Title: The role of screening expectations in modifying short–term psychological responses to low-dose computed tomography lung cancer screening among high-risk individuals

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Abstract

Objective

This study aimed to examine the relationship between pre-screening expectations and psychological responses to low-dose computerised tomography (LDCT) screening among high-risk individuals in the United Kingdom Lung Cancer Screening (UKLS) pilot trial.

Methods

Prior to screening, high-risk individuals randomised into the intervention arm of the UKLS were asked about their expected screening test result. Their actual CT scan result was compared with their baseline screening expectation to determine the level of congruence. Levels of concern about and perceived accuracy of the result were assessed in a questionnaire two weeks following receipt of their test result.

Results

The sample included 1589 participants. Regardless of their expected results, patients who required follow-up investigations after their initial CT scan were the most concerned about their result ($p<0.001$). Participants who expected to require follow-up, but did not need it, perceived the test to be least accurate ($p=0.006$).

Conclusions

Lung cancer screening participants who require follow-up or who have unexpected negative results can be identified for supportive interventions.

Practical Implications

These findings can be used to ensure that any future CT lung cancer screening programme is tailored to identify and support those high-risk individuals who may benefit from additional help.

Word count 196

1. Introduction

Lung cancer is the most commonly diagnosed cancer in the world [1] and the third most common in the UK [2]. It is the most common cause of cancer death in the UK [2] and is a significant economic burden. The average 10-year survival is 5% [3], significantly lower than other cancers, and partly attributable to late diagnosis [4]. Lung cancer screening may provide a way to improve lung cancer outcomes.

Screening has been shown to reduce mortality and morbidity for other cancers [5,6] and although a routine lung screening programme is not yet available, there is evidence that a single low-dose computerised tomography (LDCT) scan can detect tumours at early stages [7]. It is more sensitive than chest x-ray and enables detection of small, asymptomatic lung tumours [8,9]. A number of screening trials for early detection of lung cancer have been or are being conducted [10]. The UKLS pilot trial used LDCT screening in a high-risk sample and showed that it is possible to detect cancer at an early stage and deliver potentially curative treatment to a large proportion of identified cases [11]. The US-based National Lung Cancer Screening Trial (NLST) showed a 20% reduction in lung cancer-related mortality **in those at high risk** when comparing LDCT screening with chest radiography [12]. The Dutch-Belgian lung cancer screening trial (NELSON) started in 2003 and the final results are yet to be published [13].

Studies of cancer screening in both general and high-risk populations have highlighted adverse psychological effects, in particular for abnormal, false positive or inconclusive results [14,15]. Some short-term psychological effects may be expected because major diagnoses can be made, but the process of screening itself may have negative psychological effects [16]. Identifying patients at a greater risk of adverse psychological effects following LDCT for lung cancer screening is important so that screening communication strategies can be developed and implemented to prepare and support individuals. Within the UKLS pilot trial, levels of distress, anxiety and depression were within the normal range at both short- and long-term follow-up [17]. However, those who were called back for a follow-up scan showed higher levels of lung cancer distress than those who received a normal result, and those who were positive for an MDT referral (multidisciplinary team meeting indicating a major lung abnormality) reported higher distress than each of the other result groups [17]. Levels of distress in those requiring an MDT referral were approaching clinical thresholds in the short-term [17]. These individuals should be identified for additional psychosocial support [18], however there may be further factors that could identify who may benefit from more support. Indeed, a number of sociodemographic factors (being female, younger, a smoker, from a lower socioeconomic group, having experience of lung cancer, recruited from the Liverpool area, or not being married/cohabiting) have been shown to be associated with higher lung cancer distress in the UKLS sample [17]. **Expectation of what the screening result will be** is an additional factor that has not

yet been explored within this sample that may identify those who could benefit from support interventions.

The Cue Adaptive Reasoning Account (CARA) suggests that individuals' responses to screening tests depend partly on the congruence between anticipated and actual results [19]. The model proposes that those who receive unexpected or abnormal results will perceive the test result to be less accurate and more threatening than those who receive expected normal results [19]. Either unexpected or unfavourable information are thought to trigger more elaborate stimulus analysis than expected information, and the CARA model assumes that either negative or unexpected feedback that conflicts with pre-existing risk perceptions will serve as a cue to draw attentional resources for more elaborate stimulus processing [19]. It is not known whether, in the context of the UKLS pilot trial, congruence between expected and actual results affects perceived threat (indexed by concern) about or perceived accuracy of the result.

The present study aimed to examine the role of screening expectations in modifying psychological responses to screening results among high-risk individuals receiving LDCT lung cancer screening. Two main hypotheses were tested. Firstly, based on the CARA model, participants with expected negative (normal) results would perceive the result to be less concerning and more accurate than participants with other results. Secondly, based upon a potential additive effect, those with an unexpected abnormal scan result would perceive the result to be more concerning and less accurate than participants with other results.

2. Methods

2.1. Procedures

UKLS is a multicentre randomised controlled pilot trial to compare LDCT screening versus usual care, for the early detection of lung cancer, in high-risk individuals [11,20-22].

A random sample of 247,354 50-75 year olds from six primary care trusts (PCTs; three from the Liverpool area and three from the Cambridge area) was invited to participate in the trial. Having completed a risk screening questionnaire [23] individuals identified as at high-risk of lung cancer were invited to participate. Consenting, eligible participants who attended the study recruitment centre were randomised into one of the trial arms: intervention (LDCT) or usual care.

At the recruitment centre, participants completed a baseline questionnaire (T_0) including a number of psychosocial measures. Participants were sent a follow-up psychosocial questionnaire (T_1) approximately two weeks after receiving the baseline LDCT scan result letter.

2.2. Participants

High-risk participants were defined as at >5% estimated risk over five years of developing lung cancer according to the Liverpool Lung Project Risk Prediction Model [11]. Only those in the intervention arm were included in the present study.

2.3. Measures

2.3.1. Sociodemographic variables

Age and gender were provided by the PCTs. Age was provided around the time of risk calculation. Three age categories were used for some analyses: ≤65 years, 66 to 70 years and ≥71 years, **(as in the main psycho-social analysis [17]).**

Deprivation was determined using the Index of Multiple Deprivation (IMD), established using participants' postcodes. IMD ranks were categorised using standard quintiles [23]. Quintile one reflects the most deprived and quintile five the most affluent. The quintiles were further categorised into three groups for some analyses (due to small numbers): greatest deprivation (quintile one), intermediate level deprivation (quintiles two, three and four) and lowest deprivation (quintile five).

Marital group, ethnic background and highest level of education were assessed by participant report in the T_0 questionnaire. Marital group was categorised into married/cohabiting and **not married**/not cohabiting (single, widowed, divorced/separated). Highest level of education was categorised into two groups: up to GCSE/O level or equivalent and beyond GCSE/O level or equivalent.

Smoking status data were collected at the first stage of the trial [23]. Participants were identified as current smokers, ex-smokers or never smokers. Due to small numbers, never smokers were excluded from the examination of the association between smoking and both concern about and perceived accuracy of the result.

To measure experience of lung cancer, participants were asked in the T_0 questionnaire whether they, **or any of their friends or family members that are close to them, had ever** been diagnosed with lung cancer. Responses were categorised into two groups: yes (included responses "yes, self", "yes, someone close", "yes, self and someone close", "yes, prefer not to say who") and no (response "no").

2.3.2. Screening result expectation

Screening expectations were determined in the T_0 questionnaire. Participants were asked what scan result they expected to receive. Two responses were available "normal/clear scan result", renamed "negative", and "unclear or abnormal scan result".

2.3.3. LDCT scan result

Possible scan results were categorised into two groups. Participants who did not require follow-up were categorised as "negative", and participants who did require follow-up were categorised as "follow-up". This follow-up group included those who were positive for a repeat scan (at 3 or 12 months) or positive for an MDT referral due to a major lung abnormality. (For more details about classification of test results, see Field et al. **[11,22]** and Brain et al. **[17]**). Those with a "negative with incidental finding" result were excluded from the sample because of the wide range of incidental findings, hence difficult to categorise further [17].

2.3.4 Expectation-result congruence

The congruence between screening expectation and actual scan result was examined. Four groups were formed: 1) expected negative (expected a negative result and received a negative result), 2) unexpected follow-up (expected a negative result but were positive for a repeat scan or MDT referral), 3) unexpected negative (expected an unclear/abnormal result but received a negative result), 4) expected follow-up (expected an unclear/abnormal result and were positive for a repeat scan or MDT referral).

2.3.5. Perceived concern about the LDCT scan result

Perceived concern about the scan result was measured at T_1 by asking participants "how concerned were you by your CT scan result?". This measure was used to represent perceived threat. Response options were "not at all concerned", "not very concerned", "fairly concerned" and "very concerned".

2.3.6. Perceived accuracy of the LDCT scan result

Perceived accuracy of the scan result was measured at T_1 using the question "how likely do you think it was that your CT scan result was false or inaccurate?". Responses were categorised into two (due to small numbers): unlikely that CT scan result was inaccurate ("very unlikely" and "unlikely") and likely that CT scan result was inaccurate ("likely" or "very likely").

2.4. Analyses

Statistical analyses were conducted using SPSS v.20. Baseline characteristics between those in the present sample and non-completers at T_1 were compared using chi-square and *t*-tests to examine drop-out bias. Chi-square tests were used to examine the relationship between congruence and both concern about the result and perceived accuracy of the result. Post-hoc pairwise chi-square tests were conducted to explore the association between 1) those with expected negative results vs. all other expectation-result congruence groups (together; testing hypothesis 1), 2) those with

unexpected follow-up results vs. each of the other expectation-result congruence groups (individually; testing hypothesis 2). Chi-square tests, ANOVAs (one-way analysis of variance) and *t*-tests were used to examine the association between the majority of sociodemographic variables and both concern and accuracy of the result. Following a significant ANOVA result ($p<0.01$), post-hoc comparisons were carried out using a Tukey test. Ethnic group and highest level of education were not included in these analyses due to low variation and substantial missing data respectively. A Mantel-Haenszel test was conducted (for the two main chi-square analyses only) as a sensitivity analysis to examine potential confounders for the association between congruence and both concern and perceived accuracy. Potential confounders were identified if they were statistically significantly associated with concern or perceived accuracy. To account for multiple testing, a conservative p-value of 0.01 was used. [24]

3. Results

3.1. Sample

Figure 1 shows study participation and response rate. Of a total of 4055 individuals randomised, 2028 were assigned to the intervention arm (LDCT scan) of which 1994 were scanned and included in the UKLS CT scan arm [22]. While **1994** participants in the intervention arm were scanned, **1653** completed questionnaires at both T_0 and T_1 and were included in the main psycho-social analysis [17], and after making further exclusions (details in Figure 1), data from 1589 participants were in the final sample. **Those in the final sample were significantly more likely to be married/cohabiting (p=.004) and have a higher level of education (p=.001) than those who did not complete T_1 (n=301). Sample characteristics are shown in Table 1. Most participants were male and white. The average age was 67.7 years (standard deviation=3.9 years). Three quarters of the sample were married or cohabiting. All deprivation groups were reasonably represented, with just over a quarter in each of the most and least deprived groups and smaller proportions in the other deprivation groups (quintile 2; quintile 3; quintile 4). Over half had no experience of lung cancer. The majority were ex-smokers, over a third were current smokers and a very small proportion had never smoked.**

3.2. Expectation-result congruence and associations with concern about and perceived accuracy of the LDCT result

Most participants (1309; 82.4%) expected a negative result, whereas 280 (17.6%) expected an unclear/abnormal result. In reality, 757 (47.6%) participants had a negative result, and 832 (52.4%) required follow-up (Table 2).

A significant association was found between expectation-result congruence and concern about the result ($p<0.001$; Table 3). A post-hoc pairwise chi-square test showed a significant association

between expectation-result congruence and concern when grouping those who did not have an expected negative result together (p<0.001), suggesting that those who received an expected negative result were significantly less concerned (56.8% not at all concerned). Three further pairwise chi-square tests examined the associations between concern and expectation-result congruence for the unexpected follow-up group and each of the other expectation-result congruence groups in turn. Significant associations were found between expectation-result and concern for the unexpected follow-up group with the two negative result groups (p<0.001); those receiving an unexpected follow-up showed more concern **(54.3% fairly or very concerned)** than those with negative results **(22.1% and 36.3% fairly or very concerned).** However, no significant association was found for the two groups requiring follow-up (p=0.1).

A significant association between expectation-result congruence and perceived accuracy of the result was found (p=0.006; Table 4). A post-hoc pairwise chi-square test showed that those with an expected negative result reported greater perceived accuracy (94.7%) than those who did not have an expected negative result (90.5%; p=0.005). There was no significant association between expectation-result congruence and perceived accuracy in pairwise comparisons with those receiving unexpected follow-up results. However, there was a trend suggesting that those who received expected negative results reported greater accuracy than those who received an unexpected follow-up result (p=0.02). Those receiving an unexpected negative result had the greatest proportion (14.3%) that perceived the result to be inaccurate, which was principally contributing to the overall association between expectation-result congruence and perceived accuracy.

3.3. Sociodemographic factors

Age, deprivation and experience of lung cancer were significantly associated with concern about the result (Table 5). Those who were very concerned about the result were younger than those who were not at all concerned (mean difference -1.17 years, p=0.01). Those in the most deprived group were more concerned than the most affluent (p=0.01). Individuals with an experience of lung cancer were also more concerned about the result (p=0.01). The Mantel-Haenszel test was conducted for age, deprivation and experience of lung cancer. A similar pattern of results was shown within each of the levels of these variables for the overall chi-square test including the four expectation-congruence groups, thus suggesting that they are not significant confounders for the association between expectation-result congruence and concern about the result. Smoking status, gender **and** marital group were not significantly associated with concern about the result (Table 5). None of the sociodemographic factors were significantly associated with perceived accuracy of the result (Table 6).

4. Discussion and Conclusion

4.1. Discussion

In the UKLS pilot trial, individuals receiving an expected negative result perceived the test to be less concerning and more accurate than those receiving results that were unexpected or requiring follow-up, thus supporting the CARA **model**. A combined effect of both unexpected and abnormal results being more concerning and perceived as less accurate was not supported. There was however, a non-significant trend suggesting that those with unexpected abnormal results perceived them to be less accurate than those with expected negative results. Nevertheless, those receiving unexpected negative results appeared to perceive the results to be least accurate. Individuals requiring follow-up (whether or not expected) reported higher levels of concern about the scan result than those receiving negative results. While greater concern about the test result was found for those in most deprived areas, those with experience of lung cancer and younger people, these associations did not account for the relationship between expectation-result congruence and concern.

Renner **[19]** suggests that health-related feedback may elicit different levels of processing depending on feedback expectation, with the CARA **model** hypothesising that unexpected and abnormal information is more elaborately processed, thus perceived as more concerning and less accurate. [25] Furthermore, the CARA **model** suggests that the consistency of information received at different time points also affects perceptions of threat and accuracy [19]. The present study findings in the main support the CARA **model** as both expectations and actual test result were important for the response to the result, with expected negative results requiring less processing than other results. With regards to perceived accuracy, there was only a trend to support a combined effect of unexpected and adverse results. This combined effect has been shown by Shepperd and colleagues **[26]** who found that smokers given a hypothetical genetic lung cancer risk-screening test were least willing to accept genetic risk feedback when they received unexpected unfavourable results as they had higher desire for a retest. In contrast, unexpected negative results were perceived to be least accurate in the present study. This result is in contrast to Renner's **[19]** own findings that unexpected abnormal results were perceived to be least accurate. Renner **[19]** suggests that unexpected negative results may potentially be false-negative results within a health setting, hence important for a person to consider and examine carefully for their accuracy.

The present study showed that an unfavourable test result had an influence on concern about the result irrespective of expectation, suggesting that the need for follow-up is responsible for greater concern, rather than the congruence with existing beliefs. These findings contradict the notion that the combination of unexpected and adverse results creates more concern than adverse results alone. Shepperd and colleagues also found that unfavourable results were more relevant and

resulted in more negative affect regardless of expectation. The CARA model has also been examined by Bennett et al. [27], whose results did not support the model as levels of intrusive cancer-related thoughts decreased among women after receiving their genetic risk assessment result, regardless of the risk assigned and of level of surprise (indexing expectation).

Understanding how individuals react to health-risk information is gaining importance as health assessments where results are not immediate, such as cancer screening, are becoming increasingly common. It is well documented that abnormal cancer screening results can cause significant short-term distress, reducing individuals' quality of life [28]. For instance, Watson et al. [15] found the negative psychological impact of a marginally abnormal mammogram, requiring further testing, was significantly higher than for a normal mammogram. Furthermore, this occurred even if the second test was normal [15]. Within the present study many individuals (52.4%) required follow-up before receiving their final screening outcome. However, it should be highlighted that requiring follow-up did not necessarily mean there was a suspicion of lung cancer and it is likely the number requiring follow-up would be lower should a national screening lung cancer programme be introduced [11]. Within the trial, those with category two nodules (defined as small and probably benign) required a follow-up scan at 12 months as part of the trial protocol. However, as part of a national programme these would not require follow-up and a programme would likely involve annual or biennial scans [11]. The implications of these results for future screening should therefore be considered with this in mind.

The results of the present study should also be viewed in light of the previous studies examining the psychological impact of lung screening, many of which have shown no evidence of long-term negative psychological outcomes. Previously reported analyses of the UKLS study have shown increases in lung cancer distress and anxiety after receiving an MDT referral in the short-term, but no evidence of a long-term impact [17]. The NELSON trial reported lower quality of life and increased anxiety and cancer distress at two months follow-up after an indeterminate scan result, but these effects had resolved by two years [29]. The NLST reported no significant differences between those receiving an abnormal versus normal lung screening result in anxiety and health-related quality of life at one and six months follow-up [30]. Thus while potential short-term negative impacts may be beneficial to address, it is encouraging that longer-term negative psychological outcomes from lung screening appear to be limited. Indeed, further exploration of whether concern about CT result and perceived accuracy of the result are associated with other long-term psychological outcomes such as cancer distress would be interesting.

It is noteworthy that no association was found between smoking status and concern about the CT result. This is in contrast to previous analyses of the UKLS pilot trial where smokers were more

distressed about lung cancer than non-smokers were [17]. This may highlight the differences between examining concern about the CT result and a broader measure of distress about lung cancer.

Some limitations to the present study are acknowledged. There may be **selection bias** as an individual's decision to participate in a trial is different to deciding to participate in a national screening programme. Although randomised controlled trials are the gold standard for evidence-based decision-making their results may be limited when generalising to a national programme [31]. Furthermore, sample selection bias may limit external validity, as high-risk individuals who were older, female, smokers, from a lower socioeconomic group or more concerned about lung cancer were less likely to participate [32]. Smokers may have been further under-represented because smoking status was computed from self-reported information and there is a risk of social-desirability bias. However, previous studies have shown the validity of self-reported smoking status to be high [33], including in the NELSON lung cancer screening trial [34]. Once taking part in the UKLS pilot trial, those included in the present sample were similar to those who did not complete the follow up-questionnaire except more were married/cohabiting and they were better educated. These differences in characteristics further limit the generalisability of the findings. The measures of concern (indexing perceived threat from the CARA model) and perceived accuracy were both assessed using single items which resulted in limited variability of these measures. Single item measures were used to minimize participant burden as they were within longer questionnaires [22]. Finally, the element of consistency of feedback over multiple time points, posited by the CARA **model** to influence the response to results, was not examined within this study.

4.2. Conclusion

The findings support the CARA model as those receiving expected negative results view them as less concerning and more accurate than those receiving other results. Individuals requiring follow-up after their initial LCDT scan have greater concern about the result than those receiving negative results. While concern was associated with some sociodemographic variables, they did not account for the association between expectation-result congruence and concern about the test result. Those receiving unexpected negative results appear to perceive the test to be less accurate. Groups who may benefit from additional support during the screening process can therefore be identified.

4.3. Practical Implications

Identifying those at higher risk of perceiving the CT test results to be more concerning and less accurate is possible. This is important for future lung cancer screening programmes, which are likely to be annual or biennial [11], because evidence suggests that increased concern and decreased perceived accuracy can result in patients avoiding future surveillance [35-37]. Individuals with

unfavourable screening results and those with unexpected results may benefit from additional support during the screening process. For those receiving unexpected negative results, help in appreciating the accuracy of the test results may be valuable. This may be particularly important for a group already defined as “high-risk”, as a false-positive for this group may be particularly concerning. However, only a small proportion (<20%) of participants expected an unclear or abnormal scan result despite being in a high-risk group. For those requiring follow-up, additional support to cope with their result and understand the likelihood (or in reality more the unlikelihood) of a cancer actually being detected may be important. If lung cancer screening is routinely implemented, interventions for specific expectation-result groups may be developed for use within the screening programme to minimise any adverse psychological impact of the screening process.

Additional information

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Conflict of interest

None

Contributions

CD: Data analysis, data interpretation and manuscript preparation.

AE: Data analysis, data interpretation and manuscript preparation.

BC: **Trial statistician**, data analysis, data interpretation and manuscript review.

JKF: Trial conception and design, data interpretation and manuscript review.

KB: Trial conception and design, data interpretation and manuscript review.

KJL: Data collection, data analysis, data interpretation, and manuscript preparation.

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Informed consent

I can confirm all patient/personal identifiers have been removed or disguised so that the patient/person(s) described are not identifiable and cannot be identified through the details of the story.

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Table 1. Baseline sample characteristics

		Final sample (n = 1589) ‡ n (%)
Age	≤65	478 (30.1)
	66 to 70	698 (43.9)
	≥71	413 (26.0)
Gender	Male	1203 (75.7)
	Female	386 (24.3)
Education^	Up to GCSE/O level or equivalent	491 (43.6)
	Beyond GCSE/O level or equivalent	636 (56.4)
Ethnicity	White	1570 (99.2)
	Non-white	12 (0.8)
Marital group	Married /cohabiting	1199 (75.7)
	Not married/cohabiting*	385 (24.3)
IMD	Quintile 1	428 (26.9)
	Quintile 2	186 (11.7)
	Quintile 3	281 (17.7)
	Quintile 4	270 (17.0)
	Quintile 5	424 (26.7)
Smoking status	Current smoker	589 (37.6)
	Ex-smoker	990 (62.3)
	Never smoker	1 (0.1)
Experience of lung cancer	No	1098 (58.2)
	Yes	789 (41.8)

‡Ns vary within each cell due to missing data. Percentages are calculated based on available data.
^a substantial amount of data were missing or uninformative for education.

Table 2. Expected and actual LDCT scan results

		LDCT Scan Result, n (%)	
		Negative	Follow-up
Screening expectation, n (%)	Negative	634 (39.9)	675 (42.5)
	Unclear/Abnormal	123 (7.7)	157 (9.9)

Table 3. Expectation-result congruence and concern about the LDCT scan result

	Not at all concerned n (%)	**Not very concerned** n (%)	**Fairly concerned** n (%)	**Very concerned** n (%)	
Expected negative[a]	332 (56.8)	123 (21.1)	107 (18.3)	22 (3.8)	
Other expectation-result groups (break down below)	146 (17.0)	250 (29.2)	345 (40.3)	116 (13.5)	$\chi^2_{(3)}$=262.7 p<0.001[†]
Unexpected follow-up	85 (14.2)	189 (31.5)	249 (41.5)	77 (12.8)	
Unexpected negative[b]	48 (42.5)	24 (21.2)	26 (23.0)	15 (13.3)	
Expected follow-up[c]	13 (9.0)	37 (34.7)	70 (48.6)	24 (16.7)	$\chi^2_{(9)}$=309.7 p<0.001[Δ]

[Δ] overall chi-square test including the four expectation-result congruence groups.
[†] expected negative and other expectation results group (combined).
[a] unexpected follow-up and expected negative groups only: $\chi^2_{(3)}$=247.3, p<0.001.
[b] unexpected follow-up and unexpected negative groups only: $\chi^2_{(3)}$=52.7, p<0.001.
[c] unexpected follow-up and expected follow-up groups only: $\chi^2_{(3)}$=6.2, p=0.1.

Table 4. Expectation-result congruence and perceived accuracy about the LDCT scan result

	Likely that LDCT scan result was accurate n (%)	Unlikely that LDCT scan result was accurate n (%)	
Expected negative[a]	553 (94.7)	31 (5.3)	
Other expectation-result groups (break down below)	773 (90.5)	81 (9.5)	$\chi^2_{(1)}=7.9$ p=0.005[†]
Unexpected follow-up	545 (91.1)	53 (8.9)	
Unexpected negative[b]	96 (85.7)	16 (14.3)	
Expected follow-up[c]	132 (91.7)	12 (8.3)	$\chi^2_{(3)}=12.6$ p=0.006[Δ]

[Δ] overall chi-square test including the four expectation-result congruence groups.
[†] expected negative and other expectation results group (combined).
[a] unexpected follow-up and expected negative groups only: $\chi^2_{(1)}=5.1$, p=0.02.
[b] unexpected follow-up and unexpected negative groups only: $\chi^2_{(1)}=2.6$, p=0.11.
[c] unexpected follow-up and expected follow up groups only: $\chi^2_{(1)}=0.001$, p=0.97.

Table 5. Sociodemographics and concern about the LDCT scan result

		Not at all concerned (n=478) n (%) or mean (SD)	Not very concerned (n=373) n (%) or mean (SD)	Fairly concerned (n=452) n (%) or mean (SD)	Very concerned (n=138) n (%) or mean (SD)	Test statistic (*p*-value)
Age		67.96 (4.01)	67.68 (3.99)	67.45 (3.75)	66.79 (4.10)**	$F_{(3,1437)} = 3.6$ (0.01)
Gender	Male	386 (81)	280 (75)	335 (74)	99 (72)	$X^2_{(3)} = 8.3$ (0.04)
	Female	92 (19)	93 (25)	117 (26)	39 (28)	
IMD	Quintile 1	116 (24)	86 (23)	124 (27)	55 (40)	$X^2_{(12)} = 25.1$ (0.01)
	Quintile 2	61 (13)	43 (12)	46 (10)	13 (9)	
	Quintile 3	89 (19)	65 (17)	81 (18)	23 (17)	
	Quintile 4	73 (15)	66 (18)	86 (19)	25 (18)	
	Quintile 5	139 (29)	113 (30)	115 (25)	22 (16)	
Marital group ◊	Married/cohabiting	354 (74)	296 (79)	342 (76)	101 (74)	$X^2_{(3)} = 3.4$ (0.34)
	Not married/cohabiting	122 (26)	77 (21)	108 (24)	36 (26)	
Experience of lung cancer ◊	No	292 (61)	232 (62)	253 (56)	66 (48)	$X^2_{(3)} = 11.5$ (0.01)
	Yes	184 (39)	140 (38)	199 (44)	72 (52)	
Smoking status	Current smoker	158 (33)	140 (38)	181 (40)	55 (40)	$X^2_{(3)} = 5.5$ (0.14)
	Ex-smoker	320 (67)	232 (62)	271 (60)	83 (60)	
	Never smoker*	0 (0)	1 (<1)	0 (0)	0 (0)	n/a

◊ Ns vary within each cell due to missing data. Percentages are calculated based on available data
* Data excluded from analysis due to small cell size
** The post-hoc test shows this group is significantly younger than those who were not at all concerned

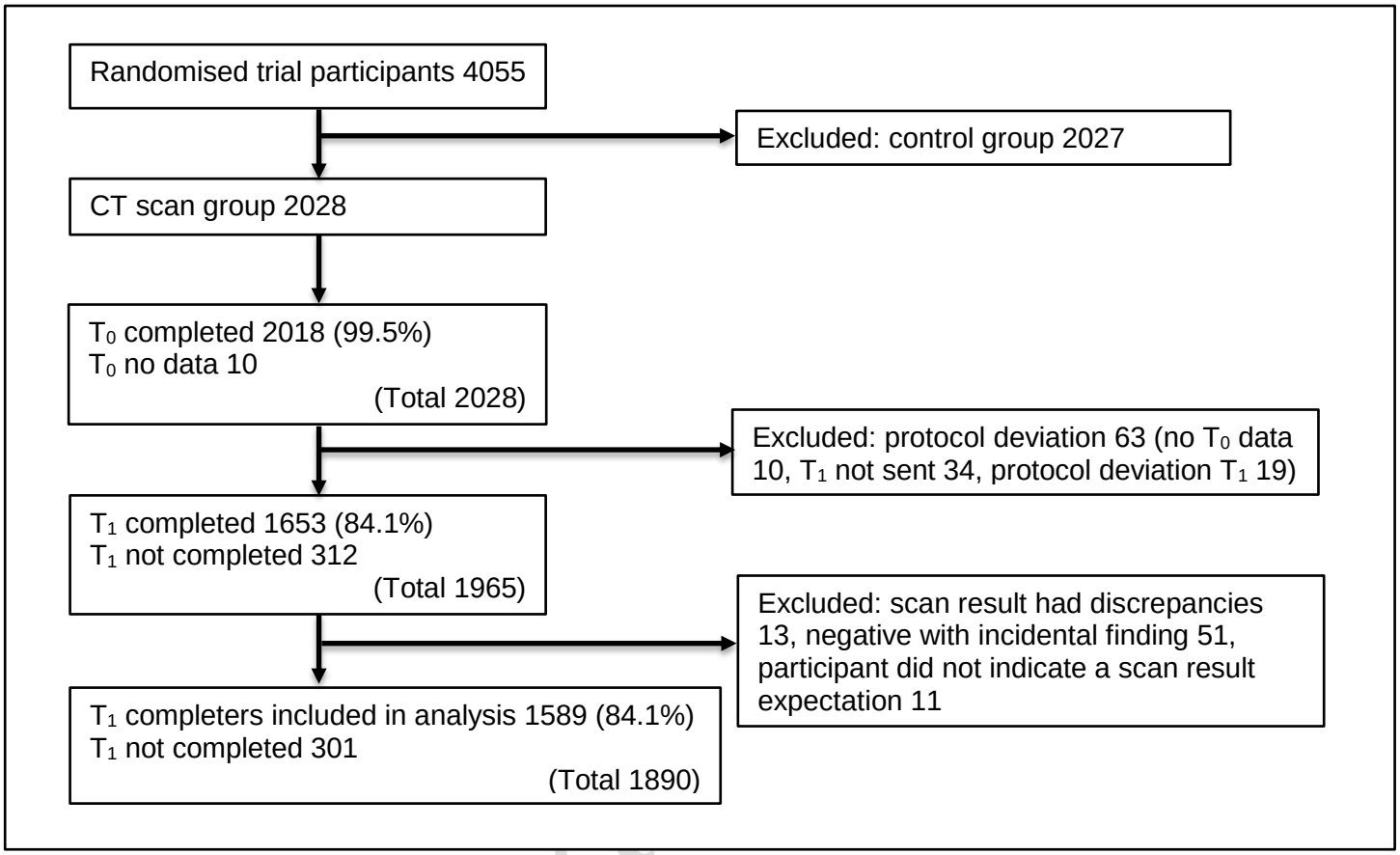
Table 6. Sociodemographics and perceived accuracy of the LDCT scan result

		Likely CT scan was accurate (n=1326) n (%) or mean (SD)	Unlikely CT scan was accurate (n=112) n (%) or mean (SD)	Test statistic (*p*-value)
Age		67.63 (3.95)	67.42 (3.99)	$t_{(1436)} = 0.5$ (0.59)
Gender	Male	1019 (77)	79 (71)	$X^2_{(1)} = 1.9$ (0.16)
	Female	307 (23)	33 (30)	
IMD	Quintile 1	348 (26)	34 (30)	$X^2_{(4)} = 1.7$ (0.80)
	Quintile 2	151 (11)	10 (9)	
	Quintile 3	236 (18)	21 (19)	
	Quintile 4	230 (17)	20 (18)	
	Quintile 5	361 (27)	27 (24)	
Marital group ◊	Married/cohabiting	1008 (76)	82 (73)	$X^2_{(1)} = 0.4$ (0.54)
	Not married/cohabiting	313 (24)	30 (27)	
Experience of lung cancer ◊	No	772 (58)	68 (61)	$X^2_{(1)} = 0.2$ (0.70)
	Yes	551 (42)	44 (39)	
Smoking status	Current smoker	497 (38)	37 (33)	$X^2_{(1)} = 0.7$ (0.40)
	Ex-smoker	828 (63)	75 (67)	
	Never smoker*	1 (<1)	0 (0)	n/a

◊ Ns vary within each cell due to missing data. Percentages are calculated based on available data
* Data excluded from analysis due to small cell size

Figure captions

Figure 1. Study participation



Highlights

- Requiring follow-up is associated with higher concern about results.
- An unexpected negative LDCT scan result is perceived as less accurate.
- Extra support may be beneficial for some during the screening process.