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BRIEF REPORT

Skin Bleaching Among African and Afro-Caribbean Women in New York City: Primary Findings from a P30 Pilot Study

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ABSTRACT

Introduction: The application of skin bleaching products to inhibit melanogenesis is a common practice within the African diaspora. Despite the adverse health effects of skin bleaching, rigorous studies investigating skin bleaching behavior among these populations in the United States are limited. In our P30 pilot study, we explored predictors of skin bleaching practice intensity among African and Afro-Caribbean women.

Methods: In collaboration with our Community Engagement Core, we conducted a cross-sectional study to investigate the relationship between demographic and psychosocial predictors and skin-bleaching-related practice patterns among African and Afro-Caribbean women in New York City.

Results: Among the 76 participants recruited, the median age at the initiation of skin bleaching was 19.5 (16–25) years, yielding a median duration of 13.5 (6–23) years. Although pregnant women were not actively recruited for the study, 13.2% ($n = 10$) of the participants used skin bleaching products while pregnant or possibly breastfeeding. Nativeness and education were associated with various components

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of skin bleaching practice intensity, including duration of skin bleaching, daily use of products, and bleaching of the entire body. Participants' perceived skin-color-related quality of life was not associated with skin bleaching practice intensity.

Conclusion: Skin bleaching is a habitual practice that likely requires culturally sensitive interventions to promote behavioral change. The existence of prenatal and postnatal exposure to mercury, hydroquinone, and other potentially harmful chemicals in skin bleaching products highlights an urgent need to explore the adverse effects of skin bleaching practices on birth outcomes and the growth and neurodevelopment of young babies.

Keywords: African health; Caribbean health; Environmental health; Immigrant health; Skin bleaching; Women's health

INTRODUCTION

The act of toning, lightening, whitening, or bleaching one's skin through the use of creams, soaps, pills, injections, and other melanin-inhibiting mechanisms is a global phenomenon among non-white populations [1–5]. There are many reasons why individuals attempt to cosmetically alter their skin complexion, ranging from unjust racial and economic oppression of poorer, darker-skinned populations [1] to reflections of modern blackness [6–8] and fashionable, ungendered expressions of beauty [3, 9]. While these studies have provided explanations for the practice, none of them have examined its prevalence [1, 10, 11]. Information regarding the exact prevalence of skin bleaching among African diasporic populations is scarce. Prior research has shown high prevalences in sub-Saharan Africa, ranging from 25% based on an epidemiologic survey conducted among women in Mali to 67% among patients in clinical settings in Senegal [6, 12–14]. Moreover, studies examining both the prevalence of skin bleaching and resulting physical and mental health outcomes are also limited [12, 15–17]. New and broader research directions are therefore necessary that are culturally sensitive, methodologically rigorous, and multidisciplinary [18].

Common active ingredients in skin bleaching products, such as mercury (Hg), hydroquinone (HQ), and corticosteroids, have been linked to a variety of adverse health outcomes, ranging from dermatitis and exogenous ochronosis to mercury poisoning and renal damage [2, 4, 13, 19–27]. In animal models, researchers have identified mechanisms by which HQ exposure from skin bleaching products could result in bone-marrow-related malignancies [28, 29]. In addition to the impact on physical health, studies have also observed an association between skin bleaching and psychosocial health [11, 30]. The combined physical and mental health effects associated with skin bleaching deserve further investigation.

While much of the focus on the ramifications of skin bleaching has centered on Africans and African immigrant communities abroad, this topic has not gained much attention among clinical and translational researchers in the United States (US) beyond investigations of Hg-poisoning-related outbreaks resulting from skin bleaching products [27, 31, 32]. Yet, there is little evidence to suggest that skin bleaching is not practiced by African and Afro-Caribbean populations in the US. For example, in New York City (NYC), elevated urine Hg concentrations among Caribbean-born blacks and Dominicans were linked with skin lightening product use [14]. Nationally, state and local health departments have issued multiple advisories and/or initiated public health campaigns to educate consumers about harmful levels of Hg in skin bleaching products [33–36].

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In an effort to shed more light on the health effects of skin bleaching among African diasporic populations in the US, we conducted a pilot study to investigate the demographics, behavioral patterns, and psychosocial motivations of African and Afro-Caribbean women in NYC. The objective of this paper is to discuss, share, and disseminate our primary findings around skin bleaching practice intensity to assist other researchers with hypothesis generation for future studies and/or identify effective strategies for interventions among similar populations in the US.

METHODS

Study Design

Working closely with a three-member (S.G., M.S., and O.D.) community engagement core (CEC), the research team designed, developed, and implemented the administration of a pilot study questionnaire via the research electronic data capture system, REDCap [37]. In designing the study questionnaire, we took advantage of established survey instruments [38–42] that were validated questionnaires from prior studies. Modifications were made to reflect questions about skin color rather than about melasma. The study questionnaire took approximately 20 min to complete. Upon completion, participants received a $20 VISA gift card for their time spent participating in the study. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study. The study was approved by the Institutional Review Board of the Icahn School of Medicine at Mount Sinai.

Study Population

We enrolled a total of 76 participants between 04/04/2017 and 05/17/2018. Our inclusion criteria required participants to be: (1) female and $\geq$ 18 years old; (2) self-identified as being of African or Afro-Caribbean descent; (3) using skin bleaching products for at least 1 year; and (4) living in NYC, defined as within the boundaries of five municipal boroughs (Manhattan, Queens, Brooklyn, Bronx, and Staten Island).

A variety of recruitment efforts were made to ensure the visibility of the study in the targeted communities, including distributing recruitment information in local shops (e.g., beauty supply stores, hair salons, pharmacies, restaurants, etc.), via various community or organization listserves, and through social media platforms such as Twitter and Facebook. Given the extensive networks of the CEC, the project PIs and CEC members had the opportunity to discuss the study on local television and internet radio programs. We also mailed out invitation letters to potential participants of Caribbean descent (n = 102) who had participated in a previous study and had expressed interest in participating in other studies. Patients who had been diagnosed with exogenous ochronosis, a condition that has been associated with the long-term use of products with HQ [22, 26], were identified through a retrospective review of the Mount Sinai Health System pathology database between 2008 and 2017 (n = 6), and invitations to participate in our study were subsequently mailed to them. Moreover, the research team conducted regular recruitment in local hair and beauty salons, where participants were able to complete the survey on-site using a study computer and with help from the research assistants. The majority of our participants (79.0%, n = 60) were recruited in-person at hair salons in NYC, and filled out the study questionnaire with the assistance of the study coordinators. About 8.0% (n = 6) were assisted by study coordinators to fill out the questionnaires by phone. The remaining 13.0% (n = 10) heard about the study either through social media, radio broadcasts, study flyers, word of mouth, or local hair salons, and filled out the questionnaires themselves online without the assistance of a study coordinator. Apart from the 76 participants who were recruited, 59 other responses were recorded in

REDCap. Of these, 25.4% (n = 15) met the criteria but were excluded because they failed to fully complete the questionnaire. The remaining 74.6% (n = 44) of the participants either did not meet the criteria or had merely clicked on the questionnaire link and left it blank.

Main Predictors

Demographics

Demographics included each participant's age in years at time of interview, self-reported ethnicity (Afro-Caribbean, African, or Other), educational attainment (primary school, high school, or post high school), marital status (married vs single/widowed/divorced), pregnant or had given birth within the past year (yes vs no), nativeness (US born vs non-US born), employment (employed vs unemployed/retired), and health insurance (yes vs no). With respect to self-reported ethnicity, all participants self-identified more broadly as being of Afro-Caribbean or African descent, but some participants additionally categorized themselves as African American, Afro-Hispanic, or Hispanic. This smaller subgroup was categorized as Other in order to take into account this additional specificity in identity without creating cell sizes that were too small or potentially identifiable for analysis. Additionally, we asked participants to self-report any skin-related health symptoms that they might have experienced.

Psychosocial Motivation

Our primary measure of participants' psychosocial motivation for skin bleaching was a modified version of the MELASQOL, a measure originally developed by Balkrishnan and colleagues [43] to examine the psychosocial impact of melasma on quality of life for female study participants. The MELASQOL consists of a total of ten questions that examine how bothered (i.e., ranging from not bothered at all to bothered all the time) a woman feels about the effects of her skin condition. Scores can range from 7 to 70, with higher scores indicating worse quality of life [43, 44]. We modified the MELASQOL by replacing the terms "skin condition" or "skin discoloration" with "skin color." For example, instead of asking a woman how she felt about the appearance of her skin condition, we inquired how she felt about the appearance of her skin color. The domains that contributed to this included general emotions like embarrassment, depression, and frustration about one's skin color, along with how much their skin color impacted relations with other people and whether skin color hindered their sense of freedom or importance. The internal stability of the modified MELASQOL scale was high (Cronbach's $\alpha = 0.91$). In an exploratory fashion, we also examined what factors, ranging from aesthetics to upward mobility to peer/family influences, motivated our participants to initiate the practice of skin bleaching.

Primary Outcomes

Our primary outcome for this pilot study was skin bleaching practice intensity, which we assessed in the following ways: (1) participant-reported duration of skin bleaching (in years); (2) number of skin bleaching products used by participants at the time of survey completion (1 vs $\geq$ 2); (3) whether participants bleached their entire body (which included all of the following parts: face, neck, chest, arms, hands, legs, and feet) vs other parts (which included either one or more of the above body parts, but not all); and (4) skin bleaching product use frequency (daily vs weekly/monthly).

Statistical Analysis

Continuous variables were summarized as medians and interquartile ranges (IQR), whereas categorical variables were summarized as frequencies with proportions. Bivariate hypothesis tests to examine associations between demographics, psychosocial motivation, and skin bleaching practice intensity were conducted using Wilcoxon rank sum or Kruskal–Wallis tests, chi-squared or Fisher's exact tests, and Spearman correlations. Statistical significance was assessed at the $\alpha = 0.05$ level. All data analyses were conducted using SAS 9.4 and R 3.3.2.

RESULTS

Demographics

The sample characteristics of the 76 participants are described in Table 1. The median (IQR) age of the 76 participants was 35.5 (30–45) years (Table 1). The majority of the participants were foreign-born (80.3%, $n = 61$). Almost one-half of the participants identified as African (47.4%, $n = 36$), and one-third (32.9%, $n = 25$) identified as Afro-Caribbean. Among the African subgroup, almost three-quarters were from Ivory Coast (47.2%, $n = 17$) or Mali (25.0%, $n = 9$). Among the Afro-Caribbean subgroup, an overwhelming majority were Jamaican (84.0%, $n = 21$). Educational attainment was approximately equally distributed in the sample, with 30.3% ($n = 23$) of the participants having a primary school education at most, 34.2% ($n = 26$) having a high-school degree, and 35.5% ($n = 27$) having a post-high-school education. While pregnant women were not actively sought out for our study, 13.2% ($n = 10$) of participants reported being pregnant at the time of interview or having given birth to a child within the last year. We observed that about 13.0% ($n = 10$) complained of stubborn acne, about 9.0% ($n = 7$) experienced blue-black darkening of skin, and 35.5% ($n = 27$) complained of stretch marks, while a small number (24.5%, $n = 11$) stated that they experienced other skin problems, such as skin irritation or skin that bruised when touched.

Psychosocial Motivation

The modified MELASQOL scores ranged from a minimum of 10 to a maximum of 64. The median score was 14 (10–26). Participants with only a primary school education had the highest median score of 20 (12–30), followed by 14 (10–38) and 10 (10–22) for those who had high school and post-high-school educations, respectively. The most noteworthy responses for the MELASQOL—that bothered participants sometimes, most of the time, or all the time—were in relation to the appearance of skin color (34.3%, $n = 26$), frustration about skin color (26.4%, $n = 20$), embarrassment about skin color (24.0%, $n = 18$), and a restricted sense of freedom (24.0%, $n = 18$). Slightly under one-tenth (9.2%, $n = 7$) of participants also said that they had feelings of not being attractive, which bothered them all the time. Additionally, while exploring the motivations behind skin bleaching, we found that 10.5% ($n = 8$) of participants initiated the practice based on the recommendation of a family member or friend, which points to the fact that social networks are an important consideration.

Skin Bleaching Practice Intensity

The median age at which the participants first started bleaching their skin was 19.5 (16–25) years, yielding a median duration of skin bleaching of 13.5 (6–23) years (Table 1). About two-thirds (65.8%, $n = 50$) of the participants reported using only one skin bleaching product, as compared to at least two products. Nearly half (44.7%, $n = 34$) of the participants reported bleaching their entire body, whereas the remaining participants (55.3%, $n = 42$) were found to be bleaching the other parts of their body, such as their face, neck, arms, legs, etc., in different combinations. More than three-quarters (77.6%, $n = 59$) of the participants applied skin bleaching products to their skin on a daily basis.

Duration of skin bleaching was significantly associated with educational attainment, age, nativeness, and ethnicity (Table 2). The median (IQR) duration of skin bleaching was longest, at 24 (19–28) years, for those with a primary school education at most, compared to 10.5 (4–18) years and 8 (5–17; $p < 0.001$) years for those with high-school and post-high-school educations, respectively. There was a moderately positive correlation between age and duration of skin bleaching (Spearman $r = 0.55$; $p < 0.001$). The median (IQR) duration of skin bleaching was almost threefold longer for non-US-born participants, at 17 (8–24) years, than for US-born participants, at 6 (4–13; $p = 0.016$) years. With respect to ethnicity, the median duration of skin bleaching was longest for African participants, at 20 (9–26) years, and shortest

Table 1 Distribution of sample characteristics (n = 76)

	Total (n = 76)
Age (years)	35 (30–45)
Age at which participants first started bleaching (years)	19.5 (16–25)
Duration of skin bleaching (years)	13.5 (6–23)
Educational attainment	
Primary school	23 (30.3%)
High school	26 (34.2%)
Post high school	27 (35.5%)
Nativeness	
US	15 (19.7%)
Non-US	61 (80.3%)
Ethnicity	
African	36 (47.4%)
Afro-Caribbean	25 (32.9%)
Other	15 (19.7%)
Pregnant or had given birth	
Yes	10 (13.2%)
No	66 (86.8%)
Marital status	
Married	32 (42.1%)
Single	44 (57.9%)
Employment status	
Employed	66 (86.8%)
Unemployed	10 (13.2%)
Health insurance	
Yes	54 (71.1%)
No	22 (28.9%)
Modified MELASQOL	14 (10–26%)
Frequency of use	
Daily	59 (77.6%)
Other	17 (22.4%)
Number of products used	
1 product	50 (65.8%)
≥ 2 products	26 (34.2%)
Number of body parts bleached	
Whole body	34 (44.7%)
Other parts	42 (55.3%)

Data are summarized as median (IQR) or frequency (%)

for those in the Other group, at 6 (5–16) years. A median duration of skin bleaching of 12 (8–21) years was observed for Afro-Caribbean participants (p = 0.046). Since duration of skin bleaching was correlated with age, we conducted a post hoc assessment to determine whether the observed associations between educational attainment, nativeness, and ethnicity could be explained by differential distributions in age. Educational attainment was negatively associated with age (p = 0.02), with a median age of 42 (38–47) years among those with a primary school education, and 33.5 (28–39) years and 33 (28–44) years, respectively, for those with high-school and post-high-school educations, respectively.

Pregnancy status and ethnicity were the only risk factors associated with the number of skin bleaching products used by participants (Table 3). None of the women who were pregnant at the time of interview or who had given birth within the last year had used ≥ 2 products, compared to 39.4% (n = 26; p = 0.013) of the other women. Less than two-thirds (60.0%, n = 15) of Afro-Caribbean participants used ≥ 2 products, compared to 16.7% (n = 6) among Africans and one-third (33.3%, n = 5; p = 0.002) among the Other group.

We observed statistically significant associations between educational attainment, nativeness, and daily use of skin bleaching products (Table 4). More specifically, higher proportions of those with a primary school education (82.6%, n = 19) or a high school education

Table 2 Bivariate assessment of the relationships between the predictors and duration of skin bleaching (n = 76)

		p value
Age	r = 0.55	< 0.001
Educational attainment		
Primary school	24 (19–28)	< 0.001
High school	10.5 (4–18)	
Post high school	8 (5–17)	
Nativeness		
US	6 (4–13)	0.016
Non-US	17 (8–24)	
Ethnicity		
African	20 (9–26)	0.046
Afro-Caribbean	12 (8–21)	
Other	6 (5–16)	
Pregnant or had given birth		
Yes	14 (6–23)	0.6
No	10 (6–18)	
Marital status		
Married	17.5 (9–26)	0.09
Single	11.5 (5–23)	
Employment status		
Employed	14.5 (8–23)	0.17
Unemployed	6.5 (2–22)	
Health insurance		
Yes	13 (5–25)	0.79
No	14.5 (8–23)	
Modified MELASQOL	r = 0.05	0.7

Data are summarized as median (IQR) or Spearman correlation

(92.3%, n = 24) than those with a post-high-school education (59.3%, n = 16; p = 0.0038) used skin bleaching products daily. The proportion of foreign-born participants (85.2%, n = 52) who used skin bleaching products daily was almost twofold higher than that of US-born participants (46.7%, n = 7; p = 0.003).

Table 3 Bivariate assessment of the relationships between the predictors and the number of skin bleaching products used (n = 76)

	1 Product	≥ 2 Products	p value
Age	36 (31–46)	35 (29–41)	0.53
Educational attainment			
Primary school	18 (78.3%)	5 (21.7%)	0.32
High school	15 (57.7%)	11 (42.3%)	
Post high school	17 (63.0%)	10 (37.0%)	
Nativeness			
US	10 (66.7%)	5 (33.3%)	1.00
Non-US	40 (65.6%)	21 (34.4%)	
Ethnicity			
African	30 (83.3%)	6 (16.7%)	0.002
Afro-Caribbean	10 (40.0%)	15 (60.0%)	
Other	10 (66.7%)	5 (33.3%)	
Pregnant or had given birth			
Yes	10 (100.0%)	0 (0.0%)	0.013
No	40 (60.6%)	26 (39.4%)	
Marital status			
Married	24 (75.0%)	8 (25.0%)	0.22
Single	26 (59.1%)	18 (40.9%)	
Employment status			
Employed	44 (66.7%)	22 (33.3%)	0.73
Unemployed	6 (60.0%)	4 (40.0%)	
Health insurance			
Yes	40 (74.1%)	14 (25.9%)	0.031
No	10 (45.5%)	12 (54.5%)	
Modified MELASQOL	14 (10–30)	14.5 (10–22)	0.66

Data are summarized as median (IQR) or frequency (%)

Lastly, we observed a significant statistical association between nativeness and whether participants bleached their entire body (Table 5). Half of those who were foreign-born

Table 4 Bivariate assessment of the relationships between the predictors and frequency of use of skin bleaching products (n = 76)

	Daily use	Other	p value
Age	38 (30–46)	33 (29–42)	0.5
Educational attainment			
Primary school	19 (82.6%)	4 (17.4%)	0.0038
High school	24 (92.3%)	2 (7.7%)	
Post high school	16 (59.3%)	11 (40.7%)	
Nativeness			
US	7 (46.7%)	8 (53.3%)	0.003
Non-US	52 (85.2%)	9 (14.8%)	
Ethnicity			
African	30 (83.3%)	6 (16.7%)	0.42
Afro-Caribbean	19 (76.0%)	6 (24.0%)	
Other	10 (66.7%)	5 (33.3%)	
Pregnant or had given birth			
Yes	7 (70.0%)	3 (30.0%)	0.7
No	52 (78.8%)	14 (21.2%)	
Marital status			
Married	24 (75.0%)	8 (25.0%)	0.8
Single	35 (79.6%)	9 (20.5%)	
Employment status			
Employed	50 (75.8%)	16 (24.2%)	0.44
Unemployed	9 (90.0%)	1 (10.0%)	
Health insurance			
Yes	42 (77.8%)	12 (22.2%)	1.00
No	17 (77.3%)	5 (22.7%)	
Modified MELASQOL	14 (10–26)	14 (10–26)	0.55

Data are summarized as median (IQR) or frequency (%)

Table 5 Bivariate assessment of the relationships between the predictors and the number of body parts bleached (n = 76)

	Whole body	Other parts	p value
Age	34.5 (30–41)	37 (30–46)	0.6
Educational attainment			
Primary school	7 (30.4%)	16 (69.6%)	0.13
High school	16 (61.5%)	10 (38.5%)	
Post high school	11 (40.7%)	16 (59.3%)	
Nativeness			
US	3 (20.0%)	12 (80.0%)	0.032
Non-US	31 (50.8%)	30 (49.2%)	
Ethnicity			
African	17 (47.2%)	19 (52.8%)	0.23
Afro-Caribbean	13 (52.0%)	12 (48.0%)	
Other	4 (26.7%)	11 (73.3%)	
Pregnant or had given birth			
Yes	3 (30.0%)	7 (70.0%)	0.5
No	31 (47.0%)	35 (53.0%)	
Marital status			
Married	13 (40.6%)	19 (59.4%)	0.64
Single	21 (47.7%)	23 (52.3%)	
Employment status			
Employed	28 (42.4%)	38 (57.6%)	0.33
Unemployed	6 (60.0%)	4 (40.0%)	
Health insurance			
Yes	23 (42.6%)	31 (57.4%)	0.62
No	11 (50.0%)	11 (50.0%)	
Modified MELASQOL	13 (10–25)	16.5 (10–28)	0.24

Data are summarized as median (IQR) or frequency (%)

(50.8%, n = 31) reported bleaching their entire body, compared with one-fifth of US-born participants (20.0%, n = 3, p = 0.032).

DISCUSSION

We have presented the primary findings of a pilot study examining skin bleaching among

African and Afro-Caribbean women in NYC. Of primary concern is the fact that 13% of our participants used skin bleaching products while pregnant and/or possibly breastfeeding. This finding is consistent with prior studies [6, 45, 46] and highlights the existence of prenatal and postnatal exposure to Hg, HQ, and other potentially harmful chemicals in skin bleaching products [27, 31, 32, 47–49], for which the neurodevelopmental and other effects on offspring remain understudied. The vulnerability of the fetus and young offspring to the adverse health effects of skin bleaching during such a sensitive period of their growth and development deserves urgent attention from the public health community, especially given the rising global incidence and prevalence of this practice.

Secondly, while higher educational attainment does not necessarily prevent the uptake of this practice, we did find that those with lower educational attainment had a more intensive skin bleaching regimen with respect to daily use and had been bleaching for a longer duration. However, the positive correlation observed between age and duration along with the fact that the oldest study participants had the least education suggest that the latter finding was most likely due to sample selection.

Third, our findings suggest that nativeness is an important risk factor to examine with respect to vulnerability to the most harmful effects of skin bleaching. To our knowledge, our study is the first to observe greater skin bleaching practice intensity among foreign-born women than US-born women in the African and Afro-Caribbean population. Not only did we observe a longer duration of skin bleaching among foreign-born women, but they also were more likely to follow a daily skin bleaching regimen and apply skin bleaching products to their entire body. This is particularly concerning since the intersection of being immigrants and women of color in the US may complicate access to quality care if they were to experience negative health effects from skin bleaching due to language, health literacy, and medical insurance barriers [50–55]. The observed relationship between ethnicity and skin bleaching practice intensity also presented an interesting conundrum suggesting a moderation by other factors such as subgroups' common beliefs and social network norms. While African women had been bleaching for a longer duration, Afro-Caribbean women were more likely to use at least two skin bleaching products simultaneously. Further research is needed to explore the unique cultural, social, behavioral, and health-related risk profiles that this variability in skin bleaching practice habits might induce for these different ethnic groups in the US.

Similar to prior studies, we found that skin bleaching tends to be a habitual practice initiated in the late teenage or early adult years [11]. Charles [1] has postulated that the early initiation of skin bleaching may stem from identity development occurring during the adolescence period. Given that 50% of our participants had been bleaching for at least 13 years, and 78% of the participants applied skin bleaching products to their skin daily, our pilot study findings provide convincing evidence to support the potential for serious adverse health effects in this population resulting from long-term, potentially harmful, exposure to chemicals in these products. The chronic, habitual nature of skin bleaching in this population may make it a difficult behavior to change. Further studies are needed on how to successfully change the bleaching behavior, disrupt the skin bleaching habits, or reduce practice intensity through means such as changing attitudes or subjective norms (e.g., changing beliefs and expectations about the consequences of skin bleaching) [56, 57] and by increasing risk perception, through conscious cognitive deliberation about the perceived benefits and risks of the skin lightening products, and by reducing the influence of the relevant social network on the individual's behavior [58].

The limitations of this pilot study include a reliance on self-reported measures, a small sample size, and a lack of exposure biomarker data. The study results may not be generalizable to women who are not of African or Afro-Caribbean descent. Our findings may also be geographically restricted in that women of similar ethnicities in other regions of the US may exhibit different skin bleaching practice

intensity patterns, or they may be related to a distinct set of risk factors.

CONCLUSIONS

Our study showed that skin bleaching is a habitual practice that is influenced by numerous factors such as ethnicity, nativeness, and educational attainment, and most likely requires culturally sensitive interventions to promote behavioral change. The existence of prenatal and postnatal exposure to mercury, hydroquinone, and other harmful chemicals in skin bleaching products highlights an urgent need for investigations of the adverse effects of skin bleaching practices on young babies during a sensitive period of their growth and neurodevelopment.

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Data Availability. The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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