Measuring Skin Cancer Risk in African Americans: Is the Fitzpatrick Skin Type Classification Scale Culturally Sensitive?

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Objective: Fitzpatrick's Skin Type Classification Scale often is used to assess sun sensitivity and skin cancer risk. Because the scale was developed with Whites, its utility and validity with Blacks may be limited by its reliance on the European-cultural terms suntan and sunburn. We tested the hypothesis that most Blacks would be unable to classify their skin into the four Fitzpatrick skin types.

Design, setting, participants: A random, statewide sample of 2085 California Black adults were administered a survey to categorize their skin into the Fitzpatrick types of always burn/never tan (I), usually burn/rarely tan (II), rarely burn/usually tan (III), and never burn/always tan (IV). We also added a response option not available in the scale, ''none of the above describes me.'' Questions on sunscreen use and demographics were included.

Main outcome measure: Self-reported skin type.

Results: 1231 (59%) selected none of the above, and only 559 (26.8%) categorized themselves as type IV. When the none option is removed and the 59% who chose it were excluded as non-responders, the 559 who selected type IV constitute 65.5% of the remaining sample. Those who selected none were significantly less likely than all others to use sunscreen, and income and residential segregation were the strongest predictors of type I/II skin.

Conclusion: Standard administration of the Fitzpatrick Scale excludes the majority of Blacks, yields data that overestimate Black population prevalence of type IV skin, and excludes the Blacks who are least likely to use sunscreen. Suggestions are provided for improving the cultural sensitivity of the skin-type assessment. (*Ethn Dis.* 2010;20:174–179)

Key Words: Skin Type, Skin Cancer, Blacks, African Americans, Fitzpatrick Skin Type Classification Scale

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Introduction

Skin type, defined as an individual's propensity to tan or sunburn, is a predictor of both non-melanoma and melanoma skin cancers. There are several ways to assess skin type, including visual inspection, objective measurement (eg, spectrometer), and self-report.[1] The Fitzpatrick Skin Type Classification Scale[2] is a standard, self-report measure for assessing sun-sensitivity (reactivity) at initial sun exposure. Originally, the measure consisted of four categories of sun-reactive skin types for those with White skin. Type I refers to White individuals with fair skin, blue or hazel eyes, and blond or red hair who always burn and never tan. A subgroup of type I consists of those who usually burn but develop a light tan (type II). Those with dark hair or brown eyes, who rarely burn and tan more than average are classified as type IV. A subgroup of type IV is those who sometimes experience a mild burn and develop a moderate tan (type III). Two additional categories later were added, brown (type V) and black (type VI) skin, said to have the same reactions as type IV.

Studies have highlighted that this measure is reliable and valid for Whites,[2,3] but is problematic for African Americans[3] and other non-White ethnic groups.[4–7] For example, these self-reported skin-type categories do not correlate well with sun reactivity among ethnic groups such as Koreans,[4] other Asians,[5] Arabs,[6] and African Americans.[7] The reason may be that the skin types rely on the words tan (ie, the skin turns brown) and burn (ie, the skin turns red). These words are culturally biased insofar as they reflect Whites' experience of sun-reactivity. Those with brown skin probably do not label their sun-reactivity as tanning or burning, and are unlikely to describe themselves as tanned even when they are. Instead, they may label their reactivity as the skin becoming darker, itching, flaking, and becoming irritated, thereby resulting in little relationship between the skin-type categories and sun-reactivity. Moreover, healthcare providers routinely classify Blacks into the low sun-sensitivity categories (IV, V, VI) based on their constitutive pigmentation rather than on their sun-sensitivity. For example, a recent study used an objective measure of skin pigmentation to assess skin type, and examined its relationship to patient race, patient self-reported Fitzpatrick skin type, and physician-assessed skin type (diagnosed phototypes).[7] Results revealed that patient race correlated poorly with the objective measure and with self-reported skin type as well, but

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correlated strongly with physician-assessed skin type; moreover, 21% of Blacks rated their skin as more photosensitive than their physician's race-driven evaluation.[7] Such findings suggest that classifying Blacks into types IV, V, and VI based on constitutive pigmentation is likely to be inaccurate,[3,8] and may overestimate the prevalence of type IV and underestimate variability in sun-reactivity and skin-cancer risk.[3,8]

The purpose of this study was to examine the utility of the Fitzpatrick scale with a random, representative sample of Black adults. Although some studies (eg, National Health Interview Surveys[8]) included large, random samples of Blacks, such samples nonetheless may not represent the population. This is because Blacks who reside in segregated Black neighborhoods rarely participate in nationwide, household or random digit-dial telephone health surveys,[9–10] yet constitute 60–70% of US Blacks.[11] The current sample of segregated and integrated participants is more representative of the population.

HYPOTHESES

1) To assess the utility of the Fitzpatrick measure, participants were administered the scale, and also given the novel opportunity to indicate that none of the 4 skin-type categories apply to them. Because the words suntan and sunburn are not used by this ethnic/racial group, we hypothesized that the majority of Blacks would select the none option; such a result would indicate that the Fitzpatrick measure has limited utility with African-Americans. 2) To provide a preliminary evaluation of the validity of the measure, the distribution of skin types when participants have the option to indicate none of the above was compared to the distribution without this option (ie, to the standard administration in which those who fail to select 1 of the 4 categories are excluded as non-responders). We hypothesized that the prevalence of type IV skin would be higher using the standard administration (due to the absence of those who selected none), with such a result suggesting that the scale may have limited validity with Blacks. 3) We explored the hypothesis that skin types vary significantly with demographic and neighborhood factors, and with sun-protection behavior (ie, sunscreen use) as well. Such results would suggest considerable variability in skin type among Blacks, and highlight the need to improve the cultural sensitivity of skin-type/skin cancer-risk assessments.

METHOD

Participants

A random, statewide sample of 2085 Black adult residents of California participated. They ranged in age from 18 to 95 years (mean=43.8 years), and 57.9% were women.

Procedures

Community-based sampling (CBS) methods and a community-based participatory research (CBPR) approach were used. Community-based sampling is a 3-stage, random-probability household-sampling procedure often used in population studies of Blacks and Latinos to assure inclusion of segregated, linguistically-isolated, phoneless, and cell-phone only minorities.[12,13] In Stage 1, the 7 counties in which the majority of California Blacks reside were selected, and Blacks sampled from those with the probability proportional to their representation. For example, 42% of all California Blacks reside in Los Angeles county, 6% in San Diego county, 12% in San Bernardino county; hence, 42% and 6% of the sample came from Los Angeles and San Diego counties (respectively) such that the sample was representative of the state's Black population. In Stage 2, 513 high- and low-segregated census tracts (CTs) within those 7 counties were selected, with segregation defined as the percentage of Black residents (20–50%=low-segregated/integrated, 60–92%=segregated). High and low segregated CTs were randomly selected from this set of 513, and 100–120 people selected from each CT. Block groups within CTs were randomly-selected and all households within sampled until the CT sample size had been acquired. The CBPR aspect of the study was a collaboration between San Diego State University and the California Black Health Network (CBHN), a respected, Black community organization that has conducted statewide, health promotion programs for California Blacks since the 1970s. The network co-sponsored the study, and hired Black surveyors who were familiar with or residents of each community to collect the data in that community. Surveyors approached all households in the aforementioned block groups, introduced themselves as CBHN staff, and stated that the purpose of the survey was to acquire data needed to improve CBHN programs in the communities. Surveyors distributed the written, anonymous, voluntary, California Black Health Network Survey on weekends and reimbursed participants $10 cash for completing it. Only one, self-identified Black adult resident of each household participated. Using this CBPR approach, the survey response rate was 99% (ie, of those who answered the door, 99% completed and 1% refused the survey). The study had the approval of the Institutional Review Board of San Diego State University.

Materials

The survey included demographic questions (eg, sex, age, income, education), a standard question on sunscreen use, the Fitzpatrick scale, and other items. To assess sunscreen use, participants were asked, ''During the summer months, how often do you do the following when you are out in the sun for more than 15 minutes: Use sunscreen with a sun protection factor (SPF)

Table 1. Distribution of self-reported Fitzpatrick skin types among 2085 African Americans

Self-reported skin type	With "none apply" option *N*=2085		Without "none" option (standard administration) *N*=853	
	n	% of sample	*n*	% of sample
I	51	2.4	51	6.0
II	55	2.6	55	6.4
III	189	9.1	189	22.1
IV	559	26.8	559	65.5
None	1231	59.0	missing	missing

of 15 or higher?" Response options ranged from never to always. The Fitzpatrick measure asked, "Which of the following best describes your skin's usual reaction to your first exposure to summer sun, without sunscreen, for one-half hour at midday?" The five response categories were: 1) always burn, unable to tan (type I); 2) usually burn, then can tan if I work at it (type II); 3) sometimes mild burn, then tan easily (type III); 4) rarely burn, tan easily (type IV); and 5) none of the above describes me, added for this study.

RESULTS

Distribution of Skin Types

Table 1 shows the distribution of self-reported skin types with and without the option to indicate that none of the categories are applicable. As shown, when given the option to indicate that none of the categories apply to them, the majority of Blacks (59%) selected this option, and only 9.1% and 26.8% categorized themselves as type III and IV, respectively. When the none option is removed (and the 59% who selected this are excluded as non-responders with missing data), then 22.1% and 65.5% (of the remaining sample) categorized themselves as type III and IV, respectively.

Correlates of Skin Type

As shown in Table 2, skin-type varied significantly with sex, age, education, income, residence in segregated neighborhoods, and sunscreen use. Notably, those who selected none of the skin-types were significantly less likely than all others to use sunscreen. Those who selected type I/II were significantly younger than other skin-type groups, and were more likely to have low-incomes and to reside in segregated neighborhoods; 68% of the sun-sensitive (type I/II) resided in segregated neighborhoods (χ^2=9.31, P=.01).

Given these findings, a multi-level logistic regression was conducted to examine the role of individual- (sex, age, income, education) and neighborhood-level (segregation) factors in reporting sun-sensitive skin. SAS PROC GLIMMIX was used to model self-reported sun-sensitive skin (types I/II=yes vs III/IV and none combined=no) using the binomial logit link. Model parameters were estimated using the maximum likelihood procedure with Newton-Raphson Ridge Optimization algorithm, and tests of significance were two-sided at $P<.05$. The odds ratio (OR) and median odds ratio (MOR) were used to measure association and variation in reporting sun-sensitive skin, respectively.[14,15] The MOR quantifies the variation in sun-sensitive skin between CTs by comparing two individuals with the same covariates from two randomly-selected CTs, with MOR=1 indicating no difference between CTs in the probability of reporting sun-sensitive skin.[14,15] The MOR was derived from the variance as described by Merlo et al.[14,15]

Results are shown in Table 3, where model 1 used individual-level predictors, model 2 used the CT-level predictor (segregation), and model 3 used both. As shown in model 1, reporting sun-sensitive skin was unrelated to sex and education, decreased significantly with age, and was more prevalent among the lowest income group. As shown in model 2, there was significant CT (neighborhood) variation in reports of sun-sensitive skin, with residents of high-segregated neighborhoods 1.75 times more likely than their integrated cohorts to report it. Model 3 reveals that after controlling for sex, age, education and income, segregation continued to contribute to self-reported sun-sensitive skin, with segregated Blacks twice as likely as integrated Blacks to report this. Also shown (at the bottom of model 3) is that reports of sun-sensitive skin continued to vary significantly across neighborhoods even after controlling for age, income, and neighborhood segregation (CT variance=.9256, SE=.3673).

DISCUSSION

This study has five novel results. First, the majority (59%) of Blacks indicated that none of the Fitzpatrick skin types (I–IV) describe them. We suggest that this is because African Americans (and other brown-skin groups) do not conceptualize or label their skin's reaction to the sun as tanning (turning brown) or burning (turning red); instead, they are likely to label their skin as becoming darker, itching, flaking, and becoming inflamed. The cultural sensitivity and cross-cultural utility of skin-type assessments thus might be improved by substituting culturally-neutral terms for the White-European words suntan and sunburn. For example, these categories might be beneficial: always itches, flakes, or hurts and never get darker (I); usually itches, flakes or hurts and

Table 2. Demographic, neighborhood, and behavioral correlates of skin types among African American adults

Correlates	Group 1 skin type I/II	Group 2 skin type III/IV	Group 3 none of the skin types	Overall χ^2 or F ($P<.05$)	Post-hoc comparisons
Mean age	37.81	43.94	44.22	7.296	2=3>1[a]
Sex					
Men	39.4	34.7	46.9	26.775	
Women	60.6	65.3	53.1		1=2>3[b] for women
Education					
≤High school graduate/GED	42.2	24.6	41.7	60.047	
>High school graduate	57.8	75.4	58.3		2>3=1[c] for>HS
Income					
$0–25,999	60.9	32.2	44.3	41.156	
≥$26,000	39.1	67.8	55.7		2>3>1[d] for≥$26K
Segregation					
Low/integrated	32.1	43.4	46.7	9.308	
High/segregated	67.9	56.6	53.3		1>2=3[e] for high
Sunscreen use					
Never	43.3	45.3	74.6	59.214	2=1>3[f] never vs always;
Sometimes	45.5	44.8	21.2		2=1>3[g] never+sometimes vs always
Always	11.1	9.9	4.2		

[a] mean age Tukey HSD, $P=.001$;
[b] sex post-hoc χ^2 s: 1 vs 2 $\chi^2=.845$, $P=.358$; 1 vs 3 $\chi^2=2.043$, $P=.153$; 2 vs 3 $\chi^2=26.426$, $P<.001$;
[c] education post-hoc χ^2 s: 1 vs 2 $\chi^2=14.170$, $P<.001$; 1 vs 3 $\chi^2=.009$, $P=.923$; 2 vs 3 $\chi^2=58.228$, $P<.001$;
[d] income post-hoc χ^2 s: 1 vs 2 $\chi^2=28.897$, $P<.001$; 1 vs 3 $\chi^2=9.420$, $P=.002$; 2 vs 3 $\chi^2=25.077$, $P<.001$;
[e] segregation post-hoc χ^2 s: 1 vs 2 $\chi^2=4.929$, $P=.026$; 1 vs 3 $\chi^2=8.428$, $P=.004$; 2 vs 3 $\chi^2=1.995$, $P=.158$;
[f] sunscreen never vs always post-hoc χ^2 s: 1 vs. 2 $\chi^2=.198$, $P=.657$; 1 vs. 3 $\chi^2=20.292$, $P<.001$; 2 vs 3 $\chi^2=53.731$, $P<.001$;
[g] sunscreen never+sometimes vs always post-hoc χ^2 s: 1 vs. 2 $\chi^2=.147$, $P=.701$; 1 vs 3 $\chi^2=9.874$, $P=.002$; 2 vs 3 $\chi^2=24.662$, $P<.001$.

gets darker with difficulty (II); rarely itches, flakes or hurts and usually gets darker easily (III); and never itches, flakes or hurts and always gets darker easily (IV). Use of such neutral categories may increase the inclusiveness and sensitivity of the measure insofar as greater percentages of dark-skin groups (eg, Blacks, Asians, Pacific Islanders, Middle-Easterners, Mediterraneans) might complete the assessment, and greater percentages might categorize themselves as types I and II (sun-sensitive) as well.

Secondly, only 41% of Blacks categorized themselves into the 4 skin-type categories. Because the measure does not include none of the above as a response option, the 59% who did not use the categories would be excluded as non-responders. This suggests that use of the measure in its current form excludes the majority of Blacks. Likewise, this finding implies that data on skin types among Blacks may be based on the small, potentially nonrepresentative subsample who use the categories, and hence may be inaccurate. The third finding was that the percentage of Blacks with type IV skin (65.5%) was substantially higher among the restricted 41% of the sample who used the categories than among the full sample (26.8%). This suggests that the measure (in its current form) overestimates Black population prevalence of type IV skin and raises concerns about the validity of the scale and its data. Thus, until culturally-neutral skin-type categories have been developed and validated, adding none of the above as a response option may be critical to enhancing the inclusiveness of assessments by increasing the percentages of dark-skin ethnic groups who complete them.

The fourth finding is that those who indicated that none of the skin-types apply to them (ie, non-responders) differed in systematic ways from those who used the categories. Notably, Blacks who did not use the categories had lower incomes than type III/IV Blacks, consisted of more men, and were least likely to use sunscreen. This raises the concern that non-responders may be most in need of sun-safety interventions, and underscores the benefits of adding none as a response option. Likewise, that non-responders differed in non-random ways from responders constitutes non-response bias, a major threat to the validity of the measure and its data.[10,16,17]

Finally, the fifth novel finding was that individual-level income and neighborhood residential segregation were the strongest predictors of type I/II skin, with low-income and segregated Blacks most likely to report this. Prior studies found that skin types vary with sex[18] (eg, with women more sun-sensitive than men), but none have investigated socioeconomic status or neighborhood variation. The latter differences might

Table 3. Individual- and area-level predictors of sun-sensitive (vs other) skin-type among 2085 African American adults

Predictors	Model 1: Individual Variables		Model 2: Area-level Variables		Model 3: Both	
Individual- level Variables	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Sex						
Reference: Men						
Women	1.22	0.79, 1.87			1.25	0.81, 1.92
Age						
	0.98	0.97, 0.99*			0.98	0.97, 0.99*
Education						
Reference: ≥college grad						
≤High school (HS) graduate	0.78	0.40, 1.49			0.80	0.42, 1.54
Some college	0.77	0.41, 1.42			0.80	0.43, 1.48
Income						
Reference: ≥$76,000						
$ 0–25,999	2.55	1.22, 5.36*			2.82	1.34, 5.96*
$ 26,000–49,999	1.25	0.55, 2.87			1.34	0.58, 3.08
$ 50,000–75,999	1.36	0.59, 3.13			1.43	0.62, 3.31
Area-Level Variables						
CT-Segregation						
Reference: Low (20–50% Blacks)						
High (60%–92% Blacks)			1.75	1.14, 2.69*	2.00	1.29, 3.11*
Measures of Clustering						
CT-level variance (SE)	.9483 (.3624)*		.9885 (0.3588)*		.9256 (.3673)*	
Median odds ratio (MOR)	2.52		2.57		2.49	
ICC	0.224		0.231		0.22	

* $P<.05$

reflect variation in sun-exposure and subsequent awareness of the skin's responses to the sun, both perhaps secondary to neighborhood differences in the prevalence of trees and in the probability of outdoor work and leisure-time activities. Irrespective of the genesis of the neighborhood variation, the magnitude of that variation is notable. Skin types among Blacks continued to vary significantly by neighborhood even after segregation was controlled in multilevel models, with 22% of the variance in skin-type (ICC in model 3, Table 3) due to unknown neighborhood factors not measured in this study. Moreover, segregated Blacks rarely are included in surveillance surveys,[9,10] yet constitute 60–70% of the US Black population and 68% of the sun-sensitive individuals in this sample. The latter finding underscores the need to include segregated Blacks in surveillance studies, and suggests that their absence may contribute to potential validity problems in data on skin types among Blacks.

This study found that most Blacks did not categorize their skin into the Fitzpatrick skin-types.

In summary, this study found that most Blacks did not categorize their skin into the Fitzpatrick skin-types. Those who did (responders) vs did not (non-responders) use the categories differed systematically, thereby raising non-response bias concerns about the measure. The cross-cultural sensitivity, utility, and validity of the measure may be increased by adding none as a response option, as well as by removing the culturally-saturated terms sunburn and suntan. Until the measure is improved, healthcare providers might use culturally-neutral words (eg, the skin gets darker, itches, hurts) to enhance this aspect of skin-cancer risk assessment for African-Americans and other brown-skin ethnic groups in the United States and elsewhere.

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