

Reinvestigating the Perceptions of Annual Skin Cancer Screening Scale: a suitable measure for older adults

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Objectives The Perceptions of Annual Skin Cancer Screening Scale (PASCSS) explains significant variance in whether people undergo annual clinical skin cancer screening beyond other relevant predictors. When developing the PASCSS, the author only tested its psychometric properties and validity with participants representative of the general USA population, despite the particular relevance of annual clinical skin cancer screenings to at-risk populations, namely, older adults. We reanalyze the PASCSS using a sample of older adults.

Methods We conducted a three-wave survey study ($n = 237$) with each wave separated by one week. Demographic information was recorded at Time 1. The PASCSS was administered at Time 2. Outcomes were measured at Time 3.

Results The model fit of our confirmatory factor analysis met or closely approached traditional cutoffs, and each item loaded very strongly onto its respective latent factor. These PASCSS's dimensions together explained an additional 38% of variance in dermatologist screening and 37% of variance in any medical professional screening beyond our control variables (both $P < 0.01$). The dimension of Unknowledgeable was statistically

significant in predicting dermatologist screening ($P = 0.03$), whereas the three dimensions of Forget, Recommended, and Unknowledgeable were statistically significant in predicting any medical professional screening (all $P < 0.05$).

Conclusion Our results supported the psychometric properties and validity of the PASCSS, and we showed that the dimensions significantly relate to whether participants received a clinical skin cancer screening in the past year. The current investigation supports that the PASCSS is appropriate to administer to older adults. *European Journal of Cancer Prevention* XXX: XXXX–XXXX
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Annual clinical skin cancer screenings with a dermatologist or primary care provider are effective at detecting the early occurrence of skin cancer, and many organizations recommend that at-risk individuals should undergo annual clinical skin cancer screenings (Choudhury *et al.*, 2012; Bibbins-Domingo *et al.*, 2016; Wernli *et al.*, 2016). Notably, rates of skin cancer steeply increase at the age of 55 (Cancer Research UK, 2023), and early detection of skin cancer in older adults can significantly prolong life expectancy (Choudhury *et al.*, 2012; Bibbins-Domingo *et al.*, 2016; Wernli *et al.*, 2016). Public health organizations have dedicated significant efforts to promoting annual clinical skin cancer screening for older adults (Coups *et al.*, 2010; Lakhani *et al.*, 2014). Unfortunately, several studies have shown that most at-risk individuals do not undergo annual clinical skin cancer screenings (Coups *et al.*, 2010; Lakhani *et al.*, 2014).

Due to this concern, Howard (2023) developed the Perceptions of Annual Skin Cancer Screening Scale (PASCSS). Table 1 provides descriptions of its 12

dimensions. The PASCSS is unique and advantageous because (in addition to other aspects) Howard (2023) provided significant psychometric and validity support for the scale, and they showed that the PASCSS explains significant variance in whether people receive annual clinical skin cancer screening beyond similar measures (e.g. perceived likelihood and severity of skin cancer) likely due to its relative comprehensiveness. Howard (2023) further suggested that this measure could aid the development of interventions to target these perceptions and promote annual clinical skin cancer screenings. In creating the PASCSS, however, the author tested the psychometric properties and validity of the measure solely with samples representative of general USA adults. While the results could support that the measure functions appropriately with general populations, they cannot support the measure's psychometric properties and validity when administered to the population most relevant to annual clinical skin cancer screenings – at-risk individuals.

To address this concern, the current article reinvestigates the psychometric properties and validity of the PASCSS is likely the largest group of at-risk individuals for skin cancer, older adults. Supporting the psychometric

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properties and validity of the PASCSS with older adults could significantly contribute to research and practice, as future researchers could have greater assurances in studying perceptions of skin cancer screening in this important population. We therefore achieve these objectives by using a sample of older adults (age >55). We conduct a confirmatory factor analysis (CFA) to assess the psychometric properties of the PASCSS, and we test the relations between the PASCSS and whether participants received an annual clinical skin cancer screening in the past year with a dermatologist as well as any medical professional (e.g. primary care provider, urgent care provider). By achieving these objectives, the current article indicates that the PASCSS is appropriate to assess perceptions of annual clinical skin cancer screening in older adults, who are likely the largest at-risk population for skin cancer.

Method

All procedures were approved by the Institutional Review Board of the University of South Alabama [#1663301].

Table 1 Descriptions of the PASCSS dimensions

Dimension	Description – Each begins with, ‘The perception that annual clinical skin cancer screening is...’
1). Cost	Expensive.
2). Time	Difficult to fit into the respondent’s schedule.
3). Not needed	Not needed in general.
4). Not at risk	Not needed because the respondent is healthy.
5). Inconvenient	A hassle.
6). Forget	Easy to not remember.
7). Undesirable outcomes	Scary because it might uncover something wrong.
8). Undesirable Interactions	Difficult because of doctor interactions.
9). Access	Unavailable or difficult to obtain.
10). Unknowledgeable	Something that the respondent does not know much about.
11). Recommended	Something that has never been recommended to the respondent.
12). Uncomfortable	Embarrassing.

Table 2 Descriptions of the PASCSS dimensions

Characteristic	Frequency (percentage)
Gender (female)	182 (63%)
Age (55–64)	179 (61%)
Age (65–74)	97 (33%)
Age (75–84)	15 (5%)
Age (85+)	1 (0%)
Race (White)	256 (91%)
Race (Black)	11 (4%)
Race (Asian)	4 (1%)
Race (other)	9 (3%)
Health insurance (yes, employer)	96 (33%)
Health insurance (yes, not employer)	165 (57%)
Health insurance (no)	31 (11%)
First language (English)	284 (98%)
First language (other)	6 (2%)
Characteristic	Mean (SD)
Age	63.01 (6.43)
Income	65 597 (58 764)

Participants

Participants (age[mean = 63.01, SD = 6.43], 63% female, 91% white, 4% Black, 1% Asian, 3% other races, 100% USA; Table 2) were recruited by a research service, Prolific (<https://prolific.co/>), and provided monetary compensation. We removed those who failed more than one of seven attention checks (e.g. ‘Please mark agree to show that you are paying attention’), and we restricted participation to those 55 years of age or older.

Procedure

We conducted a three-wave survey study. Participants were required to be over the age of 55, residing in the USA, and fluent in English. Participants were recruited from the Prolific platform, wherein they could choose to participate. Participants completed the first survey of demographic information (n = 297). One week later, participants completed a second survey with the PASCSS (n = 269). One week after the second survey, participants completed a survey with our outcome measures (n = 237). One item asked, ‘Did you have a full body skin cancer screening in the past year with a dermatologist?’ The other item asked, ‘Did you have a full body skin cancer screening in the past year with a primary care provider, dermatologist, or any other medical professional?’ Answers to both items were coded as 1 (Yes) or 0 (No).

Analyses

Our dataset is provided in Supplemental Material A, Supplemental digital content 1, <http://links.lww.com/EJCP/A412>. For all analyses, we consider *P*-values less than 0.05 to be statistically significant. We first conducted a CFA on the PASCSS (Brown, 2015). We covaried error terms of indicators loading onto common factors based on modification indices, as done in Howard (2023), and no two pairs loaded onto a common latent factor. We adhered to standard cutoffs for interpreting model fit (Comparative Fit Index [CFI] = 0.95, Tucker-Lewis Index [TLI] = 0.95, Standardized Root Mean Square Residual [SRMR] = 0.05, Root Mean Square Error of Approximation [RMSEA] = 0.05) (Brown, 2015). We further calculated correlations and Cronbach’s alphas, and we calculated binominal logistic regression analyses to assess the relations of all dimensions together with our outcomes of interest. We included the control variables of gender and age. We attempted to include additional control variables, but they produced estimation issues with our binominal logistic regression analyses. Supplemental Material B, Supplemental digital content 2, <http://links.lww.com/EJCP/A413> includes the results of linear regression analyses with these additional control variables. We believe that the analyses reported in the primary text are more appropriate assessments of our studied relations, but we provide these alternative analyses for completeness.

Table 3 Binominal logistic regression results

	Dermatologist screening				Med. professional screening			
	Step 1 OR	Step 1 P-value	Step 2 OR	Step 2 P-value	Step 1 OR	Step 1 P-value	Step 2 OR	Step 2 P-value
1). Age	1.07**	<0.01	1.06	0.07	1.06*	0.02	1.03	0.30
2). Gender	1.53	0.21	2.46	0.06	1.27	0.45	1.63	0.27
3). Cost			0.78	0.10			0.85	0.25
4). Time			1.33	0.47			1.39	0.33
5). Not Needed			1.28	0.41			1.11	0.70
6). Not at Risk			0.81	0.23			0.91	0.57
7). Inconvenient			0.80	0.56			0.83	0.57
8). Forget			0.68	0.09			0.65*	0.04
9). Undesirable Outcomes			1.00	0.99			1.11	0.46
10). Undesirable Doctor Interactions			0.90	0.69			0.91	0.69
11). Access			0.95	0.91			0.71	0.42
12). Unknowledgeable			0.69*	0.03			0.73*	0.04
13). Recommended			0.79	0.06			0.77*	0.03
14). Uncomfortable			0.93	0.78			1.02	0.93
Δ McFadden R ²	0.04**	<0.01	0.38**	<0.01	0.02*	0.04	0.37**	<0.01

OR, odds ratio.

* $P < 0.05$.** $P < 0.01$.

Results

Our model fit (CFI = 0.95, TLI = 0.94, SRMR = 0.05, RMSEA = 0.06) met or closely approached traditional cutoffs, and each item also loaded very strongly onto its respective latent factor (≥ 0.71). These findings support the psychometric properties of the PASCSS when administered to older adults. Supplemental Material C, Supplemental digital content 3, <http://links.lww.com/EJCP/A414> provides our Cronbach's alphas and correlations. Each dimension of the PASCSS produced a Cronbach's alpha equal to or above 0.82, and each dimension had a statistically significant correlation with whether participants received a clinical skin cancer screening from a dermatologist and any medical professional (all $P < 0.01$). These results support the internal consistency and validity of the PASCSS.

Table 3 provides the results of our binominal logistic regression analyses. The control variables explained 4% of the variance in whether participants received a skin cancer screening from a dermatologist in the past year ($P < 0.01$) and 2% of the variance in whether participants received a skin cancer screening from any medical professional in the past year ($P < 0.01$). Age and gender were not statistically significant in predicting dermatologist screening or any medical professional screening (all $P > 0.05$). These PASCSS's dimensions explained an additional 38% of variance in dermatologist screening and 37% of variance in any medical professional screening (both $P < 0.01$). The dimension of Unknowledgeable was statistically significant in predicting dermatologist screening ($P = 0.03$), whereas the three dimensions of Forget, Recommended, and Unknowledgeable were statistically significant in predicting any medical professional screening (all $P < 0.05$).

Discussion

Our results supported the PASCSS's psychometric properties via CFA and validity by showing that its dimensions explain a significant amount of variance in whether people received a skin cancer screening within the past year from a dermatologist and any medical professional. The dimensions of Forget, Unknowledgeable, and Recommended were most strongly related to our outcomes. These findings are similar to Howard (2023), who also found Forget and Unknowledgeable to be primary predictors of relevant outcomes. At the same time, our results did somewhat contrast with their findings, as they did not find Recommended and found Cost to be a statistically significant predictor. More broadly, several researchers have suggested that perceptions are important for understanding skin cancer screening behaviors, but they have not tested multidimensional conceptualizations despite the known complexity of these perceptions (Coups *et al.*, 2010; Lakhani *et al.*, 2014). Our findings both support and extend these prior proposals by showing that perceptions indeed relate to skin cancer screening behaviors but also discovering that only certain perceptions produce significant relations. By providing this insight, we also provide much-needed nuance to the study of skin cancer screening perceptions.

Future researchers should integrate modern theoretical perspectives when applying the PASCSS to more fully understand people's decision to undergo annual clinical skin cancer screening, as it is likely that the PASCSS's dimensions mediate the relations of relevant antecedents with skin cancer screening behaviors. For instance, the COM-B model and theoretical domains framework both broadly organize the many potential predictors of health behaviors, enabling researchers to identify linkages among the numerous constructs surrounding a health

behavior (Michie *et al.*, 2011; McDonagh *et al.*, 2018). Researchers can now, with more confidence, integrate the PASCSS's dimensions onto these theoretical perspectives to develop broader models of the entire decision-making process surrounding annual clinical skin cancer screening for older adults, as our findings supported that these dimensions are appropriate to understand the many complex perceptions that older adults may have about skin cancer screening. Likewise, future practitioners should consider the development of interventions to promote annual skin cancer screening in older adults focused on the dimensions of Forget, Unknowledgeable, and Recommended. Adaptive interventions, which present components based on participant characteristics, may be fruitful (Hardeman *et al.*, 2019). Participants with particularly high levels of these three perceptions could be provided intervention components to counteract these perceptions, resulting in greater adherence to annual skin cancer screening. Thus, supporting the application of the PASCSS with older adults opens several avenues for future research and practice.

As with any study, certain limitations should be noted. Our sampling frame was older adults (age ≥ 55) in the USA. While the characteristics of our sample were similar to our population of interest, we slightly over-sampled women and those who identify as white. Prolific samples also tend to be slightly more educated. Future research should replicate the current results using differing sampling approaches that can obtain more representative samples, such that our findings can be more firmly asserted to generalize to our population of interest. Similarly, our results cannot be guaranteed to generalize across contexts. People living in other countries with differing access to healthcare may have particularly different perceptions regarding skin cancer screening. For this reason, future researchers should assess whether the PASCSS produces a similar factor structure in other contexts via tests of measurement invariance (Brown, 2015) and whether the relations of these dimensions are similar across contexts. In these investigations, researchers should also consider whether other dimensions are necessary in these broader contexts, as no measure is an entirely comprehensive representation of its intended construct. Lastly, we did not test a theoretical model involving antecedents of skin cancer screening perceptions, as our primary goal was to reproduce the findings of Howard (2023) in a sample of people at risk for skin cancer; however, the identification of antecedents is a valuable and primary direction for future research, and

researchers should focus on potential antecedents with the greatest relevance and potential impact. Those with a history of cancer, a family history of cancer, and prior positive experiences with skin cancer screenings may be particularly likely to develop positive perceptions skin cancer screenings, which may ultimately manifest in preventive health behaviors.

Conclusion

Via a three-wave survey study, we achieved our goal of supporting that the PASCSS is a suitable measure of skin cancer screening perceptions in perhaps the largest at-risk population for skin cancer – older adults. Future researchers can now have greater assurances that the measure performs appropriately when administered to older adults, enabling a greater breadth of future research and the potential identification of avenues to promote skin cancer screenings.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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