> (95% CI)	PR <sub>unadj.</sub> (95% CI)	PR* <sub>adj.</sub> (95% CI)
<b>Gender</b>						
Female	1.00	1.00	1.00	1.00	1.00	1.00
Male	<b>1.04 (1.01-1.07)</b>	1.03 (1.00-1.06)	1.01 (0.99-1.04)	1.01 (0.93-1.09)	1.00 (0.99-1.01)	1.00 (0.99-1.01)
<b>Age group (years)</b>						
30–49	1.00	1.00	1.00	1.00	1.00	1.00
50–69	<b>1.06 (1.02-1.09)</b>	<b>1.07 (1.03-1.10)</b>	<b>1.07 (1.03-1.10)</b>	1.07 (0.98-1.17)	1.00 (0.99-1.01)	1.00 (0.99-1.01)
≥70	<b>1.05 (1.00-1.10)</b>	<b>1.06 (1.01-1.11)</b>	<b>1.08 (1.04-1.12)</b>	1.10 (0.98-1.25)	0.98 (0.96-1.00)	1.00 (0.98-1.01)
<b>Marital status</b>						
Married/cohabiting	1.00	1.00	1.00	1.00	1.00	1.00
Living alone	0.98 (0.95-1.02)	0.99 (0.95-1.02)	0.97 (0.94-1.00)	0.97 (0.88-1.06)	0.99 (0.98-1.01)	1.00 (0.99-1.01)
<b>Ethnicity</b>						
Ethnic Danes	1.00	1.00	1.00	1.00	1.00	1.00
Immigrant/descendant	0.96 (0.88-1.04)	0.98 (0.90-1.06)	0.97 (0.90-1.05)	1.00 (0.81-1.24)	0.97 (0.93-1.01)	1.00 (0.97-1.02)
<b>Educational level</b>						
High	1.00	1.00	1.00	1.00	1.00	1.00
Middle	0.98 (0.95-1.01)	0.98 (0.95-1.02)	<b>0.97 (0.94-1.00)</b>	0.97 (0.88-1.06)	0.99 (0.98-1.00)	0.99 (0.98-1.00)
Low	0.96 (0.92-1.00)	0.95 (0.91-1.00)	0.99 (0.95-1.02)	0.97 (0.87-1.08)	<b>0.98 (0.96-0.99)</b>	<b>0.98 (0.96-1.00)</b>
<b>Occupation</b>						
In the labour force	1.00	1.00	1.00	1.00	1.00	1.00
Outside the labour force	0.99 (0.93-1.05)	0.99 (0.93-1.05)	0.95 (0.90-1.01)	0.96 (0.83-1.12)	1.01 (0.88-1.16)	0.99 (0.97-1.02)
Retired	0.98 (0.94-1.03)	0.98 (0.93-1.03)	<b>1.03 (1.01-1.06)</b>	0.97 (0.85-1.10)	1.00 (0.88-1.13)	1.00 (0.98-1.02)
<b>OECD-modified household income</b>						
High	1.00	1.00	1.00	1.00	1.00	1.00
Middle	0.98 (0.95-1.01)	0.98 (0.95-1.01)	0.98 (0.95-1.00)	0.99 (0.90-1.08)	1.00 (0.99-1.01)	1.00 (0.99-1.01)
Low	<b>0.92 (0.87-0.98)</b>	<b>0.92 (0.87-0.98)</b>	0.98 (0.93-1.02)	0.98 (0.84-1.13)	0.98 (0.95-1.00)	0.98 (0.95-1.00)
<b>Cancer diagnosis within 10 years</b>						
Yes	1.00	1.00	1.00	1.00	1.00	1.00
No	1.03 (0.97-1.09)	1.01 (0.95-1.06)	<b>0.96 (0.92-0.99)</b>	0.98 (0.85-1.13)	1.00 (0.98-1.03)	1.01 (0.99-1.03)
<b>Close relative(s) with cancer</b>						
Yes	1.00	1.00	1.00	1.00	1.00	1.00
No	1.01 (0.98-1.05)	1.01 (0.97-1.04)	1.03 (1.00-1.06)	1.02 (0.92-1.12)	<b>0.98 (0.97-1.00)</b>	0.99 (0.98-1.00)
<b>Self-rated health</b>						
Good	1.00	1.00	1.00	1.00	1.00	1.00
Fair/poor	<b>0.95 (0.91-0.99)</b>	<b>0.95 (0.91-0.99)</b>	0.97 (0.94-1.00)	0.98 (0.89-1.07)	<b>0.98 (0.96-0.99)</b>	<b>0.98 (0.97-1.00)</b>

\* Adjusted for gender, age, marital status, ethnicity, educational level, cancer diagnosis within the past 10 years, close relative(s) with cancer and self-rated health. However, when using occupation and OECD-modified household income as the independent variables, we did not adjust for educational level due to intermediary associations between the variables.

could put them off going to the doctor even when they imagined having a symptom they thought could be serious. Furthermore, 15% of the respondents stated that worry about wasting the doctor's time was an anticipated barrier to healthcare seeking. A large majority perceived survival benefits from early presentation, but about 28% of the respondents also believed that a diagnosis of cancer was a death sentence.

There was no clear relationship between SEP and barriers to healthcare seeking in general, except that for all of the stated barriers the 30–49-year-olds were more likely than the older age groups to report that the stated barriers could put them off going to the doctor. For the positively framed beliefs, neither consistent nor large associations with SEP were found. On the other hand, respondents with a low level of education and those with a low household income were more likely to hold negative beliefs about cancer than those with a high educational level and a high household income, respectively.

#### Comparison with existing literature

The social inequality in cancer survival is well-established (Dalton et al., 2008; Ellis et al., 2012; Woods et al., 2006), but far less is known about the factors that contribute to this survival deficit among people with a lower SEP (Coleman et al., 2011). In this study we have focused on two of the factors, which may help explain some of the observed

survival deficit, being cognisant that several other factors are also relevant in this context.

In the patient interval literature, fear and worry appear to both prompt and delay the time from first symptom experience to healthcare seeking (Facione and Facione, 2006; O'Mahony and Hegarty, 2009; Smith et al., 2005). The direction of the association seems to depend on the strategy used for coping with the fear. A common finding is that the patients who were prompted to healthcare seeking by fear generally thought that the doctor could be of help and that early diagnosis did matter (Facione and Facione, 2006; Smith et al., 2005). This finding may be explained by Leventhal's 'fear and danger control framework' (Leventhal, 1970). Danger control involves the processes, often behavioural, that people perform to reduce the actual danger. Fear control, on the other hand, focuses on minimising the unpleasant feelings of fear (e.g. through avoidance) and takes place if people do not believe that they can control the danger (Leventhal, 1970). Thus, since worry about what the doctor might find was the most commonly endorsed barrier, healthcare seeking may be promoted by disseminating information about the positive aspect of early diagnosis and the GPs skills in interpreting symptoms.

Having a low level of education and a low household income was strongly associated with having negative beliefs about cancer. Similarly, in a study on optimism (expectancies of good outcomes) and pessimism

**Table 4**  
Negative beliefs about cancer and associations with socio-economic position indicators.

Overall	Cancer treatment is worse than the cancer itself		Not want to know if I have cancer		A diagnosis of cancer is a death sentence	
	Agree: n = 1,787 (59.6%)		Agree: n = 301 (10.0%)		Agree: n = 852 (28.4%)	
	PR <sub>unadj.</sub> (95% CI)	PR* <sub>adj.</sub> (95% CI)	PR <sub>unadj.</sub> (95% CI)	PR* <sub>adj.</sub> (95% CI)	PR <sub>unadj.</sub> (95% CI)	PR* <sub>adj.</sub> (95% CI)
<b>Gender</b>						
Female	1.00	1.00	1.00	1.00	1.00	1.00
Male	<b>0.80 (0.75-0.84)</b>	<b>0.82 (0.77-0.86)</b>	1.19 (0.96-1.48)	1.21 (0.97-1.50)	<b>0.78 (0.69-0.88)</b>	<b>0.79 (0.70-0.89)</b>
<b>Age group (years)</b>						
30-49	1.00	1.00	1.00	1.00	1.00	1.00
50-69	<b>1.08 (1.01-1.15)</b>	1.03 (0.97-1.09)	<b>1.59 (1.21-2.10)</b>	<b>1.37 (1.03-1.81)</b>	<b>0.78 (0.69-0.88)</b>	<b>0.75 (0.66-0.85)</b>
≥70	<b>1.14 (1.05-1.23)</b>	<b>1.10 (1.02-1.18)</b>	<b>2.41 (1.76-3.28)</b>	<b>1.73 (1.25-2.40)</b>	<b>0.79 (0.67-0.94)</b>	<b>0.73 (0.61-0.88)</b>
<b>Marital status</b>						
Married/cohabiting	1.00	1.00	1.00	1.00	1.00	1.00
Single	1.05 (0.98-1.11)	0.98 (0.92-1.04)	<b>1.78 (1.43-2.22)</b>	<b>1.54 (1.22-1.94)</b>	1.04 (0.91-1.19)	1.01 (0.88-1.15)
<b>Ethnicity</b>						
Ethnic Danes	1.00	1.00	1.00	1.00	1.00	1.00
Immigrant/descendant	0.86 (0.73-1.01)	0.87 (0.73-1.02)	1.34 (0.84-2.14)	1.20 (0.70-2.03)	1.25 (0.97-1.60)	1.21 (0.93-1.57)
<b>Educational level</b>						
High	1.00	1.00	1.00	1.00	1.00	1.00
Middle	<b>1.25 (1.17-1.34)</b>	<b>1.25 (1.17-1.34)</b>	<b>1.50 (1.12-2.02)</b>	<b>1.40 (1.04-1.88)</b>	1.11 (0.97-1.27)	1.14 (0.99-1.31)
Low	<b>1.40 (1.30-1.51)</b>	<b>1.33 (1.24-1.44)</b>	<b>2.74 (2.03-3.70)</b>	<b>2.08 (1.53-2.83)</b>	<b>1.28 (1.10-1.50)</b>	<b>1.37 (1.17-1.61)</b>
<b>Occupation</b>						
In the labour force	1.00	1.00	1.00	1.00	1.00	1.00
Outside the labour force	<b>1.10 (1.01-1.21)</b>	1.04 (0.95-1.15)	<b>1.89 (1.33-2.68)</b>	<b>1.51 (1.05-2.18)</b>	<b>1.22 (1.01-1.47)</b>	1.10 (0.90-1.33)
Retired	<b>1.11 (1.05-1.18)</b>	1.02 (0.94-1.12)	<b>1.92 (1.53-2.42)</b>	0.97 (0.68-1.37)	0.88 (0.77-1.01)	1.04 (0.86-1.27)
<b>OECD-modified household income</b>						
High	1.00	1.00	1.00	1.00	1.00	1.00
Middle	<b>1.16 (1.08-1.25)</b>	<b>1.15 (1.08-1.24)</b>	<b>1.36 (1.02-1.81)</b>	1.25 (0.94-1.67)	1.06 (0.92-1.22)	1.03 (0.89-1.18)
Low	1.23 (1.12-1.35)	<b>1.18 (1.08-1.30)</b>	<b>2.27 (1.60-3.21)</b>	<b>1.53 (1.06-2.21)</b>	<b>1.37 (1.13-1.64)</b>	<b>1.33 (1.10-1.62)</b>
<b>Cancer diagnosis within 10 years</b>						
Yes	1.00	1.00	1.00	1.00	1.00	1.00
No	1.08 (0.97-1.20)	1.08 (0.97-1.20)	0.90 (0.62-1.30)	1.10 (0.76-1.58)	1.14 (0.92-1.40)	1.04 (0.83-1.29)
<b>Close relative(s) with cancer</b>						
Yes	1.00	1.00	1.00 <sup>q</sup>	1.00	1.00	1.00
No	<b>0.89 (0.82-0.95)</b>	<b>0.90 (0.84-0.97)</b>	<b>1.34 (1.06-1.70)</b>	1.19 (0.93-1.52)	<b>0.80 (0.68-0.93)</b>	<b>0.82 (0.70-0.95)</b>
<b>Self-rated health</b>						
Good	1.00	1.00	1.00	1.00	1.00	1.00
Fair/poor	1.03 (0.97-1.10)	1.00 (0.94-1.06)	1.34 (1.05-1.70)	1.15 (0.90-1.46)	1.26 (1.11-1.43)	1.22 (1.07-1.39)

\* Adjusted for gender, age, marital status, ethnicity, educational level, cancer diagnosis within the past 10 years, close relative(s) with cancer and self-rated health. However, when using occupation and OECD-modified household income as the independent variables, we did not adjust for educational level due to intermediary associations between the variables.

(expectancies of bad outcomes), [Robb et al. \(2009\)](#) found that people with a lower SEP were significantly more pessimistic than people with a higher SEP, but that there was only a small SEP gradient in optimism. Furthermore, this finding may imply that positive and negative beliefs about cancer are not two poles on a one-dimensional scale. This may also help explain the counter-intuitive finding that 87.6% of respondents agreed that cancer can often be cured, but at the same time, 28.5% agreed that a diagnosis of cancer is a death sentence.

#### Strengths and limitations

One of the main strengths of the present study is its population-based approach and the relatively large number of respondents. Furthermore, while other studies in this area have relied on self-reports on SEP, we were able to use register-based data on SEP obtained at the level of the individual from Statistics Denmark. The main strength of this approach is that these data are registered with very high completeness and validity. Furthermore, it minimises differential misclassification, because potential misclassification will often be the same for all SEP groups and the SEP data is independent of the dependent data collected. However, it is also important to acknowledge that all the registers used from Statistic Denmark are byproducts of already existing

administrative registers and that though there are only few missing data in these registers it is seldom clear what missing signifies ([Thygesen and Ersboll, 2014](#)).

A second strength was the use of the ABC measure, which has shown to be a reliable and valid measure for determining awareness and beliefs about cancer among people aged 50 years and older ([Simon et al., 2012](#)). However, the measure has not been validated in people younger than 50 years of age. Moreover, it should be noted that several interviewers contributed in the data collection and the inter-rater reliability has not been assessed. However, the ABC interview was structured and much effort was done in terms of training the interviewers in order to collect data on the ABC measure accurately, sensitively and consistently ([Forbes et al., 2013](#)).

The main limitation might be the selection bias caused by non-response. A total of 63.3% of the persons who were reached by phone did not complete the interview. When comparing the respondents with the study base, it appears that people with higher SEP were over-represented in the study. Low participation rates among people with lower SEP are a common limitation in population health surveys ([Ekholm et al., 2010](#); [Hartge, 2006](#)). Further studies in this area may consider strategies such as incentives or personalised letter to increase the response rate, especially among people with lower SEP. Nevertheless,

we believe that the associations found in this study apply to the underlying Danish population, as data was collected from a range of different SEP groups.

## Conclusion and implications

This study provides detailed insight into anticipated barriers to healthcare seeking and beliefs about cancer among people aged 30 years and older. It is important that GPs know about that many people are worried about wasting the GP's time and worry about what the GP might find. Barriers to healthcare seeking and negative beliefs about cancer could be addressed by initiatives in general practices and by population-based interventions. The finding that persons with a low level of education and persons with a low household income were more likely to hold negative beliefs about cancer may be used to target these initiatives. However, the challenge is to reduce anticipated barriers to healthcare seeking and the negative beliefs about cancer without giving rise to exaggerated fear of cancer in the population and without overburdening general practice.

## Ethics approval

The study was approved by the Danish Data Protection Agency (J. no. 2011-41-6237) and the Danish Health and Medicines Authority. In accordance with the Central Denmark Region Committees on Biomedical Research Ethics, the study needed no further approval (Report no. 128/2010).

## Author contributions

AFP, CNW and PV conceived the study. All authors contributed to the design of the study and in its data collection. LH performed the statistical analyses in consultation with the other authors. LH drafted the manuscript, and all authors contributed to critically revising the paper. Finally, all authors read and approved the final version of the manuscript.

## Conflict of interest statement

The authors declare that there are no conflicts of interest.

## Acknowledgement and funding

The study was supported financially by the Danish Cancer Society, the Novo Nordisk Foundation, the Faculty of Health at Aarhus University, the Tryg Foundation (J. no. 7-11-1339), the Danish Health and Medicines Authority and the Research Centre for Cancer Diagnosis in Primary Care (CaP). The funding sources had no involvement in the study design, data collection and analysis, writing of the manuscript or decision regarding publication.

## References

Arndt, V., Sturmer, T., Stegmaier, C., Ziegler, H., Dhom, G., Brenner, H., 2002. Patient delay and stage of diagnosis among breast cancer patients in Germany—a population based study. *Br. J. Cancer* 86, 1034–1040. <http://dx.doi.org/10.1038/sj.bjc.6600209>.

Butler, J., Foot, C., Bomb, M., et al., 2013. The International Cancer Benchmarking Partnership: an international collaboration to inform cancer policy in Australia, Canada, Denmark, Norway, Sweden and the United Kingdom. *Health Policy* 112, 148–155. <http://dx.doi.org/10.1016/j.healthpol.2013.03.021>.

Coleman, M.P., Forman, D., Bryant, H., et al., 2011. Cancer survival in Australia, Canada, Denmark, Norway, Sweden, and the UK, 1995–2007 (the International Cancer Benchmarking Partnership): an analysis of population-based cancer registry data. *Lancet* 377, 127–138. [http://dx.doi.org/10.1016/S0140-6736\(10\)62231-3](http://dx.doi.org/10.1016/S0140-6736(10)62231-3).

Dalton, S.O., Schuz, J., Engholm, G., et al., 2008. Social inequality in incidence of and survival from cancer in a population-based study in Denmark, 1994–2003: summary of findings. *Eur. J. Cancer* 44, 2074–2085. <http://dx.doi.org/10.1016/j.ejca.2008.06.018>.

de Nooijer, J., Lechner, L., de Vries, H., 2001. A qualitative study on detecting cancer symptoms and seeking medical help; an application of Andersen's model of total patient delay. *Patient Educ. Couns.* 42, 145–157 (doi:S0738-3991(00)00104-X [pii]).

de Vet, H.C.W., Terwee, C.B., Mokkink, L.B., Knol, D.L., 2011. *Measurement in Medicine: A Practical Guide*. University Press, Cambridge.

Ekhholm, O., Gundgaard, J., Rasmussen, N.K., Hansen, E.H., 2010. The effect of health, socio-economic position, and mode of data collection on non-response in health interview surveys. *Scand. J. Public Health* 38, 699–706. <http://dx.doi.org/10.1177/1403494810382474>.

Ellis, L., Coleman, M.P., Rachet, B., 2012. How many deaths would be avoidable if socio-economic inequalities in cancer survival in England were eliminated? A national population-based study, 1996–2006. *Eur. J. Cancer* 48, 270–278. <http://dx.doi.org/10.1016/j.ejca.2011.10.008>.

Engeland, A., Haldorsen, T., Dickman, P.W., et al., 1998. Relative survival of cancer patients—a comparison between Denmark and the other Nordic countries. *Acta Oncol.* 37, 49–59.

Facione, N.C., Facione, P.A., 2006. The cognitive structuring of patient delay in breast cancer. *Soc. Sci. Med.* 63, 3137–3149 (doi:S0277-9536(06)00416-3 [pii]).

Forbes, L.J., Simon, A.E., Warburton, F., et al., 2013. Differences in cancer awareness and beliefs between Australia, Canada, Denmark, Norway, Sweden and the UK (The International Cancer Benchmarking Partnership): do they contribute to differences in cancer survival? *Br. J. Cancer* 108, 292–300. <http://dx.doi.org/10.1038/bjc.2012.542>.

Hansen, R.P., Vedsted, P., Sokolowski, I., Sondergaard, J., Olesen, F., 2011. Time intervals from first symptom to treatment of cancer: a cohort study of 2,212 newly diagnosed cancer patients. *BMC Health Serv. Res.* 11, 284. <http://dx.doi.org/10.1186/1472-6963-11-284> (6963-11-284).

Hartge, P., 2006. Participation in population studies. *Epidemiology* 17, 252–254. <http://dx.doi.org/10.1097/01.ede.0000209441.24307.92>.

Ipsos MORI, 2013. About Ipsos MORI. 2014. <http://www.ipsos-mori.com/aboutus.aspx>.

Jensen, L.F., Pedersen, A.F., Andersen, B., Vedsted, P., 2012. Identifying specific non-attending groups in breast cancer screening—population-based registry study of participation and socio-demography. *BMC Cancer* 12, 518. <http://dx.doi.org/10.1186/1471-2407-12-518> (2407-12-518).

Lagerlund, M., Hedin, A., Sparen, P., Thurfjell, E., Lambe, M., 2000. Attitudes, beliefs, and knowledge as predictors of nonattendance in a Swedish population-based mammography screening program. *Prev. Med.* 31, 417–428. <http://dx.doi.org/10.1006/pmed.2000.0723>.

Langagergaard, V., Garne, J.P., Vejborg, I., et al., 2013. Existing data sources for clinical epidemiology: the Danish Quality Database of Mammography Screening. *Clin. Epidemiol.* 5, 81–88. <http://dx.doi.org/10.2147/CLEP.S40484>.

Leventhal, H., 1970. Findings and Theory in the Study of Fear Communications. In: Berkowitz, L. (Ed.), *Academic Press, New York*, p. 111.

Nystrom, L., Andersson, I., Bjurstam, N., Frisell, J., Nordenskjold, B., Rutqvist, L.E., 2002. Long-term effects of mammography screening: updated overview of the Swedish randomised trials. *Lancet* 359, 909–919 (doi:S0140-6736(02)08020-0 [pii]).

OECD, 2012. What are equivalence scales? 2014: 2. <http://www.oecd.org/eco/growth/OECD-Note-EquivalenceScales.pdf>.

O'Mahony, M., Hegarty, J., 2009. Factors influencing women in seeking help from a health care professional on self discovery of a breast symptom, in an Irish context. *J. Clin. Nurs.* 18, 2020–2029. <http://dx.doi.org/10.1111/j.1365-2702.2008.02564.x>.

Pedersen, C.B., Gotzsche, H., Moller, J.O., Mortensen, P.B., 2006. The Danish Civil Registration System. A cohort of eight million persons. *Dan. Med. Bull.* 53, 441–449 (doi: DMB3816 [pii]).

Robb, K.A., Simon, A.E., Wardle, J., 2009. Socioeconomic disparities in optimism and pessimism. *Int. J. Behav. Med.* 16, 331–338. <http://dx.doi.org/10.1007/s12529-008-9018-0>.

Simon, A.E., Waller, J., Robb, K., Wardle, J., 2010. Patient delay in presentation of possible cancer symptoms: the contribution of knowledge and attitudes in a population sample from the United Kingdom. *Cancer Epidemiol. Biomarkers Prev.* 19, 2272–2277. <http://dx.doi.org/10.1158/1055-9965.EPI-10-0219>.

Simon, A.E., Forbes, L.J., Boniface, D., et al., 2012. An international measure of awareness and beliefs about cancer: development and testing of the ABC. *BMJ Open* 2. <http://dx.doi.org/10.1136/bmjopen-2012-001758> (Print 2012).

Smith, L.K., Pope, C., Botha, J.L., 2005. Patients' help-seeking experiences and delay in cancer presentation: a qualitative synthesis. *Lancet* 366, 825–831 (doi:S0140-6736(05)67030-4 [pii]).

Statistics Denmark, 2014. About us <http://www.dst.dk/en/OmDS.aspx>.

Storm, H.H., Michelsen, E.V., Clemmensen, I.H., Pihl, J., 1997. The Danish Cancer Registry—history, content, quality and use. *Dan. Med. Bull.* 44, 535–539.

Thorsted, B.L., 2007. *Forskerbeskyttelse i CPR*. Symposium i Anvendt Statistik. Danmarks Statistik.

Thygesen, L.C., Erbsoll, A.K., 2014. When the entire population is the sample: strengths and limitations in register-based epidemiology. *Eur. J. Epidemiol.* 29, 551–558. <http://dx.doi.org/10.1007/s10654-013-9873-0>.

UNESCO, 2014. *ISCED: International Standard Classification of Education*. <http://www.uis.unesco.org/Education/Pages/international-standard-classification-of-education.aspx>.

Weller, D., Vedsted, P., Rubin, G., et al., 2012. The Aarhus statement: improving design and reporting of studies on early cancer diagnosis. *Br. J. Cancer* 106, 1262–1267. <http://dx.doi.org/10.1038/bjc.2012.68>.

Woods, L.M., Rachet, B., Coleman, M.P., 2006. Origins of socio-economic inequalities in cancer survival: a review. *Ann. Oncol.* 17, 5–19 (doi:mdj007 [pii]).