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Beauty Inside Out: Examining Beauty Product Use Among Diverse Women and Femme-Identifying Individuals in Northern Manhattan and South Bronx Through an Environmental Justice Framework

Lariah Edwards, Lubna Ahmed, Leslie Martinez, Sophia Huda, Bhavna Shamasunder, Jasmine A. McDonald, Robert Dubrow, Beaumont Morton,* and Ami R. Zota*

ABSTRACT

The disproportionate use of chemical straighteners and skin lighteners by women of color is a growing public health concern given the link between product use and adverse health effects. Prior studies examined product use as an individual choice but neglected social-structural factors, which influence beauty perceptions and personal decisions around product use. We used a community-based participatory research approach to characterize product use by demographics and investigated how racialized beauty norms impact use among 297 women and femme-identifying individuals in Northern Manhattan and the South Bronx. Product use varied by race/ethnicity, nativity, and messaging from family and peers. Black respondents were more likely to ever use chemical straighteners than non-Black respondents (OR = 2.0; 95% CI = 1.2–3.2), as were respondents who heard that family members express a preference for straight hair compared with respondents whose family members expressed mixed preferences about hairstyles (OR = 2.0; 95% CI = 1.1–3.7). Compared with non-Asian respondents and respondents born in the United States, Asian respondents and respondents born in other countries, respectively, had threefold higher odds of ever using skin lighteners (Asian: OR = 3.2; 95% CI = 1.4–7.0; born in other countries: OR = 3.4; 95% CI = 1.9–6.1). Respondents' perceptions that others believe straight hair or lighter skin confer benefits such as beauty, professionalism, or youth were associated with greater use of chemical straighteners and skin lighteners. These findings

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highlight the pervasiveness of racialized beauty norms and point to the need to reduce the demand for and sale of these products through community education, market-based strategies, and public policy.

Keywords: beauty products, chemical straighteners, skin lighteners, environmental justice, beauty justice

INTRODUCTION

WEST HARLEM ENVIRONMENTAL ACTION FOR ENVIRONMENTAL JUSTICE (WE ACT) was started in 1988 when three fearless community leaders saw that environmental racism was rampant in their West Harlem neighborhood and demanded community-driven, political change.¹ In 1991, a multinational group, including WE ACT, organized The First People of Color Environmental Leadership Summit where the Principles of Environmental Justice were drafted and adopted.

The principles combined multiple movement strands, including farm workers' rights and civil rights to frame environmental activism as inclusive of everyone's concerns, including urban communities, people of color, and workers.² The environmental justice movement also provided an alternative vision for environmentalism that had not been a part of the mainstream movement. This alternative vision included addressing environmental biases that stemmed from the purposeful exclusion of minoritized racial and class groups from clean and healthful environments and combating the abuses of corporate polluters and regulatory agencies that are complicit in ongoing pollution disparities.³

The principles embraced a far-reaching spatiotemporal scale, inclusive of histories of colonialism, imperialism, and genocide of indigenous cultures, that shaped present-day environments. Today, these principles remain a guiding force for the movement that broadly seeks to call attention to, organize against, and end environmental racism.

In the past 30 years, the environmental justice movement has extended its reach to address emerging issues, including the challenges of unregulated chemicals in consumer products along with the disparate exposures and health impacts of these chemicals experienced by people of color.^{4,5} In 2019, WE ACT launched the Beauty Inside Out (BIO) campaign to educate their predominately Black and Latina/x/o community members in Northern Manhattan about environmental racism in the beauty industry and to reduce the demand for and sale of harmful products, including skin lighteners and chemical straighteners.

While unregulated toxic chemicals in consumer products is a national problem, exposures can vary by neighborhood, and Northern Manhattan has a high density of independent beauty supply stores and hair salons where these products are purchased and used.

The BIO campaign builds on scholarship by Zota and Shamasunder on the "environmental injustice of beauty," a conceptual framework linking intersectional systems of oppression (e.g., racism, sexism, and classism) to racialized beauty practices, unequal chemical exposures, and adverse health outcomes.⁶ This framework builds on scholarship in environmental justice to include beauty product exposures as one form of environmental racism.

Elevated levels of beauty-product related chemicals, such as phthalates and parabens, among women of color, can be linked to entrenched social and economic systems, such as colonialism and slavery, that have codified a hierarchy of beauty norms. These beauty norms create material advantages to people with physical traits associated with white femininity, such as light skin and straight hair.

Products sold and used to lighten skin are one example of environmental injustice of beauty. Colorism is prejudice or discrimination toward individuals with darker skin, with benefits accruing to people with lighter or whiter skin.⁷ The power and pervasiveness of colorism globally has created an extensive and ongoing market for diverse skin lightening products.^{8,9,10,11} Skin lighteners can contain hydroquinone,

⁶Ami R. Zota and Bhavna Shamasunder. "The Environmental Injustice of Beauty: Framing Chemical Exposures from Beauty Products as a Health Disparities Concern." *American Journal of Obstetrics and Gynecology* 217 (2017): 418.e1–418.e6.

⁷Jasmine A. Abrams, Faye Z. Belgrave, Chelsea D. Williams, and Morgan L. Maxwell. "African American Adolescent Girls' Beliefs About Skin Tone and Colorism." *Journal of Black Psychology* 46 (2020): 164–194.

⁸Eric P.H. Li, Hyun Jeong Min, and Russell W. Belk. "Skin Lightening and Beauty in Four Asian Cultures." *Advances in Consumer Research* 35 (2008): 444–449.

⁹Louise A Brinton, Jonine D Figueroa, Daniel Ansong, Kofi M Nyarko, Seth Wiafe, Joel Yarney, Richard Biritwum, Michelle Brotzman, Jake E Thistle, Ernest Adjei, Francis Aitpillah, Florence Dedey, Lawrence Edusei, Nicholas Titiloye, Baffour Awuah, Joe Nat Clegg-Lampety, Beatrice Wiafe-Addai, and Verna Vanderpuye. "Skin Lighteners and Hair Relaxers as Risk Factors for Breast Cancer: Results from the Ghana Breast Health Study." *Carcinogenesis* 39 (2018): 571–579.

¹⁰Samara Pollock, Susan Taylor, Oyetewa Oyerinde, Sabrina Nurmohamed, Ncoza Dlova, Rashmi Sarkar, Hassan Galadari, Mónica Manela-Azulay, Hae Shin Chung, Evangeline Handog, and A Shadi Kourosh. "The Dark Side of Skin Lightening: An International Collaboration and Review of a Public Health Issue Affecting Dermatology." *International Journal of Women's Dermatology* 7 (2021): 158–164.

¹¹Dominic Sagoe, Ståle Pallesen, Ncoza C. Dlova, Margaret Lartey, Khaled Ezzedine, and Ophelia Dadzie. "The Global Prevalence and Correlates of Skin Bleaching: A Meta-Analysis and Meta-Regression Analysis." *International Journal of Dermatology* 58 (2019): 24–44.

¹WE ACT for Environmental Justice. Our story. <<https://www.weact.org/whoware/ourstory/>>. (Last accessed on May 2, 2022).

²Julie Sze and Jonathan K. London. "Environmental Justice at the Crossroads." *Sociology Compass* 2 (2008): 1331–1354.

³Luke W. Cole and Shelia R. Foster. *From the Ground Up: Environmental Racism and the Rise of the Environmental Justice Movement*. (New York and London, New York University Press, 2001).

⁴Julie Sze and Jonathan K. London. "Environmental Justice at the Crossroads."

⁵Luke W. Cole and Shelia R Foster. *From the Ground Up: Environmental Racism and the Rise of the Environmental Justice Movement*.

corticosteroids, and mercury.^{12,13} Mercury exposure can cause kidney and nervous system damage, and overuse of corticosteroids can disrupt cortisol regulation and lead to metabolic problems.¹⁴ Use of mercury-containing skin creams has been linked to greater body burden of mercury in both female users and their offspring.¹⁵ While population-based data on skin lightener use in the United States are limited, prior studies have documented greater use among Dominican and Caribbean groups in New York City and some Hispanic communities along the Texas-Mexico border.^{16,17,18}

Natural hair discrimination, or prejudice against natural hair styles and textures such as locs, braids, fades, and afros, another form of environmental injustice in beauty, plays out through overt policy and practice.¹⁹ In particular, Black women have been pressured to straighten their naturally curly or kinky hair for reasons such as being seen as professional in the workplace, social acceptance, or other norms that have excluded Black bodies.

This has created a market for chemical straighteners, such as relaxers, perms, and texturizers. Chemical straighteners, such as relaxers, can contain harmful chemicals such as phthalates, parabens, and formaldehyde, and their use has been associated with ear-

lier age at menarche and increased risk of uterine fibroids and breast cancer.^{20,21,22,23,24}

Given the diversity of WE ACT's community members and potential for higher exposures from beauty products, the BIO campaign conducted a community-based survey to address data gaps around product use among women of color and femme-identifying individuals in Northern Manhattan and the South Bronx. The objective of our present study is to analyze survey data to characterize chemical straightener and skin lightener use in the study sample and identify socio-demographic factors and social influences associated with use.

We also examine respondents' perceptions about the perceived benefits of straight hair and light skin to understand how racialized beauty norms impact personal beliefs and subsequent product use.

METHODS

This community-based participatory research project was a collaboration between WE ACT, Yale School of Public Health (YSPH), George Washington University Milken Institute School of Public Health (GWSPH), and Columbia University Mailman School of Public Health (MSPH). (The academic Principal Investigator and her team moved from GWSPH to MSPH during the study.)

Survey

The survey was developed by YSPH students and WE ACT staff using examples from prior consumer product studies among women of color and incorporating feedback from GWSPH researchers, community groups, survey administrators, and community informants.²⁵ The

¹²Eric Selorm Agorku, Edward Ebow Kwaansa-Ansah, Ray Bright Voegborlo, Pamela Amegbletor, and Francis Opoku. "Mercury and Hydroquinone Content of Skin Toning Creams and Cosmetic Soaps, and the Potential Risks to the Health of Ghanaian Women." *Springerplus* 5 (2016): 319.

¹³Barry Ladizinski, Nisha Mistry, and Roopal V. Kundu. "Widespread Use of Toxic Skin Lightening Compounds: Medical and Psychosocial Aspects." *Dermatologic Clinics* 29 (2011): 111–123.

¹⁴Natasha Masub and Amor Khachemoune. "Cosmetic Skin Lightening Use and Side Effects." *The Journal of Dermatological Treatment* 33 (2020): 1287–1292.

¹⁵Carrie A. Dickenson, Tracey J. Woodruff, Naomi E. Stotland, Dina Dobraca, and Rupali Das. "Elevated Mercury Levels in Pregnant Woman Linked to Skin Cream from Mexico." *American Journal of Obstetrics and Gynecology* 209 (2013): e4–e5.

¹⁶Wendy McKelvey, Nancy Jeffery, Nancy Clark, Daniel Kass, and Patrick J. Parsons. "Population-Based Inorganic Mercury Biomonitoring and the Identification of Skin Care Products as a Source of Exposure in New York City." *Environmental Health Perspectives* 119 (2011): 203–209.

¹⁷Minda M. Weldon, Mark S. Smolinski, Azarnoush Maroufi, Brian W. Hasty, Debra L. Gilliss, L. Lucy Boulanger, Lina S. Balluz, and Ronald J. Dutton. "Mercury Poisoning Associated with a Mexican Beauty Cream." *Western Journal of Medicine* 173 (2000): 15–18.

¹⁸Emma K. T. Benn, Richa Deshpande, Ogonnaya Dotson-Newman, Sharon Gordon, Marian Scott, Chitra Amarasiriwardena, Ikhlas A. Khan, Yan-Hong Wang, Andrew Alexis, Bridget Kaufman, Hector Moran, Chi Wen, Christopher A. D. Charles, Novie O. M. Younger, Nihal Mohamed, and Bian Liu. "Skin Bleaching among African and Afro-Caribbean Women in New York City: Primary Findings from a P30 Pilot Study." *Dermatology and Therapy* 9 (2019): 355–367.

¹⁹Ashleigh Shelby Rosette and Tracey L. Dumas. "The hair dilemma: Conform to mainstream expectations or emphasize racial identity." *Duke Journal of Gender Law and Policy* 14 (2007): 407–422.

²⁰Jennifer S. Pierce, Anders Abelmann, Lauren J. Spicer, R. E. Adams, Meghan E. Glynn, Kari Neier, Brent L. Finley, and Shannon H. Gaffney. "Characterization of Formaldehyde Exposure Resulting from the Use of Four Professional Hair Straightening Products." *Journal of Occupational and Environmental Hygiene* 8 (2011): 686–699.

²¹Jessica S. Helm, Marcia Nishioka, Julia Green Brody, Ruthann A. Rudel, and Robin E. Dodson. "Measurement of Endocrine Disrupting and Asthma-Associated Chemicals in Hair Products Used by Black Women." *Environmental Research* 165 (2018): 448–458.

²²Jasmine A. McDonald, Parisa Tehranifar, Julie D. Flom, Mary Beth Terry, and Tamarra James-Todd. "Hair Product Use, Age at Menarche and Mammographic Breast Density in Multiethnic Urban Women." *Environmental Health* 17 (2018): 1.

²³Rohan Rao, Jasmine A. McDonald, Emily S. Barrett, Patricia Greenberg, Dede K. Teteh, Susanne B. Montgomery, Bo Qin, Yong Lin, Chi-Chen Hong, Christine B. Ambrosone, Kitaw Demissie, Elisa V. Bandera, and Adana A. M. Llanos. "Associations of Hair Dye and Relaxer Use with Breast Tumor Clinicopathologic Features: Findings from the Women's Circle of Health Study." *Environmental Research* 203 (2022): 111863.

²⁴Lauren A. Wise, Julie R. Palmer, David Reich, Yvette C. Cozier, and Lynn Rosenberg. "Hair Relaxer Use and Risk of Uterine Leiomyomata in African-American Women." *American Journal of Epidemiology* 175 (2012): 432–440.

²⁵Robin E. Dodson, Bethsaida Cardona, Ami R. Zota, Janette Robinson Flint, Sandy Navarro and Bhavna Shamasunder. "Personal care product use among diverse women in California: Taking Stock Study." *Journal of Exposure Science & Environmental Epidemiology* 31 (2021): 487–502.

survey was created in English and Spanish, using inclusive and non-gendered language that was not specific to a region or country. The final survey included 95 questions that ask respondents how, where, and why they choose to use and buy skin lighteners and chemical straighteners to better understand both use of and sentiments toward these products. We focus on a subset of questions for this analysis.

We asked respondents about their use of chemical straighteners and skin lighteners, both ever and current (i.e., past year) use, types of products used, and personal reasons for using products. We asked respondents about the messages they received about hairstyles and skin tone from their peers and family members to understand how personal networks influence product use and impact beauty norms. Respondents were asked whether family members and peers commented on hairstyles, and separately, skin tone.

We also asked questions to gauge respondents' sentiments toward and perceptions of societal beauty norms. Respondents were asked questions about their personal beliefs and, separately, beliefs respondents think that others carry about the benefits that straight hair and lighter skin confer to women. Respondents were asked to respond using a Likert scale, where 0 indicates a preference for straight hair or lighter skin, 5 indicates no preference, and 10 indicates a preference for curly or coiled hair or darker skin. All materials were reviewed and approved for use with adults by the Yale Human Research Protection Program.

Respondent recruitment and survey administrations

Respondent recruitment and survey administration were performed by trained community survey administrators via Qualtrics in March 2020 and October–November 2020 in the Northern Manhattan neighborhoods of: Morningside Heights/Hamilton Heights (including Manhattanville and West Harlem), Central Harlem, East Harlem, and Washington Heights/Inwood (see Supplementary Data for further details). Some surveys were also administered in the South Bronx. Based on feedback from community focus groups, the teams decided that surveys would be administered by women of color aged 18–30 years old who are familiar with the study area and are fluent in English or Spanish.

Data analysis

All statistical analyses were conducted in SAS 9.4 (SAS Institute, Cary, NC). We limited our analyses to respondents who were at least 18 years old, identified as female or non-binary, gender queer, gender non-conforming, or femme-identifying [femme-identifying], and lived in one of the eligible study areas. After we excluded 41 surveys that only contained responses for a few questions at the beginning of the survey, the final study sample included 297 respondents.

We first characterized ever and current use of chemical straighteners and skin lighteners by gender identity and types of products used in the study sample. Given the

small number of femme-identifying respondents, we present the majority of our results without stratifying by gender identity. Respondents were asked if they identify as Hispanic or Latina/x (Hispanic). Separately, respondents were asked to select all the racial groups with which they identify (Black or African-American [Black]; Asian or Asian-American [Asian]; Middle Eastern/North African; American Indian or Alaska Native; Native Hawaiian or Pacific Islander; White; Prefer not to answer; or Other with option to write in a response).

We summarized product use data first by distinguishing between respondents who identified as Hispanic and those who did not (Non-Hispanic). Next, we grouped respondents based on their self-identified race, including a category for respondents who identified as Hispanic ethnicity, without a reported race, as well as a category for respondents who reported more than one race/ethnicity (i.e., Multi-racial). We characterized product use by subgroups of Black/African descent (African-American, African, or Afro-Caribbean or Afro-Latina/x), for respondents who identified as Black, and by nativity within Asian and Hispanic subgroups. We also report respondents' personal reasons for using products.

We used bivariate logistic regression models to identify determinants of current and ever use of chemical straighteners and skin lighteners. Our logistic models considered the following covariates: age (35–54, 55 years or older vs. 18–34 years), being in a relationship (yes, no), education (more than equal to Associate's degree vs. less than Associate's degree), and nativity (born in the United States vs. born outside of the United States). Three self-reported race and ethnicity covariates were included because they were the largest and of interest based on the literature (Black, Asian, or Hispanic individuals vs. non-Black, non-Asian, and non-Hispanic individuals, respectively).^{26,27}

We also included messaging about hairstyles from family or, separately, peers (curly/coiled hair is preferable, straight hair is preferable, don't remember them making any comments about hairstyles vs. some said curly/coiled hair is preferable and some said straight hair is preferable), or messaging about skin tones from family or peers (darker skin is preferable, lighter skin is preferable, don't recall them making comments about skin tones vs. some said dark skin is preferable, and some said lighter skin is preferable).

To understand how racialized beauty norms impact personal beliefs and product use, we also investigated

²⁶Samara Pollock, Susan Taylor, Oyete Oyerinde, Sabrina Nurmohamed, Ncoza Dlova, Rashmi Sarkar, Hassan Galadari, Mônica Manela-Azulay, Hae Shin Chung, Evangeline Handog, and A Shadi Kourosh. "The Dark Side of Skin Lightening: An International Collaboration and Review of a Public Health Issue Affecting Dermatology."

²⁷Dede K. Tete, Susanne B. Montgomery, Sabine Monice, Laura Stiel, Phyllis Y. Clark, Eudora Mitchell, and Lincoln Geraghty (Reviewing Editor) (2017) "My Crown and Glory: Community, Identity, Culture, and Black Women's Concerns of Hair Product-Related Breast Cancer Risk." *Cogent Arts and Humanities* 4 (2017): 1345297.

respondents' personal beliefs and the beliefs they think others have about the benefits of straight hair and lighter skin for women. We categorized responses, originally captured on a Likert scale, into two groups, 0 to 4 as a preference for straight hair (or lighter skin) and 5 to 10 as a preference for curly hair (or darker skin) or no preference. We used Chi-square tests to assess the difference between respondents' personal beliefs and the beliefs they perceive others have and to investigate whether there is a relationship between other people's beliefs and ever and current use of products.

RESULTS

Respondents' characteristics

The surveys were primarily completed in English (77%) by respondents who were within the 25–34 years or 35–44 years age groups (30% and 22%, respectively) and identified as female (92%) (Table 1). More than half (55%) identified as Hispanic (Table 1). Within the Hispanic group, 31% identified as Hispanic, with no reported race, and 23% identified as Black. Among the respondents who identified as Non-Hispanic, almost two-thirds identified as Black (63%), followed by Asian (14%). Seven percent of all respondents identified as multi-racial, with a majority identifying as Black and Asian or Black plus another group. About half (52%) of respondents were born in the United States. Half of respondents had a college degree or higher, and half of respondents were single or not in a relationship.

Chemical straightener use and associations with use

Forty-four percent of female respondents reported ever use of chemical straighteners, and 34% of femme-identifying respondents reported ever using them. Current use of products was lower at 15% and 13% for female and femme-identifying respondents, respectively (Fig. 1a). Relaxers were the most common type of product used among all ever users (Fig. 1b). Product use varied by race/ethnicity. Black respondents reported the highest frequency of use, regardless of Hispanic ethnicity (Non-Hispanic Black: ever use = 60%; current use = 19%; Hispanic Black: ever use = 48%; current use = 24%) (Fig. 2a). There were similar frequencies of use across Black subgroups (Supplementary Fig. S1a).

Among current users of chemical straighteners (*n* = 44), a majority (61%) reported that they used chemical straighteners because they felt “more beautiful with straight hair.” Other common reasons for use were “straight hair is easier to manage than curly/coiled hair” (45%); “straight hair makes me feel more comfortable in social situations than curly/coiled hair” (39%); and “I feel freer with straight hair” (32%) (respondents were able to select more than one reason) (Supplementary Table S1).

In bivariate regressions, Black respondents were more likely than non-Black respondents to ever use chemical straighteners (OR = 2.0; 95% CI = 1.2–3.2) (Table 2).

TABLE 1. CHARACTERISTICS OF STUDY RESPONDENTS IN NORTHERN MANHATTAN AND THE SOUTH BRONX AREAS (*N* = 297)

| <i>Characteristics</i> | <i>% (n)</i> |
|--|--------------|
| Survey language | |
| English | 77 (230) |
| Spanish | 23 (67) |
| Preferred gender | |
| Female | 92 (274) |
| Femme-identifying individuals ^a | 8 (23) |
| Age (years) | |
| 18–24 | 13 (39) |
| 25–34 | 30 (90) |
| 35–44 | 22 (65) |
| 45–54 | 12 (37) |
| 55–64 | 15 (44) |
| 65 or older | 7 (22) |
| Hispanic or Latina/x Ethnicity | |
| Non-Hispanic | 45 (134) |
| Hispanic or Latina/x | 55 (163) |
| Race among Hispanic or Latina/x Respondents ^{b,c} | |
| Hispanic or Latina/x ^d | 31 (50) |
| Black or African-American | 23 (37) |
| Middle Eastern or North African | 1 (2) |
| American Indian or Alaskan Native | 8 (13) |
| Native Hawaiian or Pacific Islander | <1 (1) |
| White | 7 (12) |
| Multi-racial (two or more groups) | 6 (10) |
| Prefer not to respond or missing | 23 (38) |
| Race among non-Hispanic respondents ^b | |
| Black or African-American | 63 (84) |
| Middle Eastern or North African | 4 (5) |
| Asian or Asian-American | 14 (19) |
| American Indian or Alaska Native | 3 (4) |
| Native Hawaiian or Pacific Islander | 3 (4) |
| White | <1 (1) |
| Other | 2 (3) |
| Multi-racial (two or more groups) | 8 (11) |
| Prefer not to respond or missing | 2 (3) |
| Birthplace | |
| Born in the United States | 52 (154) |
| Born in other countries | 40 (118) |
| Missing | 8 (25) |
| Education | |
| Less than high school | 16 (48) |
| High school graduate or equivalent | 15 (44) |
| Some college credit, no degree | 14 (42) |
| College degree (at least an associate's degree) | 35 (104) |
| Professional or other graduate degree | 15 (44) |
| Other or missing or prefer not to respond | 5 (15) |
| Relationship status | |
| In a relationship | 22 (65) |
| Married | 24 (72) |
| Single or not in a relationship | 50 (148) |
| Missing or prefer not to answer | 4 (12) |

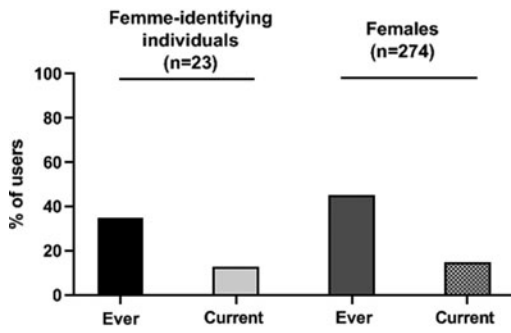
^aIncluding non-binary, genderqueer, and gender non-conforming.

^bRespondents can identify as a member of more than one racial group.

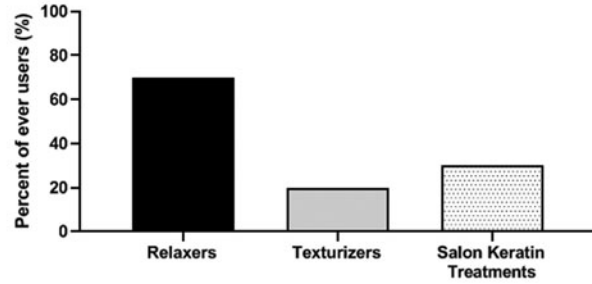
^cRespondents were asked about Hispanic or Latinx ethnicity separately from the question about race.

^dNo reported race. Respondents indicated “Other” as their racial group and wrote in one of several responses such as “Hispanic,” “Latino/a,” “Puerto Rican,” “Spanish/Espana” “Brazilian,” or “Dominican.” Category also includes respondents who indicated “Other” and did not write it a response.

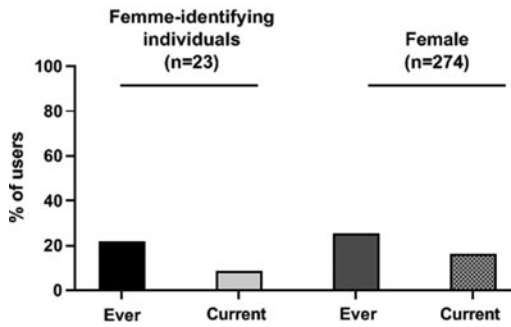
a Chemical straightener use



b Types of chemical straighteners used by ever users



c Skin lightener use

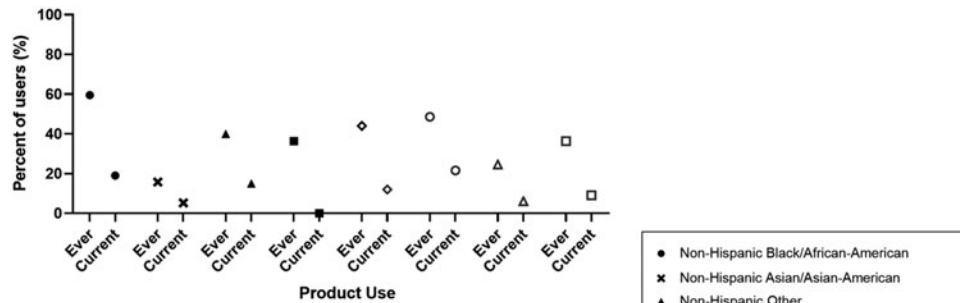


d Types of skin lighteners used by ever users



FIG. 1. Chemical straightener (a) and skin lightener (c) use for respondents by gender identity defined as female or non-binary, gender queer, gender non-conforming, or femme-identifying [femme-identifying]. Types of products used across all respondents who have ever used chemical straighteners (b) or skin lighteners (d). Respondents could choose more than one product type. Respondents who responded as “unsure” about product use or did not respond to the question are not shown.

a Chemical straightener use



b Skin lightener use

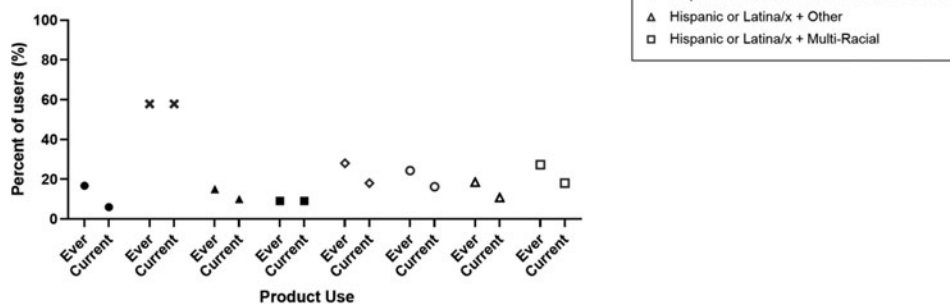


FIG. 2. Ever and current use of chemical straighteners (a) and skin lighteners (b) by race and ethnicity. We reported racial groups stratified by Hispanic ethnicity. We characterized respondents as “Black,” “Asian,” or “Other,” which includes respondents who identify as being a member of one of the other smaller groups. “Multi-racial” means a respondent reported more than one race/ethnicity.

TABLE 2. BIVARIATE ASSOCIATIONS BETWEEN SOCIO-DEMOGRAPHIC CHARACTERISTICS, MESSAGING FROM FAMILY AND PEERS, AND EVER AND CURRENT USE OF CHEMICAL STRAIGHTENERS

| Predictor ^a | Ever use of Chemical Straighteners OR (95% CI) ^b | Current use of Chemical Straighteners OR (95% CI) ^b |
|---|---|--|
| Age group | N=288 | N=285 |
| 18–34 years | Ref. | Ref. |
| 35–54 years | 2.7 (1.6–4.7) | 1.7 (0.8–3.9) |
| 55 years or older | 2.7 (1.4–4.8) | 1.8 (0.8–4.2) |
| Being in a relationship | N=285 | N=282 |
| | 0.6 (0.4–1.0) | 1.1 (0.6–2.1) |
| College educated | N=288 | N=285 |
| | 1.0 (0.6–1.6) | 0.7 (0.4–1.4) |
| Born in other countries | N=263 | N=261 |
| | 0.6 (0.3–0.9) | 1.0 (0.5–2.0) |
| Hispanic or Latina/x | N=281 | N=279 |
| | 0.7 (0.4–1.1) | 1.1 (0.5–2.1) |
| Black or African-American | N=288 | N=285 |
| | 2.0 (1.2–3.2) | 1.6 (0.8–3.0) |
| Asian or Asian-American | N=288 | N=285 |
| | 0.4 (0.1–0.9) | 0.4 (0.1–1.7) |
| Messaging about hair types from family | N=279 | N=276 |
| They said curly/colied hair is preferable | 0.7 (0.3–1.6) | 0.9 (0.3–2.7) |
| They said straight hair is preferable | 2.0 (1.1–3.7) | 1.3 (0.6–2.9) |
| Some said straight hair is better, some said curly hair is better | Ref. | Ref. |
| I don't remember my family making comments about hair types | 2.1 (1.0–4.5) | 1.4 (0.5–3.8) |
| Messaging about hair types from peers ^c | N=281 | N=279 |
| They said curly/colied hair is preferable | 0.9 (0.4–1.8) | 1.4 (0.5–3.9) |
| They said straight hair is preferable | 2.0 (1.1–3.4) | 1.3 (0.8–3.9) |
| Some said straight hair is better, some said curly hair is better | Ref. | Ref. |
| I don't remember my peers making comments about hair types | 2.3 (1.0–5.1) | 1.3 (0.4–4.2) |

^aFor dichotomous variables, odds ratios are interpreted in comparison to other option (e.g., Respondents born outside the United States vs. respondents born in the United States). For variables with more than two categories, the reference group is noted.

^bEstimated using bivariate logistic regression. Current users compared to respondents who said no to current and ever use of products.

^cPeers were defined as sibling, cousins, friends, or classmates. Ref, reference group.

Compared with respondents aged 18–34 years, respondents aged 35–54 and 55 years or older both each had a 2.7-fold increased odds of ever using chemical straighteners (35–54 years: 95% CI=1.6–4.7; 55 years or older: 95% CI=1.4–6.8). Respondents in a relationship were less likely than respondents not in a relationship to ever use chemical straighteners (OR=0.6; 95% CI=0.4–1.0), as were respondents born in other countries compared with respondents born in the United States (OR=0.6; 95% CI=0.3–0.9) and Asian respondents compared with non-Asian respondents (OR=0.4; 95% CI=0.1–0.9).

Messaging was also associated with ever use of chemical straighteners. Respondents who heard peers or family members express a preference for straight hair were more likely to ever use chemical straighteners than respondents who recalled that family and peers had mixed preferences about hair type (family: OR=2.0; 95% CI=1.1–3.7; peers: OR=2.0; 95% CI=1.1–3.4). None of these variables were associated with current use of chemical straighteners (Table 2).

Beauty perceptions and chemical straightener use

Respondents believed that others attribute certain advantages to women with straight hair; yet, in comparison, fewer respondents personally felt this way (Supplementary Fig. S3a). Half of all respondents indicated that they think others believe that straight hair makes women more beautiful, whereas only 36% of respondents personally felt this way ($p \leq 0.0001$). We found similar differences between participants' personal beliefs and their perception of others' beliefs when respondents were asked about straight hair making women look younger, wealthier, or more professional ($p < 0.05$) (Supplementary Fig. S3a).

Respondents' perceptions of others' beliefs were associated with ever use (Supplementary Table S2), but not current use of chemical straighteners (Table 4). Respondents who thought that other people believe that straight hair makes women look wealthier ($p = 0.01$) or more professional ($p = 0.03$), respectively, were more likely than women who did not have these beliefs to ever use chemical straighteners.

TABLE 3. BIVARIATE ASSOCIATIONS BETWEEN SOCIO-DEMOGRAPHIC CHARACTERISTICS, MESSAGING FROM FAMILY AND PEERS, AND EVER AND CURRENT USE OF SKIN LIGHTENERS

| Predictor ^a | Ever use of Skin Lighteners OR (95% CI) ^b | Current use of Skin Lighteners OR (95% CI) ^b |
|---|--|---|
| Age group | <i>N</i> = 282 | <i>N</i> = 279 |
| 18–34 years | Ref. | Ref. |
| 35–54 years | 1.0 (0.5–1.9) | 0.5 (0.2–1.0) |
| 55 years or older | 1.4 (0.7–2.8) | 0.8 (0.4–1.8) |
| Being in a relationship | <i>N</i> = 279 | <i>N</i> = 276 |
| | 1.0 (0.6–1.7) | 0.8 (0.4–1.5) |
| College educated | <i>N</i> = 282 | <i>N</i> = 279 |
| | 1.1 (0.6–1.8) | 1.1 (0.6–2.1) |
| Born in other countries | <i>N</i> = 257 | <i>N</i> = 254 |
| | 3.4 (1.9–6.1) | 3.7 (1.8–7.5) |
| Hispanic or Latina/x | <i>N</i> = 276 | <i>N</i> = 273 |
| | 1.2 (0.7–2.1) | 1.1 (0.6–2.2) |
| Black or African-American | <i>N</i> = 282 | <i>N</i> = 279 |
| | 0.6 (0.3–1.0) | 0.5 (0.2–0.9) |
| Asian or Asian-American | <i>N</i> = 282 | <i>N</i> = 279 |
| | 3.2 (1.4–7.0) | 6.2 (2.7–14.3) |
| Messaging from family | <i>N</i> = 271 | <i>N</i> = 268 |
| They said darker skin is preferable | 2.0 (0.7–5.5) | 2.2 (0.7–6.6) |
| They said lighter skin is preferable | 1.6 (0.8–3.2) | 1.2 (0.5–2.8) |
| Some said lighter skin is better, some said darker skin is better | Ref. | Ref. |
| I don't remember my family making comments about skin tone | 0.9 (0.4–2.1) | 0.5 (0.1–1.5) |
| Messaging from peers ^c | <i>N</i> = 268 | <i>N</i> = 266 |
| They said darker skin is preferable | 2.0 (0.8–5.2) | 1.2 (0.4–3.8) |
| They said lighter skin is preferable | 1.8 (0.9–3.6) | 1.5 (0.7–3.4) |
| Some said lighter skin is better, some said darker skin is better | Ref. | Ref. |
| I don't remember my peers making comments about skin tone | 0.8 (0.3–2.0) | 0.4 (0.1–1.5) |

^aFor dichotomous variables, odds ratios are interpreted in comparison to other option (e.g., Respondents born outside the United States vs. respondents born in the United States). For variables with more than two categories, the reference group is noted.

^bEstimated using bivariate logistic regression. Current users compared to respondents who said no to current and ever use of products.

^cPeers were defined as sibling, cousins, friends, or classmates.

Skin lightener use and associations with use

Twenty-five percent of female respondents reported ever using skin lighteners, and 22% of femme-identifying respondents reported ever using. Current use of products was lower at 16% and 9% for female and femme-identifying respondents, respectively (Fig. 1c). Among all ever users of skin lighteners, creams were the most commonly reported product use (Fig. 1d). Product use varied by race/ethnicity and nativity. Asian respondents reported the highest frequency of skin lightener use (ever users = 57%; current users = 57%) (Fig. 2b). Skin lightener use among Asian and Hispanic respondents was higher for respondents born in other countries versus the United States ($p < 0.05$) (Supplementary Fig. S2b).

Beauty was the leading reason for using skin lighteners; 57% of current users ($n = 46$) responded that they “feel more beautiful with lighter skin” (Supplementary Table S1). The next most common reasons for using skin lighteners were “I want to achieve a uniform body skin tone” (28%) and “lighter skin makes me feel more comfortable in social situations than darker skin” (28%) (respondents could select more than one).

In bivariate analyses, respondents born in other countries were more likely than respondents born in the United States to ever use skin lighteners (OR = 3.4; 95% CI = 1.9–6.1) (Table 3), as were Asian respondents compared with non-Asian respondents (OR = 3.2; 95% CI = 1.4–7.0). Black respondents were less likely than non-Black respondents to ever use skin lighteners, although this finding was only marginally significant (OR = 0.6; 95% CI = 0.3–1.0). We found similar associations with current use of skin lighteners (Table 3).

Beauty perceptions and skin lightener use

Similar to our findings for straight hair, respondents believed that others attribute certain advantages to women with light skin; yet, in comparison, fewer respondents personally felt this way (Supplementary Fig. S3b). Fifty percent of respondents thought that others find light skin more beautiful, whereas only 33% of respondents reported personally feeling this way ($p < 0.0001$). We found similar results when respondents were asked about lighter skin making women look younger, wealthier, or more professional ($p < 0.05$) (Supplementary Fig. S3b).

TABLE 4. RELATIONSHIP BETWEEN CURRENT USE OF CHEMICAL STRAIGHTENERS AND SKIN LIGHTENERS AND THE BELIEFS RESPONDENTS ATTRIBUTE TO OTHERS ABOUT THE PERCEIVED BENEFITS OF STRAIGHT HAIR OR LIGHT SKIN, RESPECTIVELY

| Current use of chemical straighteners | | | | Current use of skin lighteners | | | |
|---------------------------------------|---------|--------|-----------------------|---------------------------------------|---------|--------|-----------------------|
| Perceived benefit ^b | Yes (N) | No (N) | <i>p</i> ^a | Perceived benefit ^b | Yes (N) | No (N) | <i>p</i> ^a |
| Beauty ^c | | | | Beauty ^d | | | |
| Favor curly hair or no preference | 23 | 110 | 0.55 | Favor dark skin tone or no preference | 13 | 106 | 0.01 |
| Favor straight hair | 19 | 111 | | Favor lighter skin tone | 29 | 96 | |
| Wealth | | | | Wealth | | | |
| Favor curly hair or no preference | 24 | 119 | 0.61 | Favor dark skin tone or no preference | 18 | 104 | 0.29 |
| Favor straight hair | 16 | 95 | | Favor lighter skin tone | 23 | 92 | |
| Youth | | | | Youth | | | |
| Favor curly hair or no preference | 20 | 113 | 0.64 | Favor dark skin tone or no preference | 20 | 128 | 0.02 |
| Favor straight hair | 19 | 91 | | Favor lighter skin tone | 22 | 62 | |
| Professionalism | | | | Professionalism | | | |
| Favor curly hair or no preference | 23 | 102 | 0.35 | Favor dark skin tone or no preference | 22 | 112 | 0.76 |
| Favor straight hair | 18 | 110 | | Favor lighter skin tone | 19 | 87 | |

Respondents were asked which hairstyle or skin tone makes women look more beautiful, wealthier, younger, or more professional. Respondents were asked to respond using a Likert scale, with 0 indicating straight hair, 5 indicating no preference, or 10 indicating curly/coiled hair or 0 indicating light skin, 5 indicating no preference, or 10 indicating dark skin.

^aChi-square test of independence used to generate *p*-values.

^bLikert scale responses categorized for analyses, 0 to 4 as preference for straight hair or lighter skin and 5 to 10 as preference for curly hair or no preference or a preference for darker skin or no preference.

^cQuestions: Which hairstyle do people generally find more beautiful? Which hairstyle makes a woman look wealthier in most people's opinion? Which hairstyle makes a woman look more professional in most people's opinion? Which hairstyle makes a woman look younger in most people's opinion?

^dQuestions: Which skin tone do people generally find more beautiful? Which skin tone makes a woman look wealthier in most people's opinion? Which skin tone makes a woman look more professional in most people's opinion? Which skin tone makes a woman look younger in most people's opinion?

Respondents' perceptions of others' beliefs were associated with current use (Table 4), and to some extent, ever use of skin lighteners (Supplementary Table S2). Respondents who thought other people believe that lighter skin makes women look more beautiful ($p=0.01$) or younger ($p=0.02$), respectively, were more likely to currently use skin lighteners than women who did not have these beliefs. Among ever users of skin lighteners, beauty was the only perceived advantage that was statistically significant ($p=0.003$).

DISCUSSION

In this community-based participatory study, we documented historical and contemporary use of chemical straighteners and skin lighteners among a diverse sample of women and femme-identifying individuals in Northern Manhattan and the South Bronx. Product use varied by race/ethnicity, nativity, and messaging from family and peers. The common use of chemical straighteners and skin lighteners among self-identified Black and Asian respondents, respectively, is consistent with prior literature, and it points to the need to assess health risks of these products in communities of color.

We found evidence that racialized beauty norms can impact personal product use decisions. Achieving a certain standard of beauty was the top reason for using

products. Respondents' perceptions that others believe straight hair and/or lighter skin confer benefits were associated with greater product use. These findings have the potential to inform prevention and intervention strategies locally in New York City as well as more broadly.

Our results for product use differences by race/ethnicity and nativity shared some similarities to prior studies. For example, prior studies have reported a high prevalence (range: 52%–94%) of lifetime use of chemical straighteners among U.S. Black women with no stratification by Hispanic ethnicity.^{28,29,30} We reported

²⁸Rohan Rao, Jasmine A. McDonald, Emily S. Barrett, Patricia Greenberg, Dede K. Tete, Susanne B. Montgomery, Bo Qin, Yong Lin, Chi-Chen Hong, Christine B. Ambrosone, Kitaw Demissie, Elisa V. Bandera, and Adana A. M. Llanos. "Associations of Hair Dye and Relaxer Use with Breast Tumor Clinicopathologic Features: Findings from the Women's Circle of Health Study."

²⁹Adana A. M. Llanos, Anna Rabkin, Elisa V. Bandera, Gary Zirpoli, Brian D. Gonzalez, Cathleen Y. Xing, Bo Qin, Yong Lin, Chi-Chen Hong, Kitaw Demissie, and Christine B. Ambrosone. "Hair Product Use and Breast Cancer Risk among African American and White Women." *Carcinogenesis* 38 (2017): 883–892.

³⁰Cheryl Blackmore-Prince, Siobáin D. Harlow, Paul Gargiullo, Michelle A. Lee, and David A. Savitz. "Chemical Hair Treatments and Adverse Pregnancy Outcome among Black Women in Central North Carolina." *American Journal of Epidemiology* 149 (1999): 712–716.

57% and 48% ever use of chemical straighteners among Non-Hispanic Blacks and Hispanic Blacks, respectively, and similar frequencies among different Black subgroups. To our knowledge, we are one of the first studies to examine chemical straightener use among Black subgroups.

There is a lack of comparable data characterizing skin lightener use among U.S. racial/ethnic subgroups. Yet, our findings of high ever and current use of skin lighteners, 57% respectively, among Non-Hispanic Asians are consistent with many studies showing a high prevalence of skin lightening product use in Asian countries.^{31,32,33} Indeed, the Asia-Pacific market accounted for over half of the global skin lightener market in 2018.³⁴ Consistent with a prior study, respondents in our study who were born outside of the United States reported greater skin lightener use.³⁵ While two prior studies reported a high prevalence of skin lightener use among women of African descent globally and in New York, NY, we did not observe a similar finding among Black or African respondents.^{36,37}

We report similarities in product use between femme-identifying and female respondents, although femme-identifying individuals reported a lower current use of skin lighteners than females (9% vs. 16%, respectively). To our knowledge, we are one of the first to report product use by gender identity, which is an area of research that has yet to catch up to societal shifts where more personal care and beauty product

companies are moving toward gender-inclusive marketing or selling gender-neutral products.³⁸

Our results suggest that product use decisions are influenced by respondents' social environments, including their immediate and more distant networks. For example, respondents who received messages from their families and peers about preferences for straight hair reported greater ever use of chemical straighteners. People within respondents' personal networks may have internalized racialized beauty norms and unconsciously or consciously perpetuate these messages.^{39,40} In addition, respondents' own perceptions of others' beauty preferences about straighter hair or lighter skin may drive product use. Thus, our findings help discern how purchasing can reinscribe beauty norms, even if these preferences are not self-held.

Racialized beauty ideals can be traced back to slavery and colonialism, and still linger today.^{41,42,43} Hair relaxers or other chemical straighteners have been used over decades by Black women to achieve straighter hairstyles, and thus, more easily assimilate.⁴⁴ For example, a recent study found that Black women with natural hairstyles were considered less professional and competent and received fewer recommendations for job interviews compared with Black women with straightened hair and white women with straight or curly hair.⁴⁵

Globally, light skin is perceived as a sign of cultural capital, which extends social desirability and economic and career opportunities.^{46,47} A 2021 survey of 3375 U.S.

³¹Samara Pollock, Susan Taylor, Oyetewa Oyerinde, Sabrina Nurmohamed, Ncoza Dlova, Rashmi Sarkar, Hassan Galadari, Mónica Manela-Azulay, Hae Shin Chung, Evangeline Handog, and A Shadi Kouros. "The Dark Side of Skin Lightening: An International Collaboration and Review of a Public Health Issue Affecting Dermatology."

³²Eric P.H. Li, Hyun Jeong Min, and Russell W. Belk. "Skin Lightening and Beauty in Four Asian Cultures."

³³Dominic Sagoe, Ståle Pallesen, Ncoza C. Dlova, Margaret Lartey, Khaled Ezzedine, and Ophelia Dadzie. "The Global Prevalence and Correlates of Skin Bleaching: A Meta-Analysis and Meta-Regression Analysis."

³⁴CNN, Exclusive: Skin whitening creams containing high levels of mercury continue to be sold on the world's biggest e-commerce sites, new report finds. <<https://www.cnn.com/2022/03/09/world/zmwg-skin-whitening-creams-mercury-ecommerce-sites-intl-cmd/index.html>>. (Last accessed on March 9, 2022)

³⁵Emma K. T. Benn, Richa Deshpande, Ogonnaya Dotson-Newman, Sharon Gordon, Marian Scott, Chitra Amarasiriwardena, Ikhlas A. Khan, Yan-Hong Wang, Andrew Alexis, Bridget Kaufman, Hector Moran, Chi Wen, Christopher A. D. Charles, Novie O. M. Younger, Nihal Mohamed, and Bian Liu. "Skin Bleaching Among African and Afro-Caribbean Women in New York City: Primary Findings from a P30 Pilot Study."

³⁶Emma K. T. Benn, Richa Deshpande, Ogonnaya Dotson-Newman, Sharon Gordon, Marian Scott, Chitra Amarasiriwardena, Ikhlas A. Khan, Yan-Hong Wang, Andrew Alexis, Bridget Kaufman, Hector Moran, Chi Wen, Christopher A. D. Charles, Novie O. M. Younger, Nihal Mohamed, and Bian Liu. "Skin Bleaching Among African and Afro-Caribbean Women in New York City: Primary Findings from a P30 Pilot Study."

³⁷Wendy McKelvey, Nancy Jeffery, Nancy Clark, Daniel Kass, and Patrick J. Parsons. "Population-Based Inorganic Mercury Biomonitoring and the Identification of Skin Care Products as a Source of Exposure in New York City."

³⁸Covalo. Gender Identity: How the Cosmetics Industry is Seeing More Men Wearing Makeup. <<https://blog.covalo.com/personal-care/gender-fluidity-in-cosmetic-industry>>. (Last accessed on August 10, 2022).

³⁹Henry A. Willis, Effua E. Sosoo, Donte L. Bernard, Aaron Neal, and Enrique W. Neblett. "The Associations between Internalized Racism, Racial Identity, and Psychological Distress." *Emerging Adulthood* 9 (2021): 384–400.

⁴⁰Dede K. Teteh, Susanne B. Montgomery, Sabine Monice, Laura Stiel, Phyllis Y. Clark, Eudora Mitchell, and Lincoln Ragarty (Reviewing Editor). "My Crown and Glory: Community, Identity, Culture, and Black Women's Concerns of Hair Product-Related Breast Cancer Risk."

⁴¹Cheryl Thompson. "Black Women, Beauty, and Hair as a Matter of Being." *Women's Studies* 38 (2009): 831–856.

⁴²Jasmine A. Abrams, Faye Z. Belgrave, Chelsea D. Williams, and Morgan L. Maxwell. "African American Adolescent Girls' Beliefs About Skin Tone and Colorism."

⁴³Levashni Naidoo, Nokubonga Khoza, and Ncoza C. Dlova. "A Fairer Face, a Fairer Tomorrow? A Review of Skin Lighteners." *Cosmetics* 3 (2016): 33.

⁴⁴Dede Teteh, Marissa Ericson, Sabine Monice, Lenna Dawkins-Moultin, Nasim Bahadorani, Phyllis Clark, Eudora Mitchell, Lindsey S. Treviño, Adana Llanos, Rick Kittles, and Susanne Montgomery. "The Black Identity, Hair Product Use, and Breast Cancer Scale." *PLoS One* 14 (2019): e0225305.

⁴⁵Christy Zhou Koval and Ashleigh Shelby Rosette. "The Natural Hair Bias in Job Recruitment." *Social Psychological and Personality Science* 12 (2021): 741–750.

⁴⁶Eric P.H. Li, Hyun Jeong Min, and Russell W. Belk. "Skin Lightening and Beauty in Four Asian Cultures."

⁴⁷Dede K. Teteh, Lenna Dawkins-Moultin, Stanely Hooker, Wendy Hernandez, Carolina Bonilla, Dorothy Galloway, Victor LaGroon, Eunice Rebecca Santos, Mark Shriver, Charamaine D. M. Royal, and Rick A. Kittles. "Genetic ancestry, skin color and social attainment: The four cities." *PLoS One* 15 (2020): e0237041.

Hispanic adults reported that 59% believed that having light skin helps them get ahead in the United States.⁴⁸ Individuals with darker skin are subject to more prejudicial treatment that has documented ramifications, including adverse health outcomes.^{49,50}

Understanding how social-structural factors converge to impact product use can help reduce existing health inequities. Our findings point to potential areas for intervention such as education and advocacy directed to consumers and retailers about health concerns linked to product use. For the Harlem/Northern Manhattan area specifically, our informal research found that independent, local beauty supply stores are more likely to sell skin lighteners, so education efforts starting with those retailers could be particularly impactful.

Simultaneously, campaigns to teach consumers how to read and interpret product labels are sorely needed, even for women who choose to wear natural hairstyles. The notion that people who wear their hair naturally are avoiding toxic beauty products is unsubstantiated, since there is a lack of data on the chemical content of hair styling products sold to facilitate natural hairstyles. Lastly, educating consumers about the environmental injustice of beauty could motivate them to advocate for legislation, such as the Safer Beauty Bill package, which ensures safer products for all.⁵¹

Programs and policies are needed to counteract natural hair discrimination and colorism and transform the markets that depend on racist beauty norms. Qualitatively, our data suggest that respondents in our study are moving away from chemical straighteners since the percentage of current users was much lower than ever users. This observation aligns with the rise of the natural hair movement, which encourages Black women to embrace their natural hair.^{52,53}

Moreover, the passage of the CROWN (Create a Respectful and Open World for Natural Hair) Act in multiple states seeks to prohibit race-based hair discrimination in the workplace and in public schools. It, or inspired legislation, has passed in 17 states as of August

2022, which has both amplified the problem of hair-based discrimination and created more opportunities for dialogue.^{54,55} In contrast, there has been less progress on skin lighteners. In our study, the percentages of current and ever use of skin lighteners were equivalent for self-identified Asians and Asian-Americans.

Further, gaps in the regulations of skin lighteners and their constituent chemicals have created a market where products are easily accessible and detrimental to public health. For example, skin lighteners that are prohibited from being sold in stores are allowed to be sold online without the same level of oversight.⁵⁶ Greater efforts are needed both in the United States and abroad to address colorism and end skin lightening practices.

Our findings must be considered in light of the strengths and limitations. In alignment with environmental justice principles, this community-based project was led by WE ACT, with substantial input from its membership.⁵⁷ We are among the first exposure assessment study of beauty product use to quantify the impact of racialized beauty norms on product use. Our sample was predominantly Black and Hispanic/Latina/x women and femme-identifying individuals, which reflects key organizing populations for WE ACT's BIO Campaign. Although our results may have limited generalizability, the results are instrumental for informing intervention actions for communities that WE ACT serves and also adds to the literature about product use in understudied communities such as those from the Asian diaspora.

Our study includes some femme-identifying individuals, an understudied group in this body of literature.⁵⁸ Future studies should prioritize understudied and multiply marginalized communities. The survey was only available in English and Spanish, which also limits our generalizability. Although both languages are predominantly spoken in the study areas, we may have excluded high-risk populations who speak other languages in the diverse Northern Manhattan and South Bronx areas. Finally, the data we collected were self-reported information and may suffer from inaccurate recall or recall bias.

⁴⁸Pew Research Center, November, 2021. "Majority of Latinos Say Skin Color Impacts Opportunity in America and Shapes Daily Life." <https://www.pewresearch.org/hispanic/wp-content/uploads/sites/5/2021/11/RE_2021.11.04_Latinos-Race-Identity_FINAL.pdf>. (Last accessed on May 15, 2022).

⁴⁹Angela R. Dixon and Edward E. Telles. "Skin color and colorism: Global research, concepts, and measurement." *Annual Review of Sociology* 43 (2017): 405–424.

⁵⁰Latocia Keyes, Eusebius Small, and Silviya Pavlova Nikoiova. "The Complex Relationship between Colorism and Poor Health Outcomes with African Americans: A Systematic Review." *Analyses of Social Issues and Public Policy* 20 (2020): 676–697.

⁵¹Breast Cancer Prevention Partners. Safer Beauty Bill Package. <<https://www.bcpp.org/resource/safer-beauty-bill-package-2021/>>. (Last accessed on August 12, 2022).

⁵²Ukpebo R. Omosigho. "Changing Practices of Hair Relaxer Use among Black Women in the United States." *International Journal of Dermatology* 57 (2018): e4–e5.

⁵³Sara Asbeck, Chelsi Riley-Prescott, Ella Glaser, and Antonella Tosti. "Afro-Ethnic Hairstyling Trends, Risks, and Recommendations." *Cosmetics* 9 (2022): 17.

⁵⁴Text - H.R.2116 - 117th Congress (2021–2022): CROWN Act of 2021. (2022, February 28). <<https://www.congress.gov/bill/117th-congress/house-bill/2116/text>>. (Last accessed on March 12, 2022).

⁵⁵NewsOne, "Here Are All Of The States That Have Successfully Passed The CROWN Act". <<https://newsone.com/4383979/the-crown-act-states/>>. (Last accessed on August 16, 2022).

⁵⁶Zero Mercury Working Group (ZMWG) c/o European Environmental Bureau (EEB) "Skin Lighteners Still Online Despite Mercury Findings." (2022). <<https://eeb.org/library/skin-lighteners-still-available-online-despite-mercury-findings-march-2022/>>. (Last accessed on March 17, 2022).

⁵⁷Yoshira Ornelas Van Horne, Cecilia S. Alcalá, Richard E. Peltier, Penelope J. E. Quintana, Edmund Seto, Melissa Gonzales, Jill E. Johnston, Lupita D. Montoya, Lesliam Quirós-Alcalá, and Paloma I. Beamer. "An Applied Environmental Justice Framework for Exposure Science." *Journal of Exposure Science and Environmental Epidemiology* (2022): 1–11.

⁵⁸Jasmine A. McDonald, Adana A. M. Llanos, Taylor Morton, and Ami R. Zota "The Environmental Injustice of Beauty Products: Toward Clean and Equitable Beauty." *American Journal of Public Health* 112 (2022): 50–53.

CONCLUSION

The fight for environmental equity includes the right to clean air, land, water, and food as well as safe and healthy cosmetics and personal care products. The failure of companies to disclose the harmful chemicals in their beauty products, along with the targeted marketing of these products to women of color, raises environmental justice concerns. Adoption of environmental justice principles to protect vulnerable communities from consumer product exposures, in addition to place-based exposures, is necessary.

Specifically, principles that call for stricter regulations to hold manufacturers accountable and education of present and future generations on these issues in a manner that upholds diverse cultural perspectives are critical steps for promoting beauty justice.

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AUTHORS' CONTRIBUTIONS

L.E. helped clean the data, performed the statistical analyses, created the tables and figures, and led the writing of the paper for publication. L.A., L.M., S.H., and

B.M. were part of the team that conceptualized and led the community-based campaign that this study is based on. L.A., L.M., S.H., B.M., R.D., and A.R.Z. contributed to the study design. A.R.Z., B.S., and R.D. contributed to the statistical analyses and development of the final results. A.R.Z. and L.A. secured funding for the research study. All authors contributed to the writing and editing of the paper and read and approved the final paper.

AUTHOR DISCLOSURE STATEMENT

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SUPPLEMENTARY MATERIAL

Supplementary Data

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