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Targeted Melanoma Screening: Risk Self-Assessment and Skin Self-Examination Education Delivered During Mammography of Women

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Abstract

Background: Melanoma, which is the sixth most common cancer in women, is visible on the surface of the skin; therefore, self-screening (skin self-examination [SSE]) may be beneficial.
Methods: A convenience sample of women undergoing mammography was sequentially assigned by week into this two-arm targeted melanoma screening intervention. Both groups saw an informational poster and received a brochure promoting risk self-identification and SSE education. One group received an additional 1-week SSE reminder. Participants completed baseline and 1- and 3-month follow-up surveys assessing SSE performance, identifying a concerning mole, scheduling a dermatology appointment, and anxiety due to the program. Performance of SSE between groups was compared using χ^2 analysis. The electronic medical record was reviewed for diagnosis of concerning moles.
Results: At 1 month, 384 of 420 (91.4% retention) women completed the survey. Of those, 311 (80.9%) performed SSE. Of those who performed SSE, 54 (14%) found a concerning mole at either 1 or 3 months. At 3 months, 346 (82.4% retention) women completed the survey. The number of women who performed SSE did not differ between groups at 1 month ($\chi^2 = 1.64$, $P = .17$) or 3 months ($\chi^2 = 1.58$, $P = .12$). Seven melanomas were found among 34 women who identified a concerning mole; examination of 4.8 women yielded one melanoma. Anxiety was low with a median score of 9.5 (range = 0–42.9).
Conclusions: Introducing melanoma risks and SSE education during mammography was feasible and did not demonstrate harms; thus, there is an opportunity to reach a large, at-risk population with limited burden for the participant and clinics.

Melanoma has increased statistically significantly in the United States over the last 40 years and is projected to continue rising (1). More than 91 000 new cases and 9300 deaths are estimated to have occurred in 2018. Melanoma, which is the sixth most common cancer in women, is visible on the skin; therefore, self-screening (skin self-examination [SSE]) may be beneficial (2). Performing SSE may reduce advanced disease among melanoma patients (unadjusted risk ratio = 0.58, 95% confidence interval = 0.1 to 1.11) and mortality from melanoma by 63% (2). Women are more likely to perform SSE than men (3–6). In the general population, 9–18.4% of people perform SSE (3,4). People

at risk for melanoma, such as those with a family or personal history of skin cancer or a personal history of sunburns and indoor tanning, performed SSE more regularly than those in the general population (3–5). When counseled, 70% of family members performed SSE regularly (7). Predictors of SSE performance were perceived severity of melanoma, SSE benefit, and intention to perform SSE (6–9). Previous research did not examine risk perception as a predictor of SSE performance. Melanoma-targeted screening strategies have not utilized self-assessed risk and SSE education to reach an at-risk population.

Table 1. Presentation of risk criteria to women

Seven items used to stratify risk*	Stakeholders' preferred risk items
Age	Personal history of sunburn
Sex	Personal history of indoor tanning with 10 or more sessions
Tanning ability	Family or personal history of skin cancer
Number of moles at 21 y	
Number of skin lesions treated destructively	
Hair color	
Sunscreen use	

*Reference (14).

Because most melanomas occur in patients 40 years and older (10), the screening mammogram experience, which begins at age 40 years, could be used to enhance women's awareness of their melanoma risk and provide SSE education. The US Preventive Services Task Force posited that SSE may cause psychological harm; therefore, anxiety was assessed among participants (11). Additional potential harms of increased number of visits to or skin biopsies by health-care providers for benign conditions were assessed by electronic medical record (EMR) review.

An easily disseminated, low-cost, effective intervention provided during mammography was developed with stakeholders, who were women having a mammogram. The brochure, which was derived from an effective educational SSE intervention (12,13), presented three melanoma risks (history of indoor tanning, sunburn, and personal or family history of skin cancer) (14) (Table 1). Distributing brochures during mammography was feasible (13). This trial provided two levels of intervention intensity surveyed for 3 months to determine SSE performance, identification of concerning moles, anxiety among participants, and the clinical and pathologic diagnosis of concerning moles. The hypothesis is that when SSE education is simultaneously provided with self-perception of risk, anxiety will not be increased. Additionally, SSE will not increase visits to or skin biopsies by health-care providers for benign conditions.

Methods

Study Design

A convenience sample of women undergoing screening mammography at the Lynn Sage Comprehensive Breast Center of Northwestern Medicine was enrolled. Participants were included if they were adult women scheduled to have a screening mammogram. The exclusion criteria included prior history of breast cancer, limited visual acuity such that they were unable to read a newspaper, non-English speakers, cognitive impairment causing problems with functioning at a sixth-grade reading level, and exhibiting signs of emotional distress. Women were assigned in weekly blocks to receive a brochure and a 1-week reminder telephone call or email (group 1, intensive) or to only receive a brochure (group 2, education only) (Supplementary Figure, available online). The Institutional Review Board of Northwestern University approved the study, and written consent was obtained. (See Clinical Trials

registration: NCT03512457 https://clinicaltrials.gov/ct2/results?cond=&term=NCT03512457&cntry=&state=&city=&dist=.)

The study was conducted from June 3 to July 27, 2018. When women arrived, a research assistant performed an in-person, scripted interview to ascertain if women were interested in participating. The assistant obtained written consent from interested women. Enrolled participants completed a baseline research electronic data capture (REDCap) survey via a secure web application using a provided tablet computer (15).

Each changing room of the Lynn Sage Comprehensive Breast Center of Northwestern Medicine was equipped with the poster and brochure asking: "Are you at risk to get a melanoma?" followed by three risk factors for consideration: history of sunburn, history of indoor tanning of 10 or more sessions, and family or personal history of skin cancer (13) (Supplementary file, available online). During weeks 1, 3, 5, and 7 of the enrollment period, women were given a brochure and a card with information about making a dermatology appointment and were scheduled to receive a reminder call or email to perform SSE 1 week post-mammogram (group 1, intensive). During weeks 2, 4, and 6, women were only given a brochure (group 2, education only). If after receiving the brochure a woman decided she did not have risk factors or was not interested in enrolling, her status was recorded as declined to enroll. Completion of this process took less than 10 minutes.

Enrolled women who failed to respond to the REDCap survey were contacted once via their preference of telephone call or email. If there was no response to the telephone call, then a scripted voicemail provided a call back number. Women received a reminder by telephone call or email 48 hours later and again in 1 week. If participants did not respond to calls or emails within 2 weeks of the survey due date, they were removed from further contact. This follow-up procedure was repeated for all surveys. Upon completion of each survey, participants received an electronic gift card in the amount of $10.

The participants and research assistants were not blinded to their allocation. The dermatologist reviewing the EMR and the biostatistician were blinded.

Data Collection

One week after mammography, participants in group 1 (intensive) were contacted by telephone or email by a research assistant. Women were asked: "Since having your mammogram … (1) Did you read the brochure? (2) Did you thoroughly check your skin? (3) If you thoroughly checked your skin, did you notice any concerning moles? (4) If you did not thoroughly check your skin, will you consider checking in the future? (5) If you found a concerning mole, did you make an appointment with dermatology? If not, will you consider making an appointment soon?" All women completed three online REDCap surveys (baseline and 1 and 3 months) indicating if they performed SSE before mammography, read the informational brochure, checked their skin, found a concerning lesion, and/or scheduled an appointment with a dermatologist. All participants completing the 1-month REDCap survey were asked if they performed SSE and if they intended to perform SSE in the future and/or intended to make an appointment with a dermatologist. Also, participants were asked if they shared the brochure with others and, if so, with whom they shared it.

Three months after enrolling, both groups received the final REDCap survey by email that identified women at increased risk for melanoma based on a history of sunburn, history of indoor
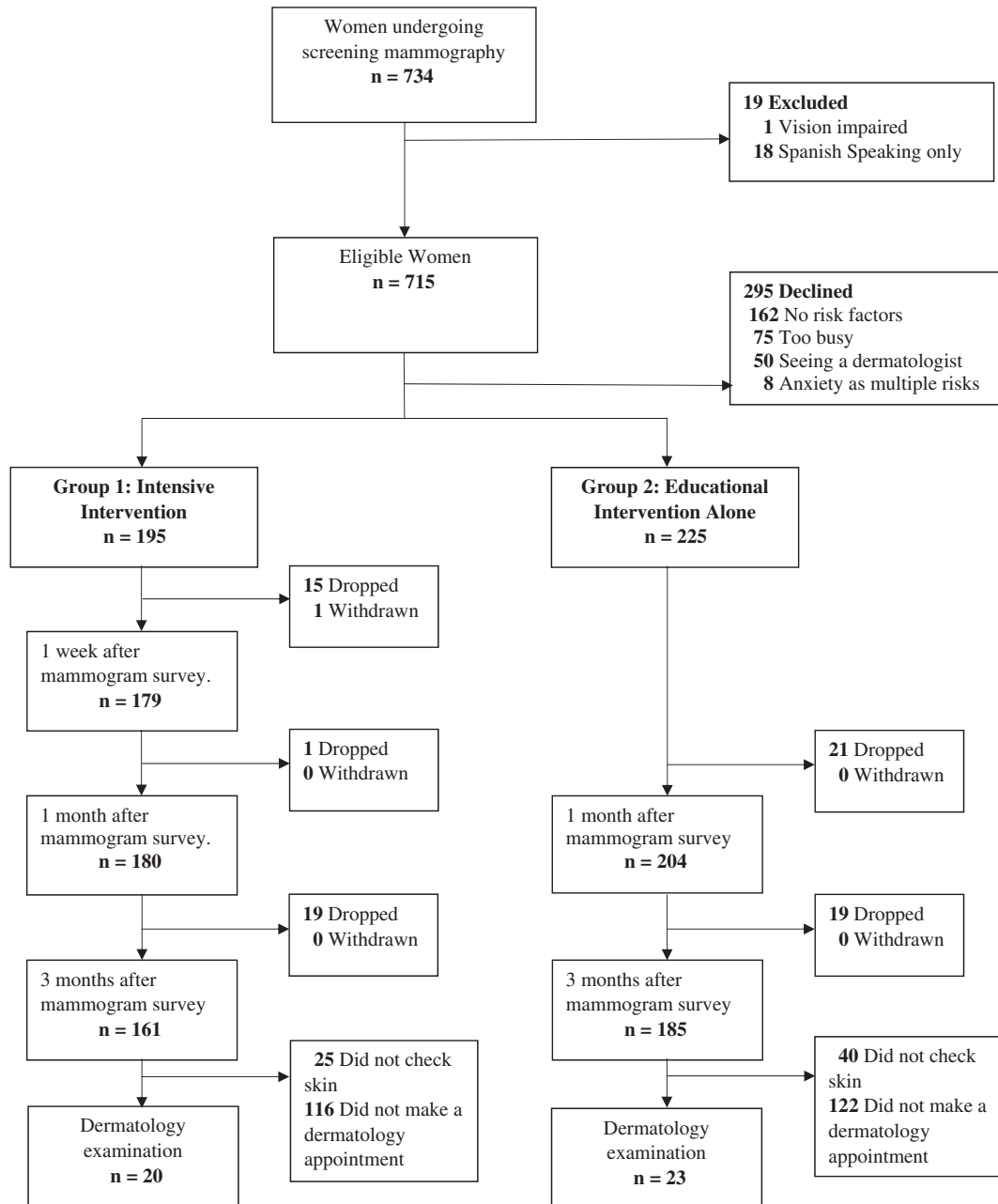
Figure 1. CONSORT diagram. The distribution and retention of participants in the two arms of the study are shown.

tanning 10+ sessions, or a family or personal history of skin cancer. Participants were asked if they checked another person's skin for a concerning mole. Potential reasons for not seeking an appointment with a doctor for a concerning mole were selected among the following: 1) I have regular appointments with a dermatologist to check my moles; 2) no health-care coverage or insurance for dermatology or doctor visit; 3) afraid of what the doctor will find; 4) no need to see a dermatologist or doctor because it will get fixed on its own or with a natural cure; 5) too busy and do not have the time to see a dermatologist or doctor; 6) feel fine so nothing is wrong with me; 7) want friend or relative to look at it first; and 8) I do not trust doctors or dermatologists. Anxiety about performing SSE was measured using the following items (5-point Likert scale): 1) Participating

in this skin check program caused me some distress; 2) participating in this skin check program made me very concerned about having a melanoma; 3) I felt fearful when I checked my skin; 4) I found it hard to focus on anything other than my anxiety when I checked my skin; 5) my worries overwhelmed me when I checked my skin; and 6) I felt uneasy when I checked my skin (16). Those scores were totaled and scaled to provide an anxiety score with a 0–100 scale (0 = no anxiety, 100 = always anxious). Also, participants related their agreement on a 5-point Likert scale with: I feel that participating in this skin check program helped me to be better able to decide if a mole needs to be checked by a doctor.

The EMR of all enrolled participants was abstracted by the principle investigator (JKR) to ascertain if the participant had an

Table 2. Demographics of population

Demographic variable	Intensive: group 1 n = 195 No. (%)	Education alone: group 2 n = 225 No. (%)
Age, y	51.8 ± 9.9	53.5 ± 9.9
Race		
Non-Hispanic white	140 (71.8)	162 (72.0)
Black or African American	30 (15.4)	43 (19.1)
Asian	8 (4.1)	6 (2.7)
Native Hawaiian or other Pacific Islander	1 (0.5)	1 (0.4)
Multiracial	4 (2.1)	4 (1.8)
Other	12 (6.2)	9 (4.0)
Ethnicity		
Hispanic	22 (11.3)	15 (6.7)
Education		
No high school	0 (0.0)	2 (0.9)
Some high school	1 (0.5)	0 (0.0)
High school graduate	73 (37.4)	64 (28.4)
Some post-high school education	17 (8.7)	16 (7.1)
College graduate	82 (42.1)	104 (46.2)
Graduate degree	22 (11.3)	39 (17.3)
Occupational status		
Part-time	16 (8.2)	25 (11.1)
Full-time	142 (72.8)	159 (70.7)
Unemployed	8 (4.1)	6 (2.7)
Student	0 (0.0)	0 (0.0)
Retired	22 (11.3)	30 (13.3)
Disabled	1 (0.5)	2 (0.9)
Homemaker	6 (3.1)	3 (1.3)
Annual household income		
$10 000–19 999	6 (3.1)	3 (1.3)
$20 000–34 999	3 (1.5)	7 (3.1)
$35 000–50 999	19 (9.7)	11 (4.9)
$51 000–100 000	37 (19.0)	46 (20.4)
>$100 000	108 (55.4)	125 (55.6)
Prefer not to respond	22 (11.3)	33 (14.7)
Risk factors		
History of sunburn	94 (58.4)	111 (60.0)
History indoor tanning	34 (21.1)	41 (22.2)
Personal or family history of melanoma	31 (19.3)	35 (18.9)

appointment with a doctor during the study or in the 4 months after study completion, if the participant pointed out a concerning mole to the doctor, the clinical diagnosis, and the pathologic diagnosis if the concerning mole was biopsied. Although most melanomas do not evolve from a preexisting nevus, visual inspection is often insufficient to differentiate an atypical nevus (dysplastic nevus) from in situ melanoma or an early-stage melanoma; therefore, abstracted data included all three and pigmented benign lesions (17).

Statistical Analysis

Demographic characteristics of the two groups are presented using means and standard deviations (age) and counts and percentages for all categorical variables. Primary outcomes of SSE performance, biopsy, and diagnoses were compared using χ^2 tests of association or Fisher exact tests where sample sizes were restrictive. Due to the skewed nature of the anxiety scale, a Wilcoxon rank sum test was used to compare anxiety, the secondary outcome, in the two groups. Descriptive statistics were performed for the tertiary outcome of dissemination.

Results

Population

Of the 715 eligible women having a mammography, 420 (58.7%) women enrolled in the study and 162 (27%) did not enroll because they had no risk factors (Figure 1). Among enrolled women, 82.4% had at least one risk factor for melanoma (Table 2).

Primary Outcome: SSE

Of the 420 enrolled women, 384 (91.4% retention) (group 1, intensive, n = 180; group 2, education only, n = 204) completed the survey at 1 month, and 346 (82.4% retention) (group 1, n = 161; group 2, n = 185) at 3 months (Table 3). At 1 month, 356 (92.7%) read the brochure and 311 (80.9%) performed SSE. The number of women who performed SSE did not differ between groups at 1 month ($\chi^2 = 1.64$, $P = .17$) or at 3 months ($\chi^2 = 1.58$, $P = .12$). Prior to the intervention, 124 (30%) women had ever performed SSE. At 3 months, 280 women (80.9%) performed SSE ($\chi^2 = 2.62$, $P = .01$). Women who had either made a dermatology appointment or already had a scheduled appointment for an unrelated condition pointed out the concerning mole to the doctor (19 of 26 [73.1%] in group 1; 21 of 28 [75.0%] in group 2). The effect size for difference in proportions is Cohen's h = 0.21.

EMR Review for Clinical-Pathologic Diagnosis

Ten biopsies were performed (five atypical nevi and five melanomas) among the 24 women who made a dermatology appointment for a concerning mole. Ten women who had a dermatology appointment for an unrelated condition pointed out a concerning lesion and three biopsies were performed (one atypical nevus and two melanomas) (Table 3). Some atypical nevi were diagnosed clinically with dermoscopy without a biopsy. During visits for unrelated conditions, doctors did not identify melanomas in the absence of patients' pointing out the concerning lesion. A dermatologist examined 34 women who were not previously cared for by a dermatologist and pointed to a concerning mole, to find seven melanomas (invasive melanoma, n = 4 women with a history of indoor tanning or melanoma-in-situ, n = 3 women with a family history of melanoma); thus, 4.8 women were examined to yield one melanoma. The melanoma incidence was 1.6%.

Secondary Outcome: Anxiety Associated with Performing SSE

Among 345 women completing the 3-month survey, the median anxiety score was 9.5 (interquartile range [IQR] = 4.8–16.7, range = 0–42.9). There was no statistically significant difference in mean anxiety scores between group 1 (7.1; IQR = 4.8–16.7; range = 0–42.8) and group 2 (9.5; IQR = 4.8–16.7; range = 0–42.8) (Wilcoxon P = .051). The effect size was Cohen's d = 0.11. Women with a familial and personal history of melanoma declined to enroll due to anxiety (n = 8) (Fig 1).

Tertiary Outcome: Dissemination

Because there was no statistically significant difference between groups, they were combined for all subsequent analyses. Twenty-six percent of women shared the brochure and 37.9%

Table 3. Performance of SSE

Variable	Intensive intervention: group 1 n = 195 No. (%)	Educational intervention alone: group 2 n = 225 No. (%)	P
Read the brochure			
1 week	163 (91.1)	NA	
1 month	166 (92)	190 (93)	.73
SSE performance			
Prior to intervention	55 (28)	70 (31)	.71
1 week	(n = 179)	NA	
Performed SSE	124 (7.5)		
Found concerning mole	20 (16)		
Made appointment with dermatology	9 (45)		
Intention to perform SSE (if not performed)	53 (96)		
1 month	(n = 180)	(n = 204)	
Performed SSE	151 (84)	160 (78)	.17
Found concerning mole	26 (17)	28 (18)	
Made appointment with dermatology	8 (31)	11 (39)	
Intention to perform SSE	26 (90)	43 (98)	
3 months	(n = 161)	(n = 185)	
Performed SSE*	136 (84)	144 (78)	.12
Found concerning mole†	16 (11)	15 (9)	
Made appointment with dermatology‡	12 (71)	12 (67)	
EMR review of physician care	(n = 195)	(n = 225)	
Non-derm physician appointment last 3 mo	32 (16)	30 (13)	.38
Patient pointed to a concerning mole	4 (14)	2 (7)	.37
Visit not related to a concerning mole	25 (86)	28 (93)	
Dermatology appointment last 3 mo	31 (16)	35 (16)	.92
Patient pointed to a concerning mole	15 (48)	19 (54)	.63

(continued)

Table 3. (continued)

Variable	Intensive intervention: group 1 n = 195 No. (%)	Educational intervention alone: group 2 n = 225 No. (%)	P
Visit not related to a concerning mole	16 (52)	16 (46)	
Diagnosis (clinical and pathologic) available	15	19	
Diagnosis (clinical and pathologic) for appointment made for concerning lesion	8 (53)	8 (42)	
Benign nevus	3 (38)	1 (12)	
Seborrheic keratosis			
Lentigo	1 (13)		
Dermatofibroma		1 (12)	
Atypical (dysplastic) nevus	2 (25)	3 (37)	
Melanoma	2 (25)	3 (37)	
Diagnosis (clinical and pathologic) for lesion pointed out during an appointment for an unrelated concern	7 (47)	11 (61)	
Benign nevus	1 (14)	3 (27)	
Seborrheic keratosis	2 (29)	0	
Lentigo			
Dermatofibroma			
Atypical (dysplastic) nevus	4 (57)	6 (55)	
Melanoma	0	2§ (18)	

*All SSE previously reported at 1 month. EMR = electronic medical record; SSE = skin self-examination.
†All concerning moles previously reported at 1 month.
‡Additional appointments made from 1 to 3 months.
§Did not complete the 3-month survey.

Table 4. Dissemination of skin self-examination

Variable	Total No. (%)	Intensive (group 1)	Education alone (group 2)
Shared brochure	100 (26.3%)	54 (31%)	46 (23%)
Spouse/partner	56	29	27
Relative	39	23	16
Friend	19	14	5
Co-worker	8	6	2
Checked skin of another	131 (37.9%)	63 (39%)	68 (37%)
Spouse/partner	85	38	47
Child	41	23	18
Parent	11	6	5
Sibling	10	7	3
Grandparent	2	0	2
Friend/co-worker	7	2	5

checked another person's skin, who was most often a spouse or partner (Table 4).

Decision to Seek an Appointment with a Doctor

Additionally, 126 (36.5%) strongly agreed that the SSE education helped them better decide if a doctor should evaluate their mole, and 130 (37.7%) moderately agreed. The rest either remained neutral (55 [15.9%]) or disagreed (18 [5.2%] moderately disagreed and 16 [4.6%] strongly disagreed).

Reasons for Not Making an Appointment for a Concerning Mole

The main reasons for not making an appointment were lack of insurance coverage (36%), too busy (27%), or already have regular appointments (9%).

Discussion

Women self-identified as being at risk and performed SSE upon seeing a poster delineating risk factors and receiving an SSE educational brochure. SSE performance improved from 30% of women before the intervention to 80% in the 3 months after the intervention. The 80% self-reported SSE in this self-selected at-risk population is comparable to SSE after intervention in at-risk populations participating in randomized trials of adult siblings of melanoma patients (18) and adults with a history of sunburn or family history of melanoma (19). Although SSE

Table 5. Comparison of US population-based cancer screening participation with targeted risk self-assessment coupled with SSE education delivered during the mammography experience

Cancer type	Method of screening examination	Participation rate	Recommended population	Barriers to screening examination
Population-based				
Breast cancer	Mammography in past 2 y	71.7% (20)	Women ≥40 y (20)	Fear of costs and pain, poor health-care access, inconvenient wait time, belief that mammography not necessary if asymptomatic (21)
Cervical cancer	Pap smear in past 3 y	81.3% (20)	Women 21–65 y (20)	Cost, fear of finding cancer, anxiety, embarrassment, anticipation of pain (22)
	Fecal test*	7.2% (23)		Unsanitary connotations of handling stool, confusion about instructions (24)
Colorectal cancer	Endoscopy†	60.3% (23)	Men and women, ≥50 y (20)	Fear of exam, preparation unpleasant, lack of knowledge, painful, embarrassing, cost, lack of time, invasive procedure (24)
	Combined fecal and endoscopy‡	63.4% (20)		Barriers cited above
Prostate cancer	PSA in past year	35.8% (20)	Men >50 y (20)	Low perception of risk, skeptical of benefit of screening, comorbid conditions (25); 2012 USPSTF recommendation against PSA screening in all men shifted patient and physician attitudes against performing exam (26)
Lung cancer	LDCT within past year	7.8% (23)	Men and women 50–80 y who currently smoke with at least 30 pack-year history of smoking or former smokers who quit within past 15 y (23)	Lack of insurance, cost, afraid to find out if have cancer (27); lack of referral by physician due to knowledge gaps of 2014 USPSTF recommendations for LDCT (28)
Targeted melanoma screening by women with risk self-assessment and SSE education delivered during mammography				
Melanoma	SSE in past month	80.9%§	Men and women 35–75 y with 1 or more risk factors for melanoma‖ (10)	Lower level of education, less knowledge of the ABCDE rule for detecting melanoma, decreased SSE self-efficacy (29)

*Fecal occult blood test (FOBT) or fecal immunochemical test (FIT) within the past year. LDCT = low-dose computed tomography; PSA = prostate-specific antigen; SSE = skin self-examination.
†Sigmoidoscopy within past 5 years or a colonoscopy within the past 10 years.
‡Either FOBT or FIT within the past year, sigmoidoscopy within the past 5 years, or a colonoscopy within the past 10 years.
§Participation rate of SSE found in this study at 1-month follow-up.
‖Risk factors include a personal history of skin cancer, actinic keratosis, or ongoing immunocompromise; a family history of melanoma in one or more first-degree relatives; one or more physical features suggestive of high risk, including lightly colored skin (Fitzpatrick skin types I–III), blonde or red hair, greater than 40 moles, greater than two atypical moles, freckles, or severely sun-damaged skin; and ultraviolet radiation overexposure, including a history of sunburn or indoor tanning.

served as an entry to surveillance by physicians for concerning moles identified by women, the number of visits to physicians for benign moles or their biopsy did not increase. The women's SSE performance (80.9%) was substantially greater than the only other self-performed cancer screening procedure: the fecal test for colorectal cancer (7.2%) (Table 5) (20). SSE was performed without increased anxiety. Lastly, dissemination by sharing the brochure and checking the skin of family members was performed by 26.3% and 37.9% of women, respectively.

The core program principles were enhanced risk perception coupled with SSE education of women. It was important for the risk items to be readily recognizable to women. The three melanoma risk statements selected and modified by stakeholders (a history of sunburn, history of indoor tanning 10+sessions, and family or personal history of skin cancer) did not require interpretation or induce worry about getting the number correct, for example, number of moles at age 21 years (Table 1). Indoor tanning was particularly relevant to the participating women.

Because the popularity of indoor tanning among adolescent and young adult women surged in the United States in the 1980s (30), participants who were in their 40s and 50s tanned 20–30 years ago. In this program risk awareness was coupled with evidence-based rules for SSE and decision support for seeking an appointment with a physician (12). Additional principals were taking the brochure home and encouraging the woman to ask a friend or relative to review the brochure, help see a mole, and participate in deciding the next step.

In the absence of proof of effectiveness of population-based screening for melanoma, the US recommendation is to limit screening to individuals at high risk for melanoma (31,32). The conundrum is that a definition of "high risk" has not been agreed upon (33–35). This research seeks to fill this void by using risk items readily perceived by the women seeing the poster and brochure. Surveillance by physicians of those at very high risk for melanoma (ie, family history and/or personal history and/or dysplastic nevus syndrome) has been shown to be both effective (36,37) and cost-efficient (38). This study demonstrated the effectiveness of physician surveillance among women who self-identify as being at-risk and find a concerning mole on SSE.

Although most in situ melanomas may be indolent (39), some have malignant potential; thus, the biological behavior of in situ melanoma is unknown for any patient (40).The clinical appearance of in situ melanoma is very difficult to distinguish from thin melanomas; therefore, in situ melanomas were included in assessing the benefit of SSE. A physician examined 4.8 women, who had no regular care with a dermatologist and pointed to a concerning mole, to find one case of melanoma or melanoma in-situ. The number needed to screen (NNS) in this study was 4.8, which was very favorable when compared to other studies in which SSE skills training was not performed. In the population-based Skin Cancer Research to Provide Evidence for Effectiveness of Screening in Northern Germany, the NNS with one risk factor was 178 (41). Thus, self-identification of a concerning mole among women who had at least one risk factor and received skills training in SSE improved the NNS.

The women in this study did not show increased anxiety from becoming aware that they were at risk to have a melanoma and/or from performing SSE. Although psychosocial effects of cancer screening such as anxiety and distress have contributed to revised screening recommendations for some cancer types, including breast and colon cancer (42–44), it does not seem to be warranted for melanoma.

Limitations of our study include a relatively short duration of follow-up resulting in a modest number of incident invasive melanoma cases and lack of participant blinding of allocation to intervention arms. Because most participants were college-educated women, the findings may not be generalizable to other populations. Exclusion of men means that this study does not represent all those at risk to develop melanoma. In addition, the study was performed at one university-based facility, which also limits generalizability.

The effectiveness of melanoma screening, which is defined by the reduction in mortality, cannot be determined until nationwide guidelines define those at-risk, structured rules for performing SSE and for seeking physician care for concerning lesions are disseminated to at-risk people, and there is adequate physician surveillance. Although the NNS for this targeted melanoma screening program among women with relatively high socioeconomic status who self-identified their risk to develop melanoma during mammography may not be replicated in population-based screening, it is interesting to compare it with the NNS for population-based screening for other cancers, for example, cervix 600–800, breast 700–1000, and colorectal 1100–2200 (45). Although general population melanoma screening is not cost-effective and the harm vs benefit ratio is not clear, melanoma-targeted screening utilizing self-identification of risk and SSE among a diverse population of women having mammography may provide targeted screening (46). Because mammography is initiated at age 40 years and repeated every year or two, broad SSE dissemination among at-risk women can be achieved with limited burden for the participant and institutions or clinics. When women have periodic mammography, they may be reminded of their melanoma risk and receive evidence-based SSE education. Before widespread implementation, the study results need to be confirmed in mammography centers serving diverse socioeconomic groups.

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Notes

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All authors declare they have no conflicts of interest.

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