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Skin Tone, Race/Ethnicity, and Gender Differences in BMI among New US Immigrants

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Scholars have been interested in the relationship between skin tone and health since at least the 1970s; however, no study, to our knowledge, has analyzed a diverse immigrant sample. In this study, we use the New Immigrant Survey and interactions to examine how skin tone and race/ethnicity – alongside gender – jointly pattern BMI among Legal Permanent Residents. Our approach allows for the analysis of BMI among multiple racial/ethnic immigrant groups, while considering skin tone. Our results document that darker skin shades are associated with higher BMI, but only for women. Further, we also tease out the relationship between gender and race/ethnicity for BMI, which allows us to better understand this critical connection for new immigrants' health in the United States. Together, our results highlight that BMI jointly varies by skin tone and race/ethnicity, which emphasizes the importance of an intersectional approach, especially for new immigrant women of color. *Ethn Dis.*2022:32(4):315-324; doi:10.18865/ed.32.4.315

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Introduction

The body mass index (BMI) is the prevailing metric used to define anthropometric height/weight characteristics in adults and has been associated with a host of physical and mental health issues, including cardiovascular disease, diabetes, and reduced health-related quality of life.[1-2] By national estimates, more than 60% of adults aged 20-39 years are overweight or obese, representing a major public health challenge.[3] While there are limitations of utilizing BMI as a proxy measure for individual health (BMI is not a perfect predictor of adiposity, comorbid conditions, or even mortality), it is a useful tool to track population change and for cross-population comparison.[4]

The biggest driver of increasing BMI in the United States is the sociocultural environment, which has facilitated excess dietary intake and other behavioral changes that contribute to weight gain.[5] Decades of research have illustrated the persistent social epidemiology of BMI, with class, race/ethnicity, and gender shaping BMI.[6] Notably, it is important to consider not only the individual influences of these (and other) factors, but also to consider how they intersect together to shape BMI.

An additional consideration is colorism or the social hierarchy based on skin tone that operates the world over.[7] Scholars have been interested in the relationship between skin tone and health—how prolonged exposure to systemic racism leads to cumulative health disadvantage in particular—since at least the 1970s.[8-11] However, only a few studies have explored the relationship between race/ethnicity, skin tone, and BMI[9-12] and these have focused on the experiences of Black Americans[9-11] or other racial/ethnic identities such as Latino/a or Asian.[12] No study to date, to our knowledge, has analyzed a diverse immigrant sample.

In this study, we use the New Immigrant Survey to examine how skin tone and race/ethnicity, alongside gender, intersect to pattern BMI among Legal Permanent Residents (LPRs), and apply both colorism and intersectional lenses to identify the unique BMI (dis)advantages experienced by immigrants.[13] Here, our central contribution to the literature is a focus on new immigrants to the United States. Ours is the first study to our knowledge to do so and this is important because this group constitutes a large, and growing, population

and is uniquely positioned within US society. Moreover, immigrant populations, while generally of lower BMI at the time of immigration relative to US-born peers, are at high risk of developing future elevated BMI with acculturation to the US context.[14] Our second contribution is to analyze multiple racial/ethnic groups as the Perreira et al study does with the Add Health data.[12] For our last contribution, in addition to exploring the intersection of gender and skin tone inequality for BMI as is done in the Hargrove and Perreira et al studies,[10,12] we analyze the relationship between gender and race/ethnicity for BMI. This allows us to better understand this critical connection for new immigrants' health in the United States.

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Conceptual Framework

Skin Tone and Health Inequality

Colorism is preferential treatment or favoritism accorded to lighter-skinned individuals or, conversely, prejudicial attitudes and discriminatory behaviors directed toward individuals with darker skin.[15] It is important to consider colorism to better understand health inequalities, alongside the traditional approach of analyzing racial/ethnic categories, because both constitute systems of discrimination that systematically advantage lighter-skinned and/or White individuals.[7]

Four studies that have looked at the relationship between skin tone and BMI[9-12] include the following. Moore and colleagues used the Study of Environment, Lifestyle, & Fibroids, which includes a sample of African American women in Detroit, MI.[11] Using a digital skin reflectance instrument, they found that darker skin tone was associated with higher BMI. BMI was also examined by skin tone for a convenience sample of female African American undergraduate students at the University of South Carolina.[9] Here, facial skin tone was associated with BMI even when accounting for chronic stress and lifetime perceived racism. Perreira and colleagues used the Add Health data and documented that darker skin tone is associated with increased BMI among women, but not men.[12] The Hargrove study used the longitudinal CARDIA data to look at BMI age-based trajectories by skin tone and gender for those who identified as Black or African American.[10]

Theoretically, Hargrove describes a number of mechanisms that could link skin tone and health, including BMI.[10] First, sociodemographic characteristics, like education, income, and marital status represent resources that provide access to health resources as well as knowledge, behaviors, beneficial connections, technologies, etc. that can promote health and/or minimize health risks.[16] Given the advantages that have been well-documented for lighter-skinned individuals, it follows that they will be better positioned to translate advantages into health. Second, darker-skinned individuals will be more likely to encounter prejudice, discrimination, and stigmatization, which will increase exposure to chronic and discrimination-related stressors.[17] Last, health behaviors may differ according to the intersection of skin tone and gender. For example, dark-skinned women may be more likely to experience elevated BMI associated with skin tone relative to men.[10]

Immigrants, Health, and Racial/Ethnic Realities

While racial and ethnic minority immigrants often have better health than US-born racial/ethnic minority and White Americans in general,[18] more refined examinations illustrate high levels of nuance to supposed health paradoxes.[19,20] For example, the oversimplification of racial/ethnic and immigrant health paradoxes can be seen in the case of BMI. The genetics of obesity have been racialized, placing high-levels of clinical and academic scrutiny on Mexican, Latino/a, and Amerindian (eg, persons indigenous to the Americas) populations who have been pathologized as inherently at-risk for elevated body-fat.[21] Because of this, Latino/a origin immigrant populations, while generally of lower BMI at the time of immigration, are framed as high risk for developing future elevated BMI

with acculturation.[14] Yet, racial/ethnic groups that have not been framed as inherently at-risk for elevated BMI, such as those of Asian origin, can be overlooked, despite also experiencing increasing BMI with acculturation.[22] Immigrants of a lower individual-level SES also tend to have higher BMIs and experience more drastic gains in BMI with assimilation to the US context.[23]

Gender and Its Intersection with Skin Tone and Racial/Ethnic Health Inequality

As the complex interplay between multiple factors described above illustrate, an intersectional framework is critical for understanding health disparities.[10,24] Intersectionality argues that systems of inequality (eg, race, class, and gender) interlock to uniquely influence individual access to resources, opportunities, and exposure to prejudice, stigma and/or discrimination.[25] Because systems of inequality are interconnected,[25] social factors such as gender, race/ethnicity, and skin tone must be considered simultaneously to better understand health disparities, including elevated BMI and downstream health outcomes.[11,26]

Decades of research have illustrated the persistent social epidemiology of BMI by documenting the independent and combined influences of class, race/ethnicity, and gender that shape BMI. Research has shown that, while the disease burden of obesity is high across various subgroups, the specific level of risk associated with a given level of BMI are different depending on the intersections of gender, race, and socioeconomic status and at the intersections of multiple social disadvantages.[6]

Intersectional health disparities research also highlights the role of intersectional stigma and "multiple minority stress" (ie, the stress resulting from occupying multiple disadvantaged social statuses) on several physical and mental health outcomes.[27] For example, there is a well-established association between stress and elevated BMI.[28,29] And, an emerging literature suggests a persistent relationship between internalized racism, coping strategies (eg, binge eating or over eating) and obesity among Black Americans and Latino/as.[30,31] Findings from these studies parallel other research suggesting that colorism elicits a traumatic stress response,[17] with elevated BMI potentially resulting from elevated stress and coping strategies. These studies provide evidence suggesting that higher BMI may be a result of "weathering" discrimination, ie, a cumulative response to social stress.[28-31]

Our Current Study

From the above theoretical framework and reviewed literature, we can offer a clear hypothesis for the relationship between skin tone and BMI: darker skin tone will be associated with higher BMI among immigrants (Hypothesis 1).

For the relationship between race/ethnicity and BMI among immigrants, specific expectations are challenging to establish. Therefore, we broadly expect that racial/ethnicity minorities of color will have different BMIs relative to White immigrants (Hypothesis 2). Last, the literature on skin tone and health (and, specifically, BMI[10]) suggests that the relationship between skin tone and BMI will be contingent on gender, with a skin tone-BMI relationship present for women and absent for men (Hypothesis 3).

Methods

Participants/Data Collection

In this study we used the New Immigrant Survey 2003 (NIS 2003) adult sample.[13] These data are nationally representative of immigrants attaining LPR status in 2003 and were sampled via a multi-cohort prospective-retrospective panel design. This yielded 8,573 respondents from a 68.6% response rate. The research team for this survey effort was supported by four institutions (New York University, Princeton University, Yale University, RAND Corporation). Data collection was sponsored by the National Institute of Health, the National Institute of Child Health & Human Development, the National Institute of Aging, National Science Foundation, and the U.S. Citizenship and Immigration Services. The data are housed at the Office of Population Research at Princeton University. Because the NIS is publicly accessible secondary data, our research was considered exempt from human subjects review.

Our sample size was 4,555. This included respondents who were living in the United States, were interviewed in person and had a value for skin tone recorded, were not Native American or Pacific Islander (groups too small for analysis), reported weight and height, and did not have a biologically implausible value for BMI (<10 or >65).[32]

Measures

Body Mass Index

We created a continuous measure of BMI: BMI= weight (lb) / [height (in)]^2 x 703.

Explanatory Variables

For skin tone, interviewers rated respondents' skin hue from 1 (lightest) to 10 (darkest) using the Massey-Martin scale.[33] The four racial/ethnic groups were non-Latino/a Asian, non-Latino/a Black, Latino/a, and non-Latino/a White ("non-Latino/a" dropped hereafter to avoid repetition). Respondents self-identified their racial/ethnic identity in the NIS and interviewers, if necessary, could prompt respondents with the wording from the US 1997 Office of Management and Budget standards on race and ethnicity. For Latinos/as, this was "A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin." For Asians this was "A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam." For Blacks, this was "A person having origins in any of the Black racial groups of Africa." And for Whites, this was "A person having origins in any of the original peoples of Europe, the Middle East, or North Africa. Gender was measured with a dichotomous variable (1=woman). We used interactions among these variables to explore intersectionality. Control variables included pre-migration characteristics (childhood health, parental education, respondents' foreign education), LPR status, class of admission, immigrant experience (US education, income, US duration, English language proficiency), age, marital status, and frequency of exercise.

Analysis

We used OLS regression with NIS-provided sample weights for our secondary data analysis. Continuous variables, with the exception of BMI, were grand-mean centered. We used the multiple imputation, then deletion (MID) procedure for missing data. We created 10 imputed datasets, dropped respondents with missing values for BMI, ran OLS regression for each imputed dataset, and then combined the results. Practically, we used SAS version 9.4 and the Multiple Imputation (MI), OLS regression (REG), and the Multiple Imputation Analyze (MIANALYZE) procedures.

Results

Descriptive Results

BMI for the full sample is 25.43, which is marginally above the threshold between the normal and overweight BMI categories. The average BMI for men is 26.03, which is classified as overweight by the CDC (BMI=25-30). Women have an average BMI (24.92) that falls within the normal weight range (BMI=18.5-25). Women have a BMI that is statistically lower by slightly more than one BMI unit when compared to men. Women's average skin shade is lighter than men's and that difference is statistically significant. (Table 1)

Regression Results

In Model 1 (Table 2), the coefficient for skin tone is positive and statistically significant, in line with our hypothesis. This indicates that each shade darker is associated with an increase in BMI. Second, for race/ethnicity, Black and Latino/a LPR immigrants are associated with higher BMIs relative to White LPR immigrants while Asian LPR immigrants are negatively associated with BMI (Hypothesis 2). Women have a lower BMI than men.

Model 2 introduces the control variables. In this model, skin tone is no longer statistically significant, though the race/ethnicity and gender differences first documented in Model 1 remain. (Table 2)

In Model 3, the interaction between skin tone and woman is positive and statistically significant. The coefficient for skin tone remains non-significant, though it now represents the relationship between skin tone and BMI for men with the interaction included. (Table 2) These results provide support for Hypothesis 3.

To illustrate the relationship between skin tone and gender, Figure 1 has predicted values for BMI by skin tone for men and women, holding variables not included in the interaction at their means. At the lightest end of the skin tone spectrum, men are associated with a higher BMI than women (this difference is from the negative coefficient for woman in Model 3). As skin tone darkens, men's BMI is associated with a decrease though this decrease is not statistically significant as indicated by the non-significant coefficient for skin tone in Model 3. In contrast, the increase in

Table 1. Select descriptive statistics, New Immigrant Survey

	Full Sample	Women	Men	Difference in Means[a]
Outcome variable				
Body mass index	25.43 (5.14)	24.92 (5.77)	26.03 (4.34)	-1.11[d]
Explanatory variables				
Skin tone (Lt -> Drk)	4.18 (2.20)	4.04 (2.20)	4.35 (2.19)	-0.31[d]
Woman	.56	—	—	—
Race/ethnicity				
Asian	.25	.28	.22	.06[d]
Black	.11	.11	.13	-.02[b]
Latino/a	.44	.44	.45	.00
White	.19	.17	.21	-.04[c]
Control variables				
Pre-migration characteristics				
Childhood health	4.26 (.92)	4.22 (.95)	4.31 (0.89)	-.09[d]
Parental educ (in yrs)	8.55 (6.20)	8.50 (6.37)	8.61 (6.01)	-.11
Respondent foreign educ (in yrs)	10.97 (5.13)	10.72 (5.43)	11.29 (4.76)	-.57[d]
Qualification for LPR status				
Adjustment of status	.61	.61	.62	-.01
Class of admission				
Employment	.08	.06	.09	-.03[d]
Immigrant experience				
US educ (one yr)	.19	.18	.21	-.03**
Income	$35,261 ($602,192)	$25,258 ($61,089)	$47,852 ($864,136)	-$22,594
US duration	5.98 (6.88)	5.50 (6.80)	6.58 (6.92)	-1.08[d]
English proficiency	1.57 (1.19)	1.44 (1.23)	1.73 (1.12)	-.29[d]
Personal characteristics				
Age	38.91 (13.99)	39.09 (14.70)	38.69 (13.18)	.4
Married	.73	.73	.74	-.01
Light exercise				
Never	.25	.25	.25	.01
Less than weekly	.03	.03	.03	.01
Weekly	.72	.72	.72	.00
N	4,555	2,355	2,200	

a. T-value, using Satterthwaite method of unequal variances. Standard deviations in parentheses.
b. P< .05; c. P < .01; d. P< .001, two-tailed

women's BMI associated with skin tone is statistically significant, as demonstrated by the interaction term.

In Model 4, with the interactions between race/ethnicity and woman included, there are differences between both Asian and Latino LPR immigrant men and White men. Asian men are associated with a lower BMI than White men while Latino men are associated with a higher BMI. All three race/ethnicity interactions, which represent women, are statistically significant and positive. Figure 2 illustrates these relationships. The largest BMI difference is among White LPR immigrants with men having a BMI, on average, which is slightly more than 2 BMI units higher than that of women. Asian and Latino LPR immigrant men are also associated with higher average BMIs than Asian and Latina women, respectively, though the gender difference is smaller. Interesting, Black women are associated with a higher BMI than Black men.

Discussion

In this study, we drew upon the New Immigrant Survey to explore how skin tone, race/ethnicity, and gender shape differences in BMI among new immigrants. Our central contribution to the literature is that this is the first study, to our knowledge, that analyzes the connection between skin tone and BMI among immigrants, thus complementing and building upon previ-

Table 2. OLS regression results for body mass index, New Immigrant Survey

	Model 1	Model 2	Model 3	Model 4
Explanatory variables				
Skin tone, Lt. -> Drk	.09 [a]	.06	-.08	.07
	(.04)	(.04)	(.05)	(.04)
Race/ethnicity (ref=White)				
Asian	-1.30 [c]	-1.48 [c]	-1.43 [c]	-2.10 [c]
	(.23)	(.23)	(.23)	(.33)
Black	.76 [a]	1.12 [c]	1.18 [c]	-.29
	(.33)	(.33)	(.33)	(.43)
Latino	2.18 [c]	1.46 [c]	1.48 [c]	.81 [b]
	(.21)	(.23)	(.23)	(.30)
Woman (ref=man)	-.95 [c]	-.91 [c]	-.91 [c]	-2.09 [c]
	(.15)	(.15)	(.15)	(.32)
Interactions				
Woman*skin tone	—	—	.27 [c]	—
			(.07)	
Woman*Asian	—	—	—	1.23 [b]
				(.43)
Woman*Black	—	—	—	2.77 [c]
				(.54)
Woman*Latino	—	—	—	1.30 [c]
				(.39)

Note: Models 2-4 control for pre-migration characteristics (childhood health, parental education, respondents' foreign education), LPR status, class of admission, immigrant experience (US education, income, US duration, English language proficiency), age, marital status, and exercise.
Standard errors in parentheses.
a. P<.05; b. P<.01; c. P<.001, two-tailed

ous studies that have done so for non-immigrant samples.[8-11] Unlike these studies and counter to Hypothesis 1, we found no relationship between skin tone and BMI when we included an extensive set of controls.

A second contribution of this study is the inclusion of the four largest US racial/ethnic groups, which builds upon previous work that focused on Black samples[8-10] and complements Perreira et al who were able to include the same four groups.[11] Our findings reflect previous research that Black and Latino/a populations often have a higher BMI, on average, while Asians have a lower average BMI. Perreira and colleagues reported the same pattern for Blacks and Hispanics, but found that Asians and Whites had statistically equivalent BMIs.[11] The results of our study, therefore, suggest that Asian immigrants merit closer consideration to develop a better understanding of how skin tone inequality, an Asian racial status or identity, and immigrant status jointly affect BMI for this important and growing group. This could be a potentially fruitful line of research as Asian immigrants constituted 30% of the 42 million immigrants in the United States in 2014 and have contributed more new immigrants than Latinos/as for over a decade now.[34]

Our last contribution centered on the intersections of skin tone inequality with gender as well as gender and race/ethnicity. The two previous studies that were able to look at skin tone and gender for BMI found that skin tone matters for BMI, but only for women.[10,12] Here our results concur, reflecting Hypothesis 3. Notably, while there was no relationship between skin tone and BMI for men, darker-skinned women were associated with significantly higher BMI. Indeed, the BMI "penalty" associated with darker skin was so large that it completely offset the initially smaller average effect of BMI associated with women.

We also broke new ground by documenting gender differences for BMI within racial/ethnic groups: We found that Black women are in a unique position as they are the only race and gender pairing that had a higher BMI than same-race/co-ethnic men. While the BMI gender difference among Whites was larger, Asians and Latinos/as demonstrated a similar pattern with women having a lower BMI than men. Our findings related to gender and BMI and, specifically, that Black immigrant women had a higher BMI, on average, relative to both Black and White men, were

…we found no relationship between skin tone and BMI when we included an extensive set of controls.

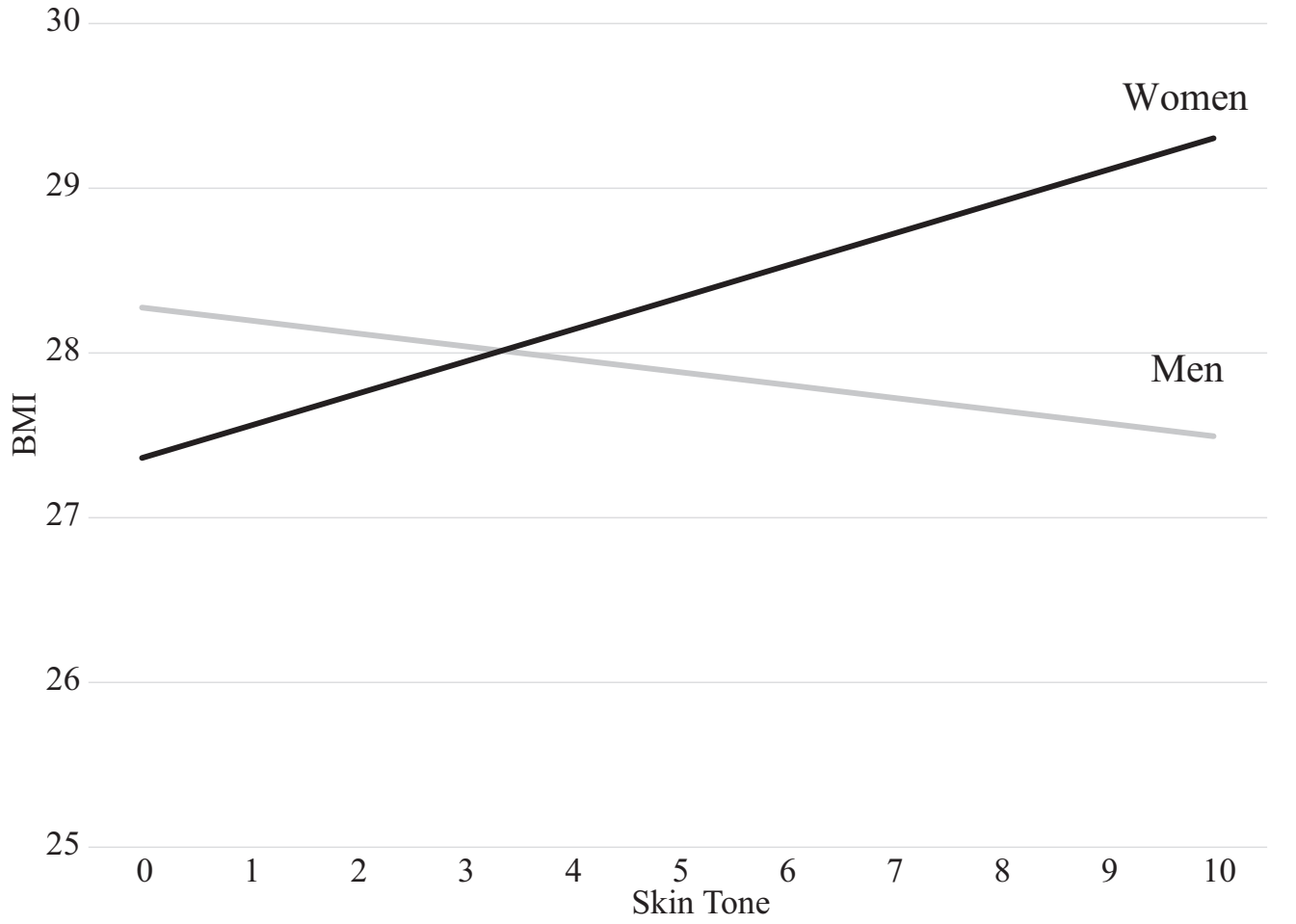

Figure 1. Predicted values of BMI, by skin tone and gender, New Immigrant Survey

in-and-of-themselves important contributions to our understanding of gender-specific BMI trends. This is because many studies suggest that women in the United States, and women globally, on average, experience greater heterogeneity in BMI, and elevated risk of obesity, relative to men across several racial/ethnic backgrounds.[35]

Limitations & Future Research

This study has many strengths, though we cannot parse out sex-based biological processes from gender-specific experiences or behaviors when considering BMI differences as there is no self-reported gender identity information in the NIS. While this conflation of sex and gender is not unique to our study, it is important for future research to identify immigrants who may self-identify as transgender or gender expansive, and examine their unique experiences. We also note that BMI is just one dimension of health and further research should continue to explore health differences among new immigrants that arise from the intersections of skin tone, race/ethnicity, and gender stratification. For example, future studies could examine the dietary changes and other potential coping mechanisms of immigrants based on skin tone, particularly among women, to explore potential behavioral mechanisms linking skin tone and BMI. Relatedly, research suggests that the relationship between BMI and mortality

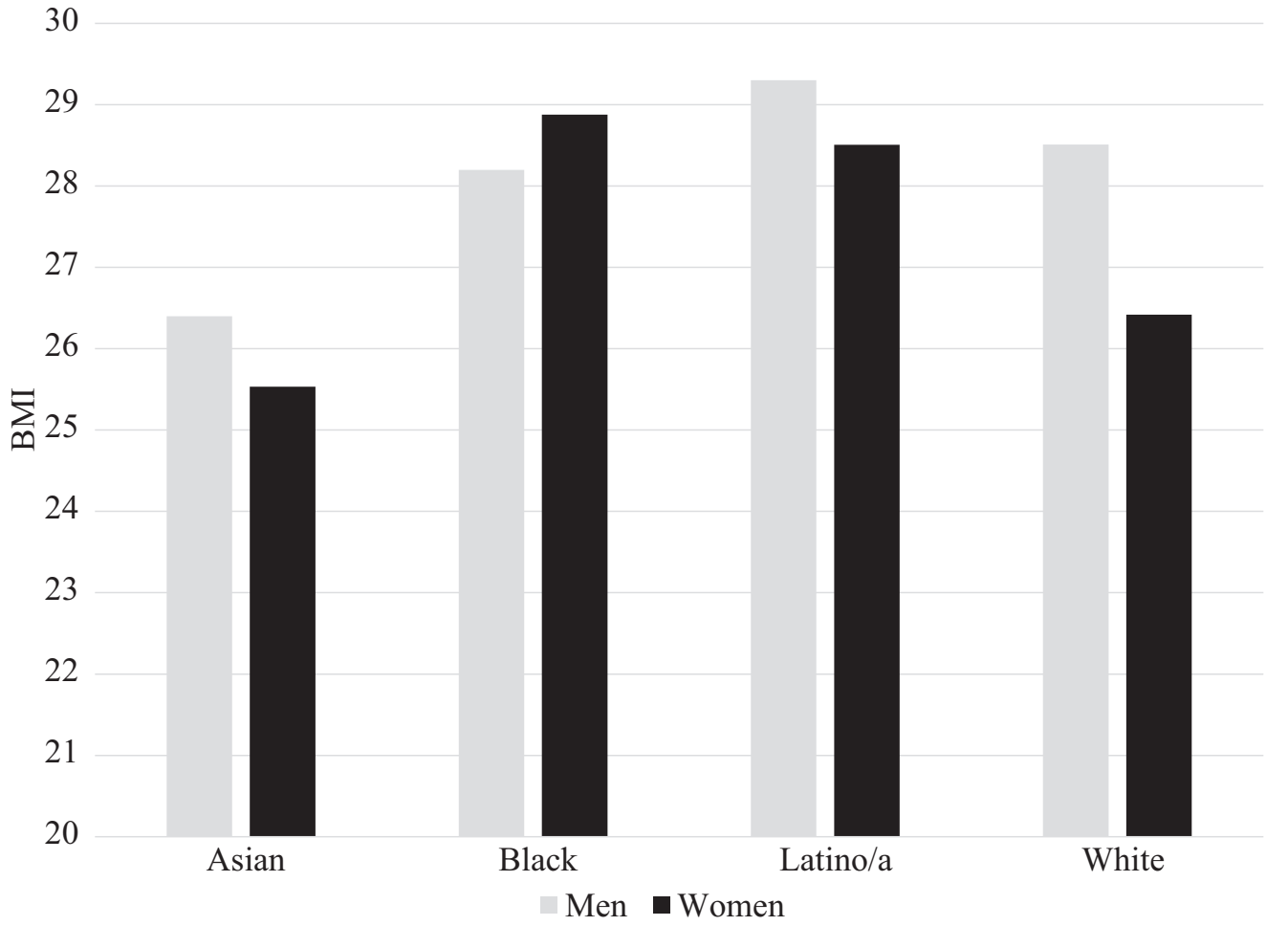

Figure 2. Predicted values of BMI, by race/ethnicity and gender, New Immigrant Survey

may vary culturally and over time.[4] While our sample was still largely in a low risk BMI range (22-28),[4] experiencing increases in BMI due to stress exposure may create additional risk of cardiovascular disease and stroke,[2-5, 8] common comorbidities of obesity and leading causes of death in the United States. Future studies should build on this work by examining immigrant mortality risk from an intersectional colorism framework.

Further, legal permanent residents are just one type of immigrant, though it is a sizeable group. In 2003, the year the NIS data were collected, 705,827 immigrants received legal permanent residency and this grew to 1.1 million almost 15 years later. In addition, LPR immigrants occupy a unique position in US society relative to the native-born and other migrants as they are able to work in the United States, own property, receive financial assistance for higher education, serve in the Armed Forces, and naturalize to US citizenship. To extend our understanding of the relationships between skin tone, race/ethnicity, gender, and BMI, future projects should examine other types of immigrants so that we can better learn how the unique characteristics of LPR immigrants inform the patterns identified in this study.

Conclusion

This study highlights that BMI is not uniform among immigrant women of color, which emphasizes the importance of an intersectional

approach that examines skin tone inequality alongside racial/ethnic inequality. Many previous studies portray women of color, and particularly Black women, as a homogenous group that experiences elevated BMI and a greater risk of obesity relative to women of other racial/ethnic backgrounds and Black men.[4] However, dark-skinned Black women may be experiencing additional risks due to the combination of gender, race, and skin tone, relative to their light-skinned peers. This suggests that future research should explore how BMI-related health risks may be uniquely patterned at the intersection of race, gender, and skin tone for immigrant and non-immigrant populations.

Conflict of Interest

No conflicts of interest to report.

Author Contributions

Research concept and design: Painter, Tabler; Data analysis and interpretation: Painter, Tabler; Manuscript draft: Painter, Tabler; Statistical expertise: Painter, Tabler.

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