

The perspectives of survivors of Hodgkin lymphoma on lung cancer screening: A qualitative study

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Abstract

Background: Hodgkin lymphoma survivors (HLS) are at excess risk of lung cancer as a consequence of HL treatment. HLS without a heavy smoking history are currently unable to access lung cancer screening (LCS) programmes aimed at ever smokers, and there is an unmet need to develop a targeted LCS programme. In this study we prospectively explored HLS perspectives on a future LCS programme, including motivating factors and potential barriers to participation, with the aim of identifying ways to optimise uptake in a future programme.

Methods: Semistructured telephone interviews were conducted with HLS, aged 18–80 and lymphoma-free for ≥ 5 years, selected from a clinical database (ADAPT). Participants provided informed consent. Data were analysed using inductive thematic analysis.

Results: Despite awareness of other late effects, most participants were unaware of their excess risk of lung cancer. Most were willing to participate in a future LCS programme, citing the potential curability of early-stage lung cancer and reassurance as motivating factors, whilst prior experience of healthcare was a facilitator. Whilst the screening test (a low dose CT scan) was considered acceptable, radiation risk was a concern for some and travel and time off work were potential barriers to participation.

Conclusions: Our results suggest that most HLS would participate in a future LCS programme, motivated by perceived benefits. Their feedback identified a need to develop educational materials addressing lung cancer risk and concerns about screening, including radiation risk. Such materials could be provided upon an invitation to LCS. Uptake in a future programme may be further optimized by offering flexible screening appointments close to home.

KEYWORDS

attitudes, benefits, concerns, Hodgkin lymphoma, lung cancer screening, risk

1 | INTRODUCTION

Hodgkin lymphoma (HL) is a malignancy which predominantly affects young adults and the elderly.¹ With modern treatments, over 90% of those diagnosed at a young age are cured and live to experience the late effects of treatment.²

Alkylating agents and radiotherapy used to treat HL put survivors at excess risk of developing subsequent malignant neoplasms (SMNs), with smoking having a multiplicative effect on lung cancer risk.^{3–5} Compared to survivors of other primary cancers, HL survivors have the highest risk for developing SMNs with those diagnosed with HL in adolescence or young adulthood being at higher risk compared to those diagnosed in childhood or during older adulthood.⁶ The most common SMNs are breast cancer, lung cancer and colorectal cancer, with 30-year reported cumulative incidences of 16.6%, 7.1% and 2.5%, respectively.⁵ Lung cancer and gastrointestinal cancers (of the upper and lower gastrointestinal tracts) are the leading causes of SMN-related mortality in HL survivors.^{3,5,7}

Despite evidence of an excess risk of breast, lung and bowel cancer, the sole targeted screening programme currently available to HL survivors in England is the NHS breast screening programme for women at very high risk of breast cancer.⁸ Through this programme, women who were treated for HL (and non-HL) with radiotherapy to the breast tissue before the age of 30 are invited to undergo early annual breast cancer screening with an MRI scan and mammogram. In the case of bowel cancer screening, HL survivors aged 60–74 can access the national bowel screening programme in the same manner as the rest of the general population. With regard to lung cancer screening (LCS), several large trials conducted in the general population in the past decade have shown that low-dose CT screening of the thorax reduces lung cancer-related mortality in ever smokers by detecting lung cancers at an early stage.^{9–12} In England, LCS is being piloted in ever smokers aged 55–74 with eligibility to undergo screening being determined by lung cancer risk calculators.¹³ Such pilots are unlikely to benefit HL survivors because the average age at lung cancer diagnosis (45 years)¹⁴ falls below the screening threshold (55 years) and lung cancer risk calculators do not account for risk associated with HL treatments. Consequently, HL survivors without a heavy smoking history do not meet screening criteria for pilots aimed at ever smokers, even if eligible by age, creating a need for a LCS programme targeted specifically towards HL survivors.

Among ever smokers in the general population, research has shown that LCS is acceptable.¹⁵ Uptake rates are variable, ranging from <5% in the United States¹⁶ to 26% in a recent community-based pilot in Manchester, UK. In the UK Lung Screening pilot trial, higher socioeconomic status was associated with a positive response to a screening invitation and subsequent participation. Current smokers were less likely to participate than former smokers and practical barriers were the most common reasons for nonparticipation.^{18,19} Qualitative studies have identified fatalistic attitudes towards lung cancer and smoking-related stigma as barriers to participation in LCS.^{20,21} The views of HL survivors towards LCS have not previously been explored so it is not known whether the barriers to LCS participation in ever smokers also apply to HL survivors or whether their views differ. By

gaining an understanding of the motivating factors and barriers to LCS participation in HL survivors, it may be possible to design a future LCS programme which reduces barriers to participation, thus optimizing uptake rates. Thus, an exploration of the perspectives of HL survivors towards a future LCS programme is warranted and is addressed by this qualitative study.

2 | METHODS

This study employed a qualitative design, using semistructured telephone interviews with survivors of HL. Ethical approval was granted by the North West Greater Manchester West Ethics Committee (ref: 20/NW/0025).

2.1 | Recruitment

HL survivors aged 18–80 who were known to be at excess risk of lung cancer due to previous treatment and who had survived relapse-free for at least 5 years after completing treatment were eligible for inclusion, regardless of smoking status. The upper age limit for eligibility reflects the highest age threshold for eligibility to participate in LCS trials in ever smokers published to date, whilst the lower age limit reflects the fact that lung cancer cases have been detected at all time periods after 5 years since completion of treatment. The wide age range threshold for also eligibility also reflects the bimodal distribution of HL in the young and the elderly. Patients with a diagnosis of lung cancer at any time, or who had participated in a pilot LCS programme were excluded. We identified potential participants from a prospectively maintained database of lymphoma survivors with at least 5 years follow-up (ADAPT). One hundred and ninety-four HL survivors were eligible for inclusion. Of these, 80 were randomly selected, stratified according to attained age, time since treatment, prior treatment and smoking history (see Table 1 for stratification criteria). Potential participants were sent an invitation letter and the participant information sheet by post. The invitation letter was signed by a doctoral student working in their treating team. Before the interview, participants received brief written information on LCS, provided written consent and completed a short questionnaire. The purpose of the questionnaire was to collect sociodemographic data which was not available from the ADAPT database (ethnicity, employment status and education), to confirm smoking history and collect other health-related data such as self-rated health and prior participation in cancer screening opportunities.

2.2 | Data collection

The first author conducted telephone interviews lasting approximately 20 minutes between March and April 2020. The interview schedule explored perceptions of lung cancer and LCS, with prompt questions to explore risk perception, the perceived benefits of LCS and potential barriers to attending.

TABLE 1 Stratification criteria to guide random selection of participants

Sex	No more than a 40:60 ratio between males and females
Attained age	Aim to include participants from each decade of age within the eligibility criteria
Time since treatment	Aim to include participants in the following ranges of years since treatment: 5–15, 16–25, 26–40
Treatment/smoking history	Aim to include participants who have been exposed to the following risk combinations: <ol style="list-style-type: none"> (1) Radiotherapy + alkylating agent (2) Alkylating agent alone (3) Radiotherapy alone (if possible) Within 1–3 we will aim to recruit ever and never smokers

2.3 | Reflexivity statement

The interviewer was a clinician and doctoral student working within the participants' treating team. In the majority of cases, the interviewer had not been involved in the participants' care during treatment or follow-up. In questioning participants and answering their questions about lung cancer risk and screening, the interviewer adopted a nonjudgemental and neutral stance. To respond to participants' questions about lung cancer risk and a future LCS programme, the interviewer referred to their knowledge acquired through review of the relevant literature, taking care to neither promote the benefits nor risks of lung cancer, or other cancer screening. Participants were aware that this study was being conducted with the view to eventually offering LCS to at risk survivors.

2.4 | Data analysis

Interviews were audio-recorded and transcribed verbatim by an external company. Transcripts were linked to a pseudo-anonymized study ID number. An inductive approach to thematic analysis was used to analyse the transcripts.²² This began with familiarization with transcripts. Whole transcripts were examined one by one and data pertinent to the research questions were identified and coded by the first author. Throughout this process, new data were applied to an existing code, or a new code was created. A second researcher followed the same process, coding nine randomly selected transcripts. The two researchers discussed the codes they had independently developed, their relationship to each other and emergent themes, following which the first author finalized the coding framework. The second researcher was involved throughout the development of the thematic analysis. Participants have been sent a summary of the study findings, but were not involved in the analytic process.

3 | RESULTS

3.1 | Participant characteristics

Thirty HL survivors took part in the study. Participants included men and women with a median age of 53 years. Most were white British.

Around half had a university education and most were in employment. The majority had received both chemotherapy and radiotherapy in keeping with treatment guidelines and trends over the last 40 years. Around two thirds rated their health as fair to poor. Five reported a history of SMN. Two thirds reported a prior invitation to undergo cancer screening, reflecting the predominance of female participants in the study invited to early breast cancer screening. Never smokers were a large majority. Participant characteristics are detailed in Table 2.

3.2 | Thematic analysis

The quotes presented here are linked to study ID number, patient gender (M/F) and age (study ID number–gender–age). Tables of quotes illustrative of each theme are available as Supporting Information.

3.2.1 | Lung cancer risk perceptions

As most participants were not aware that their prior cancer treatment increased lung cancer risk before participation in this study, there are two subthemes. The first describes participants' risk perceptions unrelated to cancer treatment (beliefs held before participation in this study) and the second relates to the impact of their prior knowledge and experiences on risk perceptions.

Subtheme 1: Lung cancer risk perceptions before study participation

Most participants were not aware of their excess risk of lung cancer due to their cancer treatment before being contacted about the study. Several factors appeared to influence lung cancer risk perception. Participants associated lung cancer with smoking and a lack of smoking history reduced perceived risk. One participant referenced the association of lung cancer with occupation or secondary exposure to cigarette smoke: 'I'm not a particularly at risk group for lung cancer. I've never smoked, I've never worked in industry or in a smoky environment' (P43, F, 66). Despite the association of lung cancer with smoking, several former smokers expected or hoped that quitting smoking abolished lung cancer risk:

TABLE 2 Participant characteristics

Participant characteristics (n = 30)	
Gender (M:F)	12:18
Median age (range)	53 (38–73)
Ethnicity	27 English/Welsh/Scottish/ Northern Irish/British
	2 Asian/Asian British
	1 British (Greek)
Education	16 undergraduate/postgraduate degree
	6 A levels/some college education
	3 had GCSEs or O levels or equivalent
	3 left school without qualifications 2 preferred not to say
Employment	21 employed/self-employed
	2 looking after home or family
	7 retired
Median number of years since treatment (range)	22.3 (12.8–43.1)
Treatment received for Hodgkin lymphoma	Radiotherapy alone: 1
	Chemotherapy and radiotherapy: 24
	Chemotherapy alone: 5
Self-rated health	Excellent—5
	Very good—5
	Fair—12
	Good—7
	Poor—1
Second cancer	Yes—5 (3 breast, 1 thyroid, 1 kidney)
Prior invite to cancer screening	Yes—19 (100% attended 1 or more screens)
	No—8
	Missing data—3
Family history of lung cancer	Yes—1
Smoking history	Current—1
	Former—11
	Never—18

You know, I've managed to get away with it, if you like, 'cause I've packed in so long ago now, I hope anyway. (P23, F, 60)

Living a healthy lifestyle was considered to reduce the risk of developing cancer; one participant said they would not attend routine cancer screening because their healthy lifestyle meant their risk of developing cancer was low. A lack of family history of cancer reduced risk perceptions and led participants to expect clear cancer screening results, as did a lack of symptoms

When I go for cancer screening I kind of go with the assumption that I'm probably alright, because nobody in my family has ever had that. (P63, F, 69)

I feel in quite good health and everything, so I would hope that, yeah, that everything was fine. (P20, F, 50)

One participant reported being reassured by a healthcare professional that her cancer risk had normalized to that of the general population. Weighing up risk factors and lived experience was difficult for one participant:

I do have COPD, so I really don't know. I mean there's no history of lung cancer and whatnot in the family, but having said that, like I've had Hodgkins and I don't know what that treatment has done, you know, to my body... (P23, F, 60)

Subtheme 2: The impact of knowledge and experience on lung cancer risk perceptions

On receiving information about the risk of lung cancer after treatment for HL in the study materials, participants considered this in the context of their prior knowledge or experience of the effects of cancer treatments. Despite being unaware of the excess risk of lung cancer, many participants recalled being told of the risk second cancers including leukaemia and breast cancer, cardiac problems or the general possibility of late effects in the future. For some, this seemed to mitigate the impact of receiving information on the risk of lung cancer:

I think 'cause I was told such a long time ago, then it wasn't like a nasty, nasty surprise when the letter came and so yeah I'm...I would have preferred...I'm glad I was told then, rather than just being a surprise. (P11, M, 48)

Women previously informed of their increased risk of breast cancer following chest radiotherapy understood the risk of lung cancer through the anatomical closeness of the lungs to the breasts: 'It's all in the same area' (P74, F, 50). Similarly, engagement in a long-term follow-up programme influenced participants' response to being informed of lung cancer risk, in that some expected to be contacted about late effects, surveillance or screening. Another participant described the new information as 'comforting' since they appreciated

being informed of their risks in the context of ongoing follow-up. However, some participants were distressed by the information. One, who had suffered a heart attack attributed to radiotherapy, said:

So, when I opened this and it said I could have lung cancer, I was just like oh for God's sake, is there anything else they're going to throw at me. Yeah, it was a like similar feeling of...well horror really. (P63, F, 69)

Participants' spoke of their personal experiences of a variety of late effects of cancer treatment. Symptoms such as breathlessness, cough and recurrent chest infections were commonly reported and some had been diagnosed with asthma or bronchiectasis. Participants frequently attributed these issues to their cancer treatment and appeared to use this to make sense of their lung cancer risk:

I think because I'm aware that the treatment I had increased my risk of breast cancer and I know I've got damage to my lungs that there seems to be a correlation between, I should probably keep track of what's going on in my lungs. (P36, F, 56)

The language used to describe cancer treatment reflected this understanding. Radiotherapy was described as a 'crude' and as being 'blasted' around the lungs, causing 'scarring'. Likewise for chemotherapy: 'it's got to do something to your body over the long haul'. (P58,M,53)

3.2.2 | Theme 2: Positive perceptions of LCS

Participants had a positive attitude towards a LCS programme for HL survivors and the majority expressed willingness to attend. Their positive attitudes were informed by views towards cancer screening in general and the personal perceived benefits of undergoing LCS.

Subtheme 1: General perceptions of cancer screening

Participants felt strongly that people should take up the offer of cancer screening and many could not comprehend why someone would decline the offer.

Undergoing cancer screening tests was described as 'sensible' and 'a positive cause'. Several participants expressed their view that all types of cancer screening are beneficial. Many said they would always take up an offer of cancer screening. Cancer screening was described as a 'routine MOT' test and compared to the 'Well Man and Well Woman' health checks. Several viewed access to targeted screening tests as a benefit of being a cancer survivor—one participant described this as a 'silver lining'. For some, prior experience of cancer was a clear motivation for participating in cancer screening, whereas others felt they would have been enthusiastic about participating even without a prior diagnosis. Recommendation by a medical professional a motivating factor for participating in screening programmes.

Subtheme 2: Benefits of lung cancer screening

Early diagnosis of lung cancer. An early diagnosis of lung cancer was a benefit of screening reported by all participants, who perceived early-stage lung cancer as treatable and curable, whilst late-stage lung cancer was perceived to have fewer treatment options and poor survival rates. Several knew people who had died of advanced cancer.

The earlier you catch any of these things, the better you are of, you know, finding treatment. (P 23, F, 60)

Many reported that you could be asymptomatic of cancer and felt that cancer symptoms were associated with advanced cancer. It was felt that lung cancer was best detected whilst asymptomatic.

For some participants, perceptions of early diagnosis were informed by their previous experience of being diagnosed with cancer. Experiences of a protracted journey to a diagnosis of HL, preceded by multiple visits to the GP had led to a late-stage HL diagnosis for some, who felt their treatment could have been less severe had they been diagnosed earlier. Some participants' had already been diagnosed and treated for second cancers detected at an early stage. Similarly, one participant described being diagnosed with ischaemic heart disease at routine follow-up before any serious consequences. In contrast, a participant who had suffered a heart attack 'out of nowhere' lamented the lack of screening for ischaemic heart disease before the event.

Whilst the main focus of discussion was early diagnosis, several acknowledged the possibility of a diagnosis of advanced lung cancer as a result of screening. They perceived this to be a benefit of screening since it would allow them to plan and spend time with their loved ones: 'at least you can do things and be with your family more'. (P67,F,73)

Reassurance and information about one's health. The 'peace of mind' and 'reassurance' that LCS could offer was a benefit reported by all participants. Several reported that their spouse would also feel reassured. A prior cancer diagnosis influenced the degree of health-related concerns experienced by participants, who described being 'hypersensitive' about their health. For one participant, developing thyroid cancer 'convinced' her that she will develop cancer again in the future. Others denied worrying about their health, stating they felt 'lucky' or 'grateful' to have survived HL and that any time was a bonus, although they still reported reassurance as a benefit of screening.

Uncertainty over health was often expressed. The opportunity to gain information about one's health, and thus reduce uncertainty, seemed to increase enthusiasm for screening and imaging surveillance. Another was anxious to commence bowel cancer screening, despite not being of an eligible age. Several felt their GP lacked knowledge about late effects, which might have increased enthusiasm for screening as a method of seeking information about their health.

You don't know what's going on inside you, unless somebody's constantly checking you. (P5, F, 51)

Several participants felt that a screening scan could provide information about future health issues, allowing them to take preventative action to improve overall health, for example through lifestyle change:

If you know that something is going on, you can at least attempt to do something about it. (P40, M, 38)

Participants commonly reported a proactive approach towards their health, adopting a healthy lifestyle through diet and exercise, motivated by their previous cancer diagnosis.

3.2.3 | Theme 3: Concerns and potential barriers to participation

Whilst a CT scan was perceived as fast, painless and noninvasive test—which compared favourably to participants' experiences of other investigations such as MR scans and other diagnostic tests—many reported concern about the radiation associated with a CT scan, with some stating they would want more information about the level of risk involved. For one female participant who was participating in the breast screening programme for women at high risk, even a small risk associated with radiation could be a potential barrier to undergoing LCS. One participant was concerned about the possibility of false-positive results, which could lead to unnecessary further investigations, although they, and one other participant, also perceived a CT scan to be less likely to produce false-positive results than other tests. When other participants were probed about their views on the potential need for further investigations following the baseline screening test, such as a biopsy, the majority expressed that this would not be a barrier to attending as it was seen as a necessary part of the screening process to rule out cancer or make a diagnosis. Taking time off work was reported as a potential barrier to participant by two participants, one of whom had previously needed to take multiple days of work for biopsies following breast cancer screening. Other participants said that supportive employers and help from family could help overcome practical issues relating to time off work and travel.

Participants commonly wanted more information about the process, risks and benefits and potential outcomes of LCS. For one participant who had experienced difficulties obtaining information about breast cancer screening, easy access to clear and non-contradictory information was a crucial factor in deciding whether to participate.

If I couldn't get the information I needed for this to just get a sense of what the various risks and issues were,

then I would be definitely more likely to not have it than to have it. (P18, F, 44)

Waiting for a screening result was frequently described as worrying time, although the severity of worry experienced varied between participants. Some said they would be 'mildly worried' and able to 'put it out of my mind', but others said the result would always be on their mind.

Prior experience of waiting for scan results helped some people cope with worry, or worry less.

I had so many things in my life, so I guess I'm a bit used to it. (P68, M, 50)

Similarly, having experienced clear screening results before meant one participant did not anticipate worrying about the LCS result. Several took the approach, 'I'll worry when I have to' and felt that a positive attitude towards screening made it less traumatic and could even make a positive outcome more likely.

Almost all participants said that they would attend LCS despite their concerns.

Explaining their willingness to undergo screening, many expressed that it was better to know either way, reflecting uncertainty about their health and desire for surveillance and screening:

To not know, is a greater fear than knowing, to me. (P33, M, 71)

Like, if I get worried about anything, I've got a lot of things to look back on that I've had. But I think that's why I'd rather know and be kept an eye on than not, than just forgotten. (P29, F, 56)

Furthermore, screening was considered to be an important and necessary health intervention to the extent that many were prepared to accept more uncomfortable or invasive tests such as MRI or endoscopy.

Like I said if it was the MRI scan, my mind-set would be different, but I'm still...I'm sure I'd still somehow get round it. (P5, F, 51)

Reflecting the frequently expressed view that the potential benefits would outweigh the risks, one participant said:

For all the things that I've mentioned, like convenience or uncomfortableness or, you know, having to have a CT scan, whatever that might be, none of that is of any relevance in the grander scheme of things. (P74, F, 50)

4 | DISCUSSION

In this study we explored the perspectives of long-term survivors of HL towards LCS. We report high levels of enthusiasm, possibly reflecting views in the general population towards cancer screening and the positive perceptions of screening held by cancer survivors,^{23,24} who are known to be more likely to participate in cancer screening than noncancer survivors.^{25,26} LCS research to date has focussed on ever smokers. In this study, we found that HL survivors differ from ever smokers in that they perceive early-stage lung cancer as curable, thereby differentiating them from ever smokers who frequently report fatalistic attitudes as a barrier to undergoing LCS.^{15,20,21} Such fatalistic attitudes towards lung cancer are more prevalent among smokers than nonsmokers,²⁰ which may explain the lack of fatalism in our study where current smokers were underrepresented.

For our participants, the reassurance provided by screening was an important benefit, in keeping with other studies of lung and prostate cancer screening.^{20,21,27} Seeking reassurance could be a particularly important motivation in HL survivors due to the worry resulting from a prior cancer diagnosis; one study found that 77% and 72% of HL survivors are concerned about future health or developing another cancer, respectively.²⁸ In a future LCS programme, the delivery of lung cancer risk information to survivors who were previously unaware of their risk has the potential to exacerbate pre-existing health-related anxiety, especially given that lung cancer risk increases with time since treatment and is not negated by undergoing screening. Whilst the context in which this information would be delivered—within an offer to undergo LCS—might help to mitigate negative psychological outcomes, it will be important to provide psychological support to survivors following a LCS invitation. The potential for causing anxiety should be balanced against the potential benefits of LCS, most importantly the early detection of lung cancer.

In this study we identified a lack of awareness of lung cancer risk after treatment for HL, with participants perceiving their lung cancer risk to be low when considering risk factors such as smoking and family history. Notably, former smokers attached little significance to their smoking history, in keeping with a study showing that former smokers have a low personal perceived risk after quitting.²⁹ Although a CT scan was considered an acceptable test in our study, consistent with the views of ever smokers,^{15,30} radiation was a frequently reported concern. Since better knowledge and higher levels of risk perception are associated with screening uptake,³¹ participation in a future LCS programme may be optimized by educating survivors about risk through the provision of targeted informational materials, which could additionally address concerns about radiation risk associated with a low-dose CT scan and the likelihood of false positives. Taking time off work and travelling were reported as potential barriers to participation in our study, consistent with reported barriers to participation in cervical and bowel cancer screening^{32,33} and a LCS trial.¹⁹ A future LCS programme for HL survivors should address these barriers—which may disproportionately impact those of working-age and lower socioeconomic status—by offering flexible screening appointments and minimizing the distance people are

required to travel, potentially by offering screening in the community, or in local health centres or hospitals.

In the present study, most participants indicated an intention to participate if LCS was offered, but their enthusiasm may not reflect actual future participation rates. The gap between people's intentions and their subsequent behaviour is a well-known phenomenon³⁴ that is typically not considered in classical models of health behaviour,³⁵ but are addressed in newer models such as the health action process approach (HAPA). The HAPA makes a distinction between the variables that influence intention—the motivational phase—and the volitional phase that ensures maintenance of behaviour.³⁶ Risk perception, outcome expectancies and self-efficacy, which were explored in the present study, are important in the motivational phase, but the hypothetical nature of LCS for HL survivors means that volitional phase variables may have been missed and would be worthy of further research.

4.1 | Strengths and limitations

This study is part of a comprehensive project investigating the feasibility of delivering a LCS programme for HL survivors. We have shown for the first time that most HL survivors are willing to undergo LCS if available. We have identified gaps in survivors' knowledge about lung cancer risk, which should be addressed in educational materials provided to HL survivors as part of an invitation to undergo LCS. Our sampling strategy helped ensure that study participants were diverse in their current age and time since treatment, with both genders represented. By recruiting using a clinical database with details of previous cancer treatment, we were able to select participants known to be at risk of lung cancer. The use of semistructured interviews allowed the researcher to explore the beliefs and experiences, which informed participants' views towards screening and willingness to undergo screening. We have described discordant views in the data.

The findings are limited by the participant characteristics. Half the participants had college or university education, which is associated with higher uptake of cancer screening.³⁷ It is therefore possible that our findings, in terms of enthusiasm for screening and reported barriers, do not reflect the views of all HL survivors. In particular, those with fewer material resources, for example those who do not own a vehicle, and people with a lower than average reading age who might have difficulty accessing written LCS educational materials, are likely to experience greater barriers to participation than reported by our participants. Current smokers, who are at the highest risk of lung cancer, were significantly underrepresented in our sample, which could reflect smoking practices in HL survivors; the rate of current smoking in HL survivors has been reported as 7%.²⁸ Nevertheless, we cannot report on the perspectives of HL survivors who currently smoke. The participants may be more enthusiastic about LCS than those who did not respond to our study invitation, which is likely to have introduced a response bias. HL survivors who remain in

follow-up may have better knowledge of late effects than those discharged soon after completion of treatment, and our results may therefore not be representative of the national survivor population discharged from long-term follow-up. Finally, the invitation to this study came from a doctor who worked at the participants' treating centre, which could have led to social desirability bias, with fewer reported barriers reported as a result.³⁸

5 | CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

Our findings suggest that HL survivors would be willing to attend LCS, motivated by perceived benefits of cancer screening tests, and that uptake of a future LCS programme by HL survivors may exceed uptake by ever smokers. There is no established protocol for survivorship care for people treated for HL, with follow-up care for those in remission varying widely throughout the country. Breast cancer screening for HL survivors is coordinated at a national level by Public Health England rather than individual treating centres and it is likely that a future targeted LCS programme would follow a similar structural approach. However, the most pressing challenge before implementation will be the identification of long-term survivors at risk of lung cancer, many of whom will be discharged from follow-up, which will require a coordinated effort by treating centres. Further steps towards delivering LCS include large scale epidemiological cohort analyses to determine an appropriate lung cancer risk threshold to guide eligibility for screening and the development of LCS educational materials to support decision making and reduce barriers to screening uptake. Future studies should address the feasibility of such a programme and explore barriers to participation in a real-life setting, particularly in current smokers and survivors discharged from routine follow-up.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

AUTHOR CONTRIBUTIONS

All authors made substantial contributions to the conception and design of the study. Rachel Broadbent carried out data collection, data analysis and drafted the manuscript. Louise Gorman analysed data and contributed to the data interpretation and shaping of the manuscript. All authors were involved in the manuscript revision and gave final approval of the version to be published.

DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the supplementary material of this article

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