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Background. *Lung cancer screening can result in a high rate of indeterminate findings and has not yet been proven to be efficacious in reducing mortality. To date, the psychological consequences of receiving an indeterminate screening result are not known.* ***Methods.*** *Four hundred individuals were recruited into this study. Participants completed 4 surveys: baseline, after lung screening results were known, and at 6 and 12 mo after screening. Demographics, state/trait anxiety, fear of cancer, and perceived risk of lung cancer were measured. Mixed-model regressions were used to determine whether the levels and time trends of outcome variables were different among individuals with different screening outcomes.* ***Results.*** *An indeterminate screening result increased state anxiety of participants, although anxiety then decreased over time. The objective risk of cancer is lower for individuals with an indeterminate screen than their initial perceived risk, and screening did not change their perceived risk of cancer. Those with a suspicious screening result had increased perceived risk of cancer and fear of cancer after screening, and these effects also diminished over time. Individuals with a negative screen had a temporary reduction in perceived risk of cancer.* ***Conclusions.*** *Individuals who are screened for lung cancer and receive an indeterminate or suspicious screening result have some negative psychological effects from being screened. The results suggest that individuals who are considering screening should be fully informed of the risk of negative psychosocial consequences and that individuals who have been screened should receive clear and detailed information on interpreting screening results.* ***Key words:*** *lung cancer screening; decision making; consequences; quality of life.* ***(Med Decis Making 2008;28:917–925)***

Lung cancer is the 2nd most common cancer in the United States and is the leading cause of cancer death among both men and women.[1] In 2005, there were 170,000 new cases of lung cancer with 163,000 deaths.[2] The cure rate for lung cancer is approximately 12% to 15% and the 5-y survival rate for symptomatic disease is only slightly higher.[3–5] Recently, spiral computed tomography (CT) has been studied for its effectiveness and outcomes in diagnosing lung cancer. Several large studies are under way to explore the use of screening lung CT in detecting early-stage lung cancer and improving survival and mortality rates.[6–9] These studies have shown a higher sensitivity and superior detection rate for lung abnormalities with screening lung CT as compared with chest radiography. Recently released results of the International Early Lung Cancer Action Project (IELCAP) report an estimated 10-y survival rate of 88% for those who were screened and found to have stage I lung cancer.[10] Study investigators interpret results as proving that annual spiral CT screening can detect lung cancer that is curable and thus will improve mortality rates.

Not all investigators agree with these findings. There is concern that although the IELCAP study appears to demonstrate improvements in survival, these differences may be ascribed to overdiagnosis, lead-time bias, and identification of indolent lesions through screening. Using more than 18 y of follow-up data, the Mayo Lung Project found no difference in mortality between the screened group and the control group.[11,12] A just-released large study of the effect of CT screening on lung cancer mortality found

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no beneficial effect of screening on mortality[13] and raised strong concerns about possible harmful consequences of screening. Thus, it is still an open question as to whether there are mortality benefits from CT screening.

To allow for the best decision making possible, a full assessment of the impacts of any medical intervention should be known and communicated to individuals who are deciding whether to undergo that intervention. For screening tests, one unintended effect of screening may be the psychological reaction to the screening results. Clearly, a positive screening result for cancer or other diseases can lead to anxiety.[14,15] However, indeterminate or false-positive,[16–19] and even negative,[20] results have also been shown to cause adverse psychological effects including worry and anxiety. Studies report variable duration for these negative effects. Anxiety over false-positive breast cancer screening results with recall may last for some time even after repeat screening indicates the absence of cancer.[21,22] On the other hand, some research on genetic testing for Huntington's disease and colorectal cancer has shown that carriers suffer only short-term adverse anxiety after learning of their positive status.[15]

In the case of spiral CT screening, there are potentially a number of unintended consequences of screening. Screening and follow-up investigations may be very costly, and there is a high (23%–51%[1]) rate of suspicious/indeterminate screening results (i.e., individuals with any abnormality detected). If, as has been shown in other screening scenarios,[18] false-positive results in lung cancer screening lead to negative psychological effects, a large number of individuals may be affected adversely by screening. However, little research has explored patient preferences or psychological and quality-of-life effects associated with lung cancer screening. In this study, we examined the psychological effects of receiving a certain lung cancer screening result and how these effects change over a 1-y period following screening. Here, we report the effect of screening outcomes on anxiety levels, fear of cancer, and perceived risk of having lung cancer for individuals in 3 different screening outcome categories. Our main focus is how these negative psychosocial measures change over time for individuals in each of the screening outcome categories.

METHODS

The protocol for this study was approved by the University of Pittsburgh and University of Miami Institutional Review Boards.

Study Population

Participants for this study were recruited as they enrolled in the Pittsburgh Lung Screening Study (PLuSS), which was funded by the National Cancer Institute (PLuSS was not related to the National Lung Screening Trial). PLuSS investigated the operational characteristics of screening lung CT in a local setting and evaluated the pathologic and molecular characteristics and outcomes of screening lung CT–detected cancer. Individuals were recruited into PLuSS via mass mailing and physician referral. Participants completed background history information and were screened approximately 1 to 4 wk following enrollment and at a 1-y follow-up.

When individuals arrived to complete informed consent and enroll in PLuSS, a research assistant explained the aims and protocol of this study and asked if they would be willing to participate. Those who agreed completed informed consent. Eligibility criteria matched those for the PLuSS study, which were age 50 to 79 y, no personal history of lung cancer, smoking history of at least 25 y, no self-reported screening lung CT within 1 y, and weight of less than 400 lb.

Study Design

The core of this study was a series of 4 written surveys completed by participants. One was completed prior to the participant's initial CT screening in the PLuSS study, the 2nd within 1 to 2 wk after screening results were given to the participant, and follow-up surveys at 6 and 12 mo. All 4 surveys contained the same instruments. The 1st survey was given to the participant following enrollment, with a stamped return envelope. The subsequent surveys were mailed to participants and again included a stamped return envelope. When surveys were not returned within 2 to 3 wk of mailing, participants were contacted and urged to return the survey. Duplicate surveys were sent if the participant had lost or misplaced a survey. Participants were mailed $5 as a thank you following receipt of the completed survey.

Survey Instruments

The survey instruments completed by participants for this component of the study were as follows.

State-Trait Anxiety Inventory (STAI). The STAI[23] is one of the most frequently used measures of anxiety.[24] The inventory consists of 20 items to assess

state anxiety and 20 items to assess trait anxiety. State anxiety is defined as an unpleasant emotional arousal in the face of threatening demands and dangers. Trait anxiety reflects the existence of stable individual differences in the tendency to respond with anxiety when anticipating a threatening situation. Each item is rated on a 4-point scale ranging from *not at all* to *very much so*, with higher values of the final score indicating greater anxiety.

Fear of lung cancer. Three questions were adapted from the Psychological Consequences Questionnaire (PCQ)[18] to assess the effects of screening on fear about lung cancer. The PCQ was developed to assess emotional, social, and physical consequences of breast cancer screening. The 3 questions used were the following: Are you afraid that you may have cancer? Does the thought of death from lung cancer scare you? and Are you afraid of dying soon from lung cancer? Response levels were rated on a 5-point scale ranging from *never* to *most of the time*. Scores of individual items were summed, with higher total scores indicating greater fear of cancer.

Perceived risk of lung cancer. Participants were also asked how likely they believed it was that they had or will get lung cancer. They were given a scale anchored with *from no chance* (0%) and *certain* (100%). To allow for accuracy in representing small percentages, there was an additional inset scale to allow individuals to indicate percentages between 0% and 1%.

Other data. The following demographic characteristics were collected at the baseline interview: gender, age, marital status (married/not married), race (white non-Hispanic, Hispanic, African American), education level (high school or less, some post–high school education, college graduate or more), and number of years smoked. In addition, information on current smoking status was collected at baseline and at 12-mo follow-up. Finally, from the PLuSS study data, we collected information on whether individuals had undergone their 12-mo follow-up CT screening prior to completing the 12-mo survey and the results of the follow-up screening.

Screening results. Participants were categorized into 4 screening outcome classes following their initial CT screening. The categories are related to the following recommendations for follow-up care or diagnoses. The objective risk of lung cancer assigned to each of the categories is provided in parentheses following the category description.

- Category 1 = negative; no diagnostic follow-up or physician referral recommended (<1%)
- Category 2 = definitely or probably benign; physician referral for clinically significant noncancer radiological finding (<1%)
- Category 3 = indeterminate; advise periodic follow-up CT for 1 or more indeterminate noncalcified lung nodule (1%–5%)
- Category 4 = suspicious; strong physician referral for lung cancer suspicion on screening CT (15%–20%)

Statistical Analyses

Descriptive demographic characteristics and screening outcomes were calculated for all participants and for those participants who completed all surveys. However, as category 2 included only 4 participants, the participants in this category were not included in further analyses. Although the risk of lung cancer is the same for these individuals as for those with a negative screen, the presence of a noncancer lung finding and referral for follow-up suggests that outcomes may differ for participants with a category 2 finding as compared with those with a negative screening result. In addition, 3 individuals with a category 4 finding were diagnosed with lung cancer during the study, and these individuals are not included in analyses. For the remaining individuals, summary demographic information assessed at baseline was calculated for individuals in each of the outcome categories and compared where possible to the demographics of participants in the larger PLuSS study.

We calculated summary scores of the 4 outcome measures for individuals in each category at each of the survey time points. We also compared the perceived risk of having lung cancer to the objective risk estimated by the PLuSS investigators.

Our main aim in this research was to determine, within screening categories, changes in the outcome measures over time. We hypothesized that individuals with an indeterminate or suspicious screening result will have higher levels of state anxiety, higher perceived risk of lung cancer, and a higher fear of cancer after screening than they did at baseline. Furthermore, we expected that these effects would diminish over the year following screening. We also hypothesized that individuals with a negative screening result would show improvements in the outcome measures following screening.

To address these hypotheses, we used mixed-model regressions to analyze our repeated-measures data. Our data are hierarchical, as each individual provided data for up to 4 points in time. Thus, in

Table 1 Characteristics of Participants

	All		No Missing Surveys		1 + Missing Surveys	
	n	%	n	%	n	%
Number	400		341	85.3	59	14.7
Age, y[a]	60.2 (6.8)		60.1 (6.7)		60.4 (7.6)	
Female	197	49.3	165	48.4	32	54.2
White	378	94.5	324	95.0	54	91.5
Married	245	61.3	212	62.2	33	55.9
Education						
High school or less	111	27.8	93	27.3	18	30.5
Some post–high school	161	40.3	135	39.6	26	44.1
College graduate or more	128	32.0	113	33.1	15	25.4
Years smoked[a]	40.8 (7.4)		40.9 (7.3)		40.3 (8.0)	
Current smoker	236	59	201	58.9	35	59.3
Overall rating						
Negative	228	57.0	190	55.7	38	64.4
Benign	4	1.0	4	1.2	0	0
Indeterminate	141	35.3	126	37.0	15	25.4
Suspicious	27	6.7	21	6.2	6	10.2

Note: There were no significant differences between those not missing a survey and those missing a survey.
a. $\bar{x}(s)$.

our model, individual identity is included as a random effect in a hierarchical model. We estimated regression models for 4 outcome measures: state anxiety, trait anxiety, fear of cancer, and perceived risk of cancer. The main independent variables of interest were the interaction of screening result and survey time (baseline survey, survey following screening, 6 mo, and 12 mo). Because we hypothesized that the effect of some screening results on the outcome variables would change over time (e.g., an immediate increase in anxiety followed by a decrease), we include both screening result interacted with survey time, and screening result interacted with survey time squared. The variables for survey time, survey time squared, and screening result were also included individually. The regressions were estimated controlling for demographic variables of gender, age, marital status, education level, and current smoking status.

As secondary analyses, we estimated the effects of other covariates that we believed may be significantly associated with our dependent variables and therefore potentially confound the model's results. These included whether the 2nd screening had occurred prior to the final survey and the results of the 2nd screening, 2nd screening results interacted with survey time and survey time squared, and 2nd screening results interacted with initial screening result. As none of these additional variables showed a significant association with the dependent variable in any regression and also did not affect the other coefficients, results from these regressions are not presented.

RESULTS

Study Participants

Four hundred individuals were enrolled in the study. Of those approached, approximately 2% declined to participate. Of the 400 enrolled, 341 completed all of the surveys, for an overall full completion rate of more than 85%. Table 1 shows demographic characteristics of all individuals, those individuals who completed all surveys, and those who had missing surveys. The average age was 60 y, and average years smoked was 41. Half were female, and the majority (95%) were white. There were no significant differences in demographics between those who completed all surveys and those who did not. The study participants did not differ from the larger PLuSS population from which they were drawn on average age (~60 y in the overall PLuSS population), percentage female (~51%), or percentage who were current smokers (60%).

Table 1 also shows that overall, 57% of participants had a negative screening result, 35% had an

Table 2 Demographic Characteristics of Participants by Screening Results Category, after Removing Those with a Noncancer Lung Finding and Whose Who Were Diagnosed with Lung Cancer

	Negative		Indeterminate		Suspicious	
	n	%	n	%	n	%
Number	228		141		24	
Age, y[a]	59.8 (6.6)		60.4 (6.8)		61.2 (6.9)	
Female*	101	44.3	83	58.9	10	41.7
White	211	92.5	136	96.5	24	100
Married*	149	65.4	84	59.6	9	37.5
Education*						
High school or less	56	24.6	44	31.2	10	41.7
Some post–high school	90	39.5	59	41.8	10	41.7
College graduate or more	82	36.0	38	27.0	4	16.7
Years smoked	40.5 (7.3)		40.9 (7.4)		42.8 (8.1)	
Current smoker	137	60.1	80	56.7	15	62.5

a. $\bar{x}(s)$.
*Significant differences between the categories, $P < 0.05$, analysis of variance.

indeterminate result, and less than 7% had a suspicious result. There were no significant differences in the screening results for those who completed all of the surveys and those who did not. In addition (data not shown), there were no significant differences on any of the baseline psychosocial measures between individuals who did and did not complete all surveys. As there were no significant differences in baseline demographic characteristics, screening outcomes, or baseline survey measures between those who completed all surveys and those who did not, we include all participants in our analyses.

Table 2 shows the demographic characteristics of participants by screening results category. There was a significantly higher percentage of women with an indeterminate result than in the other result categories and a higher percentage of married individuals in the negative and indeterminate classes than in the suspicious category. In addition, there were significant differences among categories in educational level.

Summary statistics for the survey measures are provided in Table 3. Tests of statistical differences over time and between the different screening results groups were not conducted on these averages, as the mixed-model regressions provide that information in an adjusted and more parsimonious manner.

From the unadjusted values in Table 3, we find that for individuals with either indeterminate or suspicious screening results, state anxiety rose following screening. The average state anxiety for those with indeterminate results did not fall substantially until the 12-mo survey. However, state anxiety at the 6-mo survey was lower than that immediately after screening for those individuals with suspicious results. The average trait anxiety did not change much over time, although it increased slightly after screening for those with suspicious screening results. The average fear of cancer scores for those with negative or indeterminate screens stayed fairly level over time. For individuals with suspicious screens, fear of cancer increased following screening and did not return to baseline by the 12-mo follow-up survey. Finally, perceived risk of cancer fell somewhat after screening for those with a negative screen and dipped at 6 mo for those with an indeterminate screen. The average perceived risk of cancer rose dramatically for those with a suspicious screen and stayed high throughout the entire year follow-up. For all of the categories, the perceived risk of cancer following screening was substantially higher than objective risk.

Results from the multivariable models are presented in Table 4. For each outcome measure, the variable "survey time" indicates the 4 surveys (baseline, postscreening, 6 mo, and 12 mo). For all regressions, the likelihood ratio test comparing the mixed model with repeat measures on individuals to a linear regression model was significant, indicating the necessity of using a hierarchical model structure.

State anxiety showed a strong concave path over time for both individuals with indeterminate and suspicious screening results, although the coefficients on the interacted survey time and survey time squared are significant only for those with an indeterminate screen. Individuals with the highest level

Table 3 Mean (Standard Deviation) Values for Outcome Measures by Initial Screening Result

Survey	Negative Screening Result	Indeterminate Screening Result	Suspicious Screening Result
State anxiety			
Initial	35.9 (12.4)	34.4 (12.3)	32.6 (12.3)
Postscreen	35.9 (12.3)	37.7 (13.8)	38.3 (14.4)
6 mo	34.4 (12.0)	37.3 (12.6)	32.6 (12.1)
12 mo	35.1 (12.9)	35.3 (13.5)	35.1 (17.5)
Trait anxiety			
Initial	37.0 (11.3)	36.7 (11.7)	33.9 (9.8)
Postscreen	36.6 (11.3)	37.5 (12.2)	36.6 (11.2)
6 mo	35.7 (12.0)	36.7 (11.9)	35.4 (11.7)
12 mo	35.8 (11.8)	36.3 (12.4)	35.0 (16.3)
Cancer fear			
Initial	7.0 (2.5)	7.2 (2.8)	6.4 (2.3)
Postscreen	7.0 (2.4)	7.5 (2.7)	8.5 (2.6)
6 mo	6.5 (2.4)	7.1 (2.6)	7.4 (3.0)
12 mo	6.7 (2.3)	7.1 (2.7)	7.1 (2.5)
Perceived risk (%)			
Objective risk	<1	1–5	15–20
Initial	17.1 (20.4)	18.9 (22.9)	18.6 (15.7)
Postscreen	11.2 (20.2)	20.1 (25.0)	34.5 (28.0)
6 mo	13.1 (20.8)	14.8 (19.7)	30.3 (28.0)
12 mo	13.1 (19.9)	18.9 (25.2)	31.2 (28.9)

Note: There were no significant differences at baseline among the screening results group.

Table 4 Mixed-Model Hierarchical Regression Results, Coefficients and Standard Errors for Each of the Outcome Measures

	State Anxiety	Trait Anxiety	Fear of Cancer	Perceived Risk of Cancer
Constant	48.58 (6.18)**	49.26 (5.91)	7.94 (1.20)**	27.00 (9.34)*
Survey time	−0.97 (1.26)	−0.70 (0.99)	−0.37 (0.25)	−7.55 (3.02)*
Survey time^2	0.13 (0.25)	0.06 (0.20)	0.05 (0.05)	1.35 (0.60)*
Indeterminate	−8.04 (2.46)**	−2.02 (2.05)	−0.48 (0.49)	0.23 (5.45)
Suspicious	−9.00 (5.02)	−7.73 (4.18)	−3.45 (1.00)**	−25.89 (11.11)*
Indeterminate × survey time	7.50 (2.00)**	1.77 (1.57)	0.74 (0.40)	3.27 (4.81)
Suspicious × survey time	6.19 (4.08)	4.29 (3.20)	3.49 (0.82)**	32.63 (9.79)**
Indeterminate × survey time^2	−1.41 (0.39)**	−0.34 (0.31)	−0.14 (0.08)	−0.62 (0.95)
Suspicious × survey time^2	−1.16 (0.81)	−0.79 (0.64)	−0.66 (0.16)**	−5.81 (1.94)*
Age	−0.20 (0.09)*	−0.15 (0.08)	−0.02 (0.02)	−0.09 (0.12)
Female	1.52 (1.18)	0.83 (1.13)	0.51 (0.23)*	0.47 (1.71)
Black	0.31 (2.62)	−0.21 (2.52)	0.53 (0.51)	5.50 (3.79)
Married	−1.76 (1.25)	−2.57 (1.20)*	−0.32 (0.24)	−0.54 (1.81)
Post–high school education	−3.04 (1.41)	−3.76 (1.36)*	−0.81 (0.27)*	−2.28 (2.05)
College graduate or more	−4.20 (1.48)*	−4.44 (1.43)*	−0.76 (0.29)*	−7.48 (2.15)**
Current smoker	3.37 (1.17)*	2.11 (1.13)	0.90 (0.23)**	6.67 (1.70)**

Note: Individual is the random effect. Excluded categories for fixed effects are negative screening results and high school or education or less. Highlighted variables are variables of interest.
*Significant at $P < 0.03$.
**Significant at $P < 0.001$.

of education had significantly lower overall state anxiety than those with less education, and current smokers had significantly higher state anxiety than nonsmokers did. In contrast to state anxiety, none of the survey time or screening results variables were significantly associated with trait anxiety. However,

we found that married individuals and individuals in higher education classes had significantly lower trait anxiety.

Baseline fear of cancer for those individuals with a suspicious screening result was significantly lower than for those who would eventually receive a negative result. Individuals with a suspicious screening did exhibit a highly significant increase in fear of cancer over time, although the significant negative coefficient on the interacted survey time squared variable shows that this decreased over time. The coefficient on survey time was not significant, indicating that fear of cancer did not diminish over time for those with a negative screen, as one might have expected to be the case. Women and current smokers had higher fears of cancer, whereas those with more education had lower levels. Finally, findings for perceived risk of cancer also showed that although individuals with suspicious screens had lower baseline levels of perceived risk, this increased significantly over time, tracing a concave path. For those with a negative screen, the opposite effect was seen, with perceived risk tracing a negative convex path over time. There were no significant changes in perceived risk over time for those with an indeterminate screen, even though their objective risk level—of which they were informed—is substantially lower than their perceived risk.

DISCUSSION

Considerable debate is ongoing as to whether screening and early detection of lung cancer are beneficial in reducing mortality and morbidity from lung cancer. Thus, it is vitally important that potential negative side effects of screening on quality of life are known, as this should play a relatively large role in decisions about screening. Our results show that individuals with a suspicious or indeterminate screening result have increases in negative psychosocial measures following screening, but these adverse effects mostly decrease over time. Surprisingly, individuals with a negative screening result do not have a sustained decrease (i.e., improvement) in these measures following screening.

Although our research is the first to explore a range of psychosocial effects of being screened for lung cancer, some of our findings can be compared with previous research. First, similar to much of the previous literature on breast and cervical cancer,[18,19,25] we found that individuals with indeterminate and suspicious screening results—which were not ultimately cancer—had increased anxiety following screening. Second, in contrast to previous studies that report that individuals at high risk of lung cancer underestimate their risk of cancer,[26,27] we found that individuals at baseline had a relatively high perceived risk for having lung cancer (18%), which was an overestimate of the actual risk in all groups. Following screening, the average perceived risk of cancer for those with a negative screen fell somewhat, although only to 13% at 12 mo, whereas the average perceived risk for those with indeterminate screening results did not substantially change over time. All individuals in the study were counseled extensively on what their screening results meant in terms of the risk of having cancer; thus, individuals with negative and indeterminate results were told that their risk was, respectively, <1% and 1% to 5%. Similarly, those with a suspicious screening result were informed their risk was 15% to 20%. Despite provision of this information and counseling concerning the screening results, individuals on average had substantially inflated perceptions of their risk of cancer.

The results from this research contribute to the literature on lung cancer screening decision making in a number of ways. First, the extensive literature on decision aids suggests that provision of additional information to individuals will affect the decisions that they make.[28,29] Thus, it is possible that by presenting information on the high false-positive rate and potential negative psychological consequences of being screened, individuals may alter their decisions about screening or may seek additional information or clinical guidance before being screened. However, some previous studies have shown that the occurrence of false-positive results does not deter individuals from seeking screening.[30,31] Second, previous research has explored how anxiety and cancer worry affects adherence to follow-up screening, with mixed conclusions. Many studies have found that individuals with higher levels of intrusive thoughts concerning cancer or higher anxiety are less likely to be adherent to clinical follow-up,[32–34] although other studies have shown that women with increased worry about breast cancer were more adherent to repeat screening.[35–37] Nevertheless, our findings that indeterminate and suspicious screening results may increase anxiety and cancer worry should alert clinicians that compliance among this population of patients may be problematic and that they should be monitored for adherence.

There are several limitations to our study. First, our population consisted of individuals who had

enrolled in a lung cancer screening study and thus is not necessarily representative of the general public at high risk for lung cancer. However, our aim in this research was to examine the effects of screening on those individuals who were actually being screened, and our main interest was in the change over time in psychosocial measures for individuals receiving different screening results. The individuals in our study are likely to be representative of individuals in the community who may be contemplating screening. Thus, the results of our study are likely to be generalizable to a community-based population of high-risk individuals who are or will be facing screening decisions. Second, our measures are self-reported via a mailed survey and thus may be biased either because of missing information or because of a lack of understanding by participants of the survey content. Approximately 15% of the study participants did not complete all 4 surveys. Although these individuals were no different at baseline from those retained throughout the study, their reaction to screening results may have been different from those who were retained. Thus, the collected psychosocial measures may not reflect measures for those who withdrew. In addition, as this was a mailed survey, we do not know whether participants fully understood the instruments or questions. However, as we used instruments that have been extensively validated and tested, error introduced through these means should be minimal. Finally, the sample size for those with a suspicious screening result was small, and thus, we may not have had sufficient power to detect significant results for some outcome measures (e.g., state anxiety).

In summary, we found that screening for lung cancer does have negative psychological effects on those being screened, particularly those with a suspicious screening result, although most effects fade over time. Our results suggest that individuals who are considering screening should be fully informed of the risk of negative psychosocial consequences, as it is clear that some negative consequences may occur. Clinicians and individuals considering screening should also be aware that receipt of a negative screening result may not bring peace of mind, as sustained reductions in fear of cancer and perceived risk were not seen in those with a negative screen. In addition, individuals who have been screened should receive clear and detailed information on what their results mean, as individuals' perceived risk of cancer is not aligned with their objective risk and because increased perceived risk and anxiety may affect adherence to follow-up screening. Additional research is needed to determine how, if at all, improved knowledge of screening effects influences screening decisions in lung cancer.

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