



Diminished Health Returns of Educational Attainment Among Immigrant Adults in the United States

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Objectives: Marginalization-related diminished returns (MDRs) refer to weaker health effects of educational attainment for socially marginalized groups compared to the socially privileged groups. Most of the existing literature on MDRs, however, has focused on marginalization due to race, ethnicity, and sexual orientation. Thus, very limited information exists on MDRs of educational attainment among immigrant populations in the United States.

Aims: Building on the MDRs framework and using a nationally representative sample of US adults, we compared immigrant and native-born adults for the effects of educational attainment on psychological distress, self-rated health (SRH), and chronic diseases (CDs).

Methods: The 2015 National Health Interview Survey (NHIS) has enrolled 33,672 individuals who were either immigrant ($n = 6,225$; 18.5%) or native born ($n = 27,429$; 81.5%). The independent variable (IV) was educational attainment, which was treated as a categorical variable. The dependent variables included psychological distress, SRH, and CDs, all of which were dichotomous variables. Age, gender, race, ethnicity, and region were confounders. Immigration (nativity status) was the moderator.

Results: Higher educational attainment was associated with lower odds of psychological distress, poor SRH, and CDs. However, immigration showed a significant statistical interaction with college graduation on all outcomes, which were suggestive of smaller protective effects of college graduation on psychological distress, poor SRH, and CDs for immigrant than native-born adults.

Conclusions: In the US, the associations between educational attainment and psychological distress, SRH, and CDs are all weaker for immigrant than native-born adults. To prevent health disparities, it is essential to decompose health inequalities that are due to low educational attainment from those that are due to diminished returns of educational attainment (i.e., MDRs). There is a need to help highly educated immigrant adults secure positive health outcomes, similar to their native-born counterparts. Such

changes may require bold and innovative economic, public, and social policies that help immigrant adults to more effectively mobilize their educational attainment to secure tangible outcomes. Elimination of health disparities in the US requires efforts that go beyond equalizing access to education.

Keywords: population groups, immigration, nativity, socioeconomic status, socioeconomic position, psychological distress, self-rated health, chronic disease

BACKGROUND

Extensive theoretical and empirical work has established a connection between socioeconomic status (SES) indicators, particularly educational attainment and a wide range of physical and mental health outcomes (1–3). For example, individuals with high levels of formal education are less likely to report depression (4), anxiety (5), suicidal ideas (6), or psychological distress (7, 8), and are more likely to report happiness (9). Various types of social marginalization (e.g., based on race, ethnicity, sexual orientation, and immigrant status) may reduce the salience of educational attainment on the mental well-being of populations (10–13). Immigration also exposes populations to a wide range of stressors and social risk factors that increase risk of mental distress (14–17).

Research on intersectionality (18–20) has well-established that subpopulations, however, differ widely in the health effects of educational attainment (21–24) and other SES indicators (25–27). According to the marginalization-related diminished returns (MDRs) (28, 29), the effects of educational attainment (30) on mental (31, 32) and physical health (33–36) are weaker for racial and ethnic minority adults than the majority group. Although comparisons of Black and White people (22, 23) shape most of this literature, some similar results have been reported for Hispanics (37, 38), Asian Americans (39), Native Americans (40), and even members of the lesbian, gay, bisexual, and transgender (LGBT) community (41–43). For example, educational attainment shows weaker effects on mental well-being (41), smoking (42), and obesity (43) for LGBT adults than non-LGBT people.

While there is compelling evidence that racial, ethnic, and sexual minority adults tend to gain fewer health benefits from their educational attainment (33), it is yet unknown if the same MDRs may also be relevant to the comparison of immigrant and native-born people. Similar to Black (31), Hispanic (37, 44), and LGBT (41–43) individuals, immigrant adults experience marginalization and discrimination by the host society (45–49). Exposure to unequal treatment, in turn, reduces immigrant adults' participation in social activities and labor market. Societal and structural factors such as social stratification, residential segregation, labor market discrimination, and low quality of education in urban areas may hinder the full benefit of education. Due to social and economic adversities, educational attainment may not be an equalizer of health for marginalized groups. Nevertheless, little is known on whether the association between education and health differs by nativity status.

Previous research on immigrant populations has shown considerable differences in health status between immigrant and native-born individuals. A pattern known as the healthy immigrant effect (50–52) suggests that despite experiencing a wide range of social disadvantages (e.g., lower levels of education and income, poor access to healthcare), immigrant individuals show better health profile than native-born individuals. For example, a large body of research has established lower mortality risk of Latino immigrant adults compared to White adults (53–56). For Hispanics, this phenomenon has been coined the Hispanic or Latino mortality paradox because Hispanic and Latino immigrants have lower education and higher exposure to social risk factors such as economic adversities and social disorder, yet have lower mortality risk than White adults (50, 54, 57–65). The relationship between nativity status and health cannot be interpreted unequivocally, as immigration-related factors, such as country of origin, reason behind immigration, and age play important roles in the relationship (15, 16, 66). For instance, the degree to which immigrant adults acculturate and adopt the host country's culture influences their health outcomes, health behaviors, and well-being (67–71).

Marginalization and discrimination are major drivers of immigrant peoples' poor health (46, 47, 49, 72–74). Another factor is that they may live in ethnic enclaves with low access to resources (75–80). Another factor is that some immigrant groups have high and some have low SES (81–85). For example, in the US, Asian Indian, Cuban, Asian American, and Chinese people have higher SES while Mexican, Puerto Rican, and Filipino people have lower SES compared to White people in the US. These are a source of heterogeneities and should be considered in future analysis of the association between immigration and health (81–85).

Despite immigrant populations showing better health profiles than native-born people, they may not gain the same health benefits provided by social structures. Xenophobia can be seen as another source of poor health and well-being of immigrant populations (86, 87). Exposure to Xenophobia and related hate and discrimination, may, however, not be the same across regions (88). As such, experiences of immigrant people may widely depend on a wide range of geopolitical factors such as which political party that holds administrative and legislative power (89). Even within the same region, drastic changes may occur as a result of elections and changes in the leadership of countries, states, and even cities (90). Life condition of immigrant populations and resources that they can access can be heavily influenced by the political party that takes power (91). In the US, for example (92), a major part of the nationalist, populist

political rallies have focused on generating fear in the voters. These policies commonly focus on safety, crime, and scarcity of jobs and resources so immigrant individuals are perceived as a security threat and competitors to jobs (91). Such policies and rhetoric's have historically helped the conservative politicians to collect votes (86). As such, there has been an inertia against advocating for the health and well-being of immigrant adults by the right-wing policymakers. Two latest examples of these changes are remarks by Donald Trump in the US (91–93), and Boris Johnson and Nigel Farage in the UK (94). As a result, many undocumented immigrant people, and even legal immigrant adults, may face fear, hate crimes, and discrimination (95).

Intersectionality research has been also used to study the health status of immigrant populations in the US and other countries (96). Another source of health inequalities in immigrant populations is low SES, which may partially explain poor health of some of the groups of immigrant adults, compared to the native people (97, 98). Not all groups of immigrant populations, however, have lower SES than the native-born people. In the US, for example, Cubans, Asian Americans, and Asian Indians have comparable or even higher SES than the average for Whites (99). There is also some research on this topic, showing that SES may generate less outcomes for immigrant than native-born individuals (100). Thus, all this literature and all these patterns suggest that health of immigrant populations have major nuances and complexities, and one size does not fit all (50, 59, 60, 62, 101, 102). These nuances emerge as a result of complex interactions between immigration, acculturation, culture, and visible and invisible identity markers that depend on country of origin and SES and clash with various systems of privilege in the host country (103, 104). Intersectionality framework has helped us understand some of these complexities (105).

AIM

By borrowing data from the National Health Interview Survey (NHIS), and informed by the MDRs and intersectionality frameworks, we conducted a cross-sectional study to compare immigrant and native-born people in the US for the association between educational attainment and income and psychological distress of American adults. As suggested by both intersectionality and MDRs, we conceptualized immigration status as a combination of visible or invisible marginalizing identities that would reduce access of individuals to the opportunity structure, deny them their dignity and privilege, and expose them to prejudice and injustice. Thus, we expected diminished effects of educational attainment on psychological distress, self-rated health (SRH), and chronic diseases (CDs) of immigrant compared to native-born people. While the same research question could be asked in an international scope, the focus of this paper is exclusively the US.

METHODS

Data of the NHIS 2015 were used. The NHIS is the primary source of information regarding the physical health status of

American adults 18 years or older. The NHIS sample is composed of US residents, civilians, and non-institutionalized people.

PARTICIPANTS AND SAMPLING

The NHIS used a multistage sampling: First, was to sample 428 primary sampling units (PSUs) drawn from 1,900 geographically defined PSUs. All 50 US states and the District of Columbia had PSUs in the study. The PSUs were either a metropolitan statistical area, a single county, or a small group of contiguous counties.

PROCESS

The data are collected by the National Center for Health Statistics (NCHS), which is a part of the Centers for Disease Control and Prevention (CDC). The U.S. Census Bureau collects the data. Data are collected via face-to-face interviews in participants' households. On some occasions, this face-to-face interview is followed or replaced by telephone interview.

PARTICIPANTS

The total sample in this study was 33,672 individuals who were either immigrants ($n = 6,225$; 18.5%) or native-born ($n = 27,429$; 81.5%). We did not impose any exclusion criteria.

MEASURES

Predictor

Educational Attainment (EA)

Educational attainment was operationalized as a categorical variable with four levels. Participants were asked about the number of years of schooling. The educational levels included (1) <12 years (reference group), (2) 12 years, (3) some college education, and (4) college graduate.

Moderator

Immigration Status

Nativity was self-reported. All participants were asked if they were born in the US. The responses were coded 1 for immigrant and 0 for native born.

Covariates

Demographic Factors

Demographic factors included age, gender, census region, race, and ethnicity. Age (years) was a continuous variable. Gender was a dichotomous measure (female = 0 and male = 1). The region was either Northeast, Midwest, South, or West. Participants self-identified their race and ethnicity. Race and ethnicity were both operationalized as categorical variables. Race included White only (reference category), Black/African American only, Native American/Alaska Native only, Asian only, Multiple race, and race group not releasable (masked or missing). Ethnicity included Non-Hispanics = 0 (reference category) and Hispanics = 1.

Dependent Variable Psychological Distress

The following items were used to measure psychological distress. (1) How often you felt so sad nothing cheers you up during the past 30 days, (2) How often you felt nervous during the past 30 days, (3) How often you felt restless/fidgety, during the past 30 days, (4) How often you felt hopeless during the past 30 days, (5) How often you felt everything was an effort during the past 30 days, and (6) How often you felt worthless during the past 30 days. Responses to these items included (0) none of the time, (1) a little of the time, (2) some of the time, (3) most of the time, and (4) all of the time. We calculated a sum score, ranging from 0 to 24, with a higher score indicating higher psychological distress.

Self-Rated Health (SRH)

We used the conventional single item of SRH to measure overall health. Responses were excellent, very good, good, fair, and poor. Responses were dichotomized so fair and poor reflected poor, and other responses reflected good health. Poor SRH is predictive of morbidity and mortality in clinical as well as community settings (106).

Chronic Diseases (CDs)

Participants were asked if they had any of the following conditions: cancer, epilepsy/seizure, sinusitis, hay fever, emphysema COPD, chronic bronchitis, weak/failing kidneys, liver condition, arthritis, carpal tunnel syndrome, hypertension, high cholesterol, diabetes, coronary heart disease, angina pectoris, stroke asthma, ulcer, and/or Crohn’s disease/ulcerative colitis. The exact items read as: “Ever been told you have diabetes,” etc. We calculated a dichotomous variable that included presence or absence of any CDs, regardless of their type.

Statistical Analyses

Given the NHIS’s multistage sampling design, we needed to apply SPSS 23.0 (IBM Inc, NY, USA) for our data analysis. Using SPSS, we adjusted for the NHIS survey weights that were due to the design variables (strata, clusters, and non-response). Taylor series linearization was applied for the re-estimation of the standard errors (SEs). For descriptive statistics, we used weighted means and frequencies.

For our multivariable analyses, given our binary outcomes, we applied two logistic regression models for each outcome. In these models, either psychological distress, SRH, or CD were the dependent variable. In all these models, which were all significant, educational attainment was the independent variable, while demographic factors, income, and region were the control variables, and immigration status was the moderator. Both our models were calculated in the pooled sample that included both immigrant and native-born adults. *Model 1* did not include immigration by educational attainment interaction terms. *Model 2*, however, included immigration by educational attainment interaction terms. To generate an interaction term, three interaction terms were entered to the models: 12 years × immigrant, 13–15 years × immigrant, and 16 + years × immigrant. If these interactions were significant and positive, they would suggest that the protective effect of 12 years

education, in comparison to the reference group (<12 years of education) is smaller for the immigrant than native-born groups. This would be in support of our MDRs hypothesis. For our immigrant variable, immigrants were coded as 1 and native-born coded as 0. Similarly, for race, White only was the reference group so the OR would mean the effect of a particular race relative to

TABLE 1 | Descriptive statistics overall (33,672).

	All		Native born		Immigrant		
	n	%	n	%	n	%	
Immigration status							
Native born	27,429	81.5	27,429	100.0	–	–	
Immigrant	6,225	18.5	–	–	6,225	100.0	
Race*							
White only	25,831	76.7	21,937	80.0	3,881	62.3	
Black only	4,673	13.9	4,033	14.7	637	10.2	
Native American/Alaska Native only	392	1.2	311	1.1	81	1.3	
Asian only	1,983	5.9	492	1.8	1,489	23.9	
Multiple race	699	2.1	609	2.2	90	1.4	
Race group not releasable	94	0.3	47	0.2	47	0.8	
Ethnicity*							
Non-Hispanics	28,080	83.4	25,128	91.6	2,942	47.3	
Hispanics	5,591	16.6	2,301	8.4	3,283	52.7	
Region*							
Northeast	4,681	13.9	4,346	15.8	1,232	19.8	
Midwest	8,359	24.8	6,395	23.3	705	11.3	
South	9,047	26.9	9,579	34.9	2,061	33.1	
West	11,436	34.0	7,109	25.9	2,227	35.8	
Gender							
Female	18,601	55.2	15,152	55.2	3,440	55.3	
Male	15,071	44.8	12,277	44.8	2,785	44.7	
Education*							
Less than 12 years	5,580	16.6	2,852	10.4	1,826	29.3	
12 years	7,102	21.1	7,045	25.7	1,313	21.1	
13–15 years	11,646	34.6	7,990	29.1	1,057	17.0	
16+ years	9,344	27.8	9,457	34.5	1,970	31.6	
Psychological distress							
No	25,266	78.3	20,512	74.8	4,741	76.2	
Yes	6,990	21.7	5,792	21.1	1,196	19.2	
Self-rated health (SRH) (Poor)							
Yes	28,614	85.0	23,272	84.8	5,328	85.6	
No	5,046	15.0	4,147	15.1	896	14.4	
Chronic diseases (CDs)*							
No	16,653	50.6	13,066	47.6	3,574	57.4	
Yes	16,227	49.4	13,727	50.0	2,495	40.1	
			SD	Mean	SD	Mean	SD
Age (years)*	49.94	18.38	50.57	18.68	47.19	16.71	

*p < 0.05 for comparison of immigrant and native born.

Whites. Similarly, non-Hispanic was the reference group, thus the effect of ethnicity referred to the effect of being Hispanic compared to non-Hispanic. Adjusted odds ratio (AOR), 95% confidence intervals (CI), SE, and p -values were reported. A $p < 0.05$ was considered significant.

RESULTS

Descriptive Statistics

The total sample in this study was 33,672 immigrant and native-born American adults 18+ years old. Of the participants, 18.5% were immigrants, and 81.5% were native born. From the total sample, 77% were White, and 23% were a member of other racial groups. Additionally, 17% were Hispanic, and 83% were non-Hispanic. **Table 1** depicts the descriptive statistics of the participants overall and based on the nativity.

Table 1 also compares the two groups. Compared to native-born people, immigrant adults were more likely to be Asian, less likely to be White, more likely to be Hispanic, more likely to live in the West and Northeast, and less likely to live in the South. Compared to their native-born counterparts, immigrant adults were 3 years younger, and have lower rates of chronic disease.

Logistic Regressions

Table 2 shows the results of two logistic regressions in the pooled sample with educational attainment as the predictor and psychological distress, SRH, and CDs as the outcomes (dependent variables). *Model 1* only included the main effects. However, *Model 2* added the interaction terms between immigration status with educational attainment.

Based on *Model 1*, high educational attainment was inversely associated with psychological distress (OR = 0.71, 95% CI = 0.65–0.77; $p \leq 0.001$ for 12 years, OR = 0.66, 95% CI = 0.60–0.72; $p \leq 0.001$ for 13–15 years, OR = 0.44, 95% CI = 0.40–0.48; $p \leq 0.001$ for 16 + years.), SRH (OR = 0.51, 95% CI = 0.46–0.55; $p \leq 0.001$ for 12 years, OR = 0.43, 95% CI = 0.39–0.47; $p \leq 0.001$ for 13–15 years, OR = 0.19, 95% CI = 0.17–0.21; $p \leq 0.001$ for 16 + years), and CDs (OR = 0.85, 95% CI = 0.78–0.93; $p \leq 0.001$ for 12 years, OR = 0.90, 95% CI = 0.82–0.99; $p = 0.022$ for 13–15 Years; OR = 0.70, 95% CI = 0.64–0.77; $p \leq 0.001$ for 16 + years). *Model 2*, however, revealed a statistically significant interaction between educational attainment and immigration on psychological distress (OR = 1.36; 95% CI = 1.11–1.67; $p = 0.003$ for 16 + Years \times immigrant term), SRH (OR = 1.36; 95% CI = 1.11–1.67; $p = 0.003$ for 16 + Years \times immigrant term), and CDs (OR = 1.36; 95% CI = 1.11–1.67; $p = 0.003$ for 16 + Years \times immigrant term). The model suggested that the protective effects of educational attainment against psychological distress, SRH, and CDs are all smaller for immigrant than native-born adults (**Table 2**).

Logistic Regressions

Table 3 shows the results of two logistic regressions in native-born (*Model 3*) and one in immigrant (*Model 4*) adults for each outcome. In these models, educational attainment was the predictor and either psychological distress, SRH, and CDs were the outcome (dependent variable). Based on *Model*

3, high educational attainment was inversely associated with psychological distress, SRH, and CDs for native-born adults. *Model 3* also showed some protective effects of educational attainment on psychological distress, SRH, and CDs for immigrant adults. These protective effects were all larger for native-born than immigrant adults (**Table 3**).

DISCUSSION

The current study supports the finding that all educational credentials are associated with lower odds of psychological distress, poor SRH, and CDs; however, the protective effects of 16+ years of education are stronger for native-born than immigrant adults in the US.

The observation that as educational attainment credentials are gained, odds of psychological distress, poor SRH, and CDs decreases, but 16+ years of education better promote health for native-born than immigrant adults in the US, is an extension of previous literature on MDRs (28, 29). Previous research found that the association between educational attainment and a wide range of physical health outcomes such as self-rated health (32, 37, 107), CDs (35, 108, 109), depression (110, 111), suicide (31), obesity (33, 34), disability (112), and mortality (36) was weaker in Black and Hispanic relative to Non-Hispanic White people. It is also in line with the observations that education generates less health for LGBT than non-LGBT individuals (41–43).

The robust and consistent nature of the MDRs suggests that differences in education and health may be due to the function and structure of society. US social institutions differentially treat people based on their color, race, ethnicity, class, heritage, and nativity (113). These result in systemic marginalization of non-majority groups. Such marginalization reduces people's chance of full participation and full benefit from resources that are available to them. Racism, xenophobia, and nationalism are embedded in the social fabric of the US society and reduce immigrant adults' ability to fully benefit their own human capital and turn their resources into tangible outcomes. As a result, they show less than expected benefits in the presence of educational attainment (28, 29).

It seems that it is not just educational attainment (32) but also income (109), occupation (36), and marital status (114) that tend to generate better health for the majority than marginalized people. These MDRs are not just for psychological distress (107), SRH (12, 32, 107), and CDs (35, 108, 109) but for obesity (33, 34), vaping (115), smoking (40, 42, 116–118), drinking (44, 119), diet (120), exercise (11), hospitalization (121), and mortality (36). Thus, MDRs are neither specific to SES indicators nor to any health outcomes. They are seen for mental health, behaviors, and physical health. These universal patterns of MDRs suggest that they are due to upstream social processes rather than group behaviors.

The observed MDRs of educational attainment on the protective effects of high educational attainment on psychological distress, SRH, and CDs may be because, similar to poverty, race, and ethnicity, immigration status shapes life chances and health. Immigrant adults generally have better

TABLE 2 | Logistic regressions in the pooled sample (33,672).

	Psychological distress			Self-rated health			Chronic diseases					
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p			
Main effect model												
Immigrant	0.88	0.80	0.96	0.004	0.78	0.70	0.87	< 0.001	0.58	0.54	0.63	< 0.001
Hispanic	0.85	0.78	0.93	< 0.001	1.18	1.06	1.32	0.002	0.92	0.85	1.00	0.043
Race				< 0.001				< 0.001				< 0.001
Black only	0.96	0.88	1.04	0.312	1.65	1.51	1.80	< 0.001	1.18	1.09	1.27	< 0.001
Native American/Alaska Native only	1.40	1.12	1.76	0.004	1.66	1.28	2.14	< 0.001	1.38	1.10	1.73	0.006
Asian only	0.77	0.67	0.89	< 0.001	1.04	0.87	1.24	0.674	0.96	0.85	1.08	0.496
Multiple race	1.48	1.25	1.76	< 0.001	1.79	1.47	2.19	< 0.001	1.38	1.16	1.64	< 0.001
Race group not releasable	0.96	0.58	1.60	0.890	0.35	0.13	0.97	0.044	0.81	0.52	1.28	0.367
Gender (male)	0.72	0.68	0.76	< 0.001	0.99	0.93	1.06	0.757	0.97	0.92	1.02	0.274
Region												
West												
Northeast	1.06	0.97	1.15	0.197	0.97	0.88	1.08	0.592	1.04	0.96	1.12	0.371
Midwest	0.96	0.89	1.04	0.363	0.91	0.82	1.00	0.051	1.03	0.96	1.11	0.456
South	0.98	0.91	1.05	0.570	1.11	1.02	1.21	0.013	1.02	0.96	1.09	0.475
Age	0.99	0.99	0.99	< 0.001	1.03	1.03	1.03	< 0.001	1.06	1.06	1.06	< 0.001
Education				< 0.001				< 0.001				< 0.001
Less than 12 years												
12 years	0.71	0.65	0.77	< 0.001	0.51	0.46	0.55	< 0.001	0.85	0.78	0.93	< 0.001
13–15 years	0.66	0.60	0.72	< 0.001	0.43	0.39	0.47	< 0.001	0.90	0.82	0.99	0.022
16+ years	0.44	0.40	0.48	< 0.001	0.19	0.17	0.21	< 0.001	0.70	0.64	0.77	< 0.001
Constant	0.92			0.183	0.09			< 0.001	0.12			< 0.001
Interaction model												
Immigrant	0.79	0.68	0.92	0.002	0.67	0.58	0.79	< 0.001	0.66	0.57	0.77	< 0.001
Hispanic	0.87	0.79	0.95	0.002	1.21	1.09	1.35	0.001	1.01	0.92	1.10	0.859
Race				< 0.001				< 0.001				< 0.001
Whites only												
Black only	0.95	0.88	1.03	0.250	1.64	1.50	1.79	< 0.001	1.37	1.27	1.48	< 0.001
Native American/Alaska Native only	1.39	1.11	1.75	0.005	1.65	1.28	2.14	< 0.001	1.35	1.06	1.70	0.014
Asian only	0.74	0.64	0.86	< 0.001	1.01	0.84	1.20	0.956	1.06	0.94	1.21	0.350
Multiple race	1.48	1.25	1.75	< 0.001	1.79	1.46	2.19	< 0.001	1.26	1.06	1.51	0.010
Race group not releasable	0.97	0.59	1.61	0.918	0.35	0.13	0.98	0.045	1.01	0.62	1.64	0.979
Gender (male)	0.72	0.68	0.76	< 0.001	0.99	0.93	1.05	0.701	1.17	1.12	1.24	< 0.001
Region												
West												
Northeast	1.06	0.97	1.15	0.201	0.97	0.88	1.07	0.548	1.05	0.97	1.14	0.219
Midwest	0.96	0.89	1.04	0.323	0.90	0.82	1.00	0.041	1.10	1.02	1.19	0.012
South	0.98	0.91	1.05	0.498	1.10	1.02	1.20	0.020	1.16	1.08	1.24	< 0.001
Age	0.99	0.99	0.99	< 0.001	1.03	1.03	1.03	< 0.001	1.07	1.07	1.07	< 0.001
Education				< 0.001				< 0.001				< 0.001
Less than 12 years												
12 years	0.69	0.62	0.76	< 0.001	0.48	0.44	0.54	< 0.001	0.84	0.76	0.94	0.002
13–15 years	0.64	0.58	0.71	< 0.001	0.41	0.37	0.46	< 0.001	0.86	0.78	0.96	0.008
16+ years	0.41	0.37	0.46	< 0.001	0.18	0.16	0.20	< 0.001	0.68	0.61	0.75	< 0.001
Education × immigrant				0.009				0.056				0.053
12 years × immigrant	1.04	0.85	1.28	0.699	1.17	0.94	1.46	0.154	1.09	0.89	1.33	0.402
13–15 Years × immigrant	1.03	0.83	1.28	0.782	1.24	0.97	1.58	0.086	1.06	0.86	1.31	0.558
16+ Years × immigrant	1.36	1.11	1.67	0.003	1.39	1.08	1.79	0.010	1.28	1.06	1.54	0.011
Constant	0.95			0.451	0.09			< 0.001	0.04			< 0.001

TABLE 3 | Logistic regressions in native-born and immigrant adults.

	Psychological distress			Self-rated health			Chronic diseases					
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p			
Native born												
Hispanic	0.85	0.76	0.94	0.002	1.08	0.95	1.23	0.257	1.00	0.90	1.11	0.991
Race				< 0.001				< 0.001				< 0.001
White only												
Black only	0.97	0.89	1.06	0.476	1.66	1.52	1.82	< 0.001	1.40	1.29	1.52	< 0.001
Native American/Alaska	1.36	1.06	1.76	0.017	1.47	1.09	1.97	0.012	1.44	1.10	1.87	0.008
Native only												
Asian only	0.77	0.61	0.98	0.036	1.05	0.78	1.43	0.732	1.12	0.90	1.39	0.313
Multiple race	1.50	1.25	1.80	< 0.001	1.89	1.53	2.34	< 0.001	1.35	1.11	1.63	0.002
Race group not releasable	0.46	0.19	1.10	0.080	0.00	0.00		0.997	1.15	0.59	2.25	0.680
Gender (male)	0.72	0.68	0.77	< 0.001	1.03	0.96	1.11	0.337	1.19	1.12	1.26	< 0.001
Region	1.00	0.91	1.10	0.940	0.88	0.78	0.99	0.034	1.06	0.97	1.16	0.221
West												
Northeast	0.94	0.86	1.02	0.156	0.94	0.85	1.05	0.266	1.16	1.07	1.26	< 0.001
Midwest	0.97	0.89	1.05	0.384	1.17	1.06	1.28	0.001	1.24	1.15	1.34	< 0.001
South	0.99	0.99	0.99	< 0.001	1.02	1.02	1.03	< 0.001	1.07	1.07	1.07	< 0.001
Education				< 0.001				< 0.001				< 0.001
Less than 12 years												
12 years	0.69	0.62	0.76	< 0.001	0.48	0.44	0.53	< 0.001	0.85	0.76	0.95	0.003
13–15 years	0.63	0.57	0.70	< 0.001	0.40	0.36	0.45	< 0.001	0.87	0.78	0.97	0.009
16+ years	0.41	0.37	0.45	< 0.001	0.17	0.16	0.20	< 0.001	0.68	0.62	0.76	< 0.001
Constant	1.08			0.279	0.11			< 0.001	0.04			< 0.001
Immigrant												
Hispanic	0.90	0.75	1.08	0.257	1.65	1.31	2.07	< 0.001	0.97	0.82	1.16	0.753
Race				0.001				0.057				0.867
White only												
Black only	0.80	0.62	1.02	0.075	1.11	0.82	1.50	0.514	1.06	0.85	1.32	0.604
Native American/Alaska	1.44	0.87	2.38	0.160	2.42	1.41	4.14	0.001	1.03	0.61	1.74	0.913
Native only												
Asian only	0.72	0.58	0.88	0.002	1.00	0.76	1.30	0.991	0.93	0.77	1.12	0.438
Multiple race	1.25	0.76	2.04	0.382	1.07	0.56	2.04	0.836	0.85	0.51	1.40	0.521
Race group not releasable	1.96	1.02	3.78	0.044	1.00	0.34	2.88	0.996	0.88	0.43	1.80	0.723
Gender (male)	0.70	0.62	0.80	< 0.001	0.79	0.68	0.93	0.005	1.14	1.01	1.29	0.031
Region	1.28	1.07	1.54	0.007	1.30	1.05	1.60	0.015	1.06	0.89	1.26	0.504
West												
Northeast	1.11	0.89	1.39	0.344	0.68	0.50	0.94	0.018	0.87	0.70	1.07	0.173
Midwest	1.00	0.85	1.17	0.966	0.80	0.66	0.97	0.025	0.89	0.77	1.03	0.108
South	1.00	1.00	1.01	0.427	1.05	1.05	1.06	< 0.001	1.08	1.07	1.08	< 0.001
Education				< 0.001				< 0.001				0.851
Less than 12 years												
12 years	0.75	0.62	0.89	0.002	0.63	0.52	0.78	< 0.001	0.95	0.80	1.13	0.588
13–15 years	0.72	0.58	0.88	0.001	0.59	0.47	0.75	< 0.001	0.96	0.79	1.16	0.668
16+ years	0.61	0.50	0.73	< 0.001	0.31	0.24	0.40	< 0.001	0.92	0.77	1.10	0.378
Constant	0.38			< 0.001	0.02			< 0.001	0.02			< 0.001

health than US-born individuals, despite having lower education. We would assume that additional education would significantly augment immigrant health. However, the diminished health return of education suggest that additional education may not protect immigrant individuals from exposure to discrimination, risky work conditions, and having limited access to quality healthcare (122). We found that relative to highly educated native Americans, highly educated immigrant adults remain at an increased risk of health problems such as psychological distress, poor SRH, and CDs. Clinicians and healthcare providers should be cognizant that immigrant adults, regardless of education, are exposed to structural barriers such as immigration laws, labor market laws, and residential segregation that potentially reduce the health gain of social upward mobility.

Area of Future Research

First of all, the results reported here are exclusively relevant to the US context. Thus, there is a need to conduct similar studies in other countries. Immigration is not a simple and singular variable such as age, gender, or even nationality. Immigration is a proxy of culture, lived experiences, life history, and marginalization. That said, research has continuously shown that one size does not fit all regarding immigrant adults' health status. By that we mean that these factors contribute to health profile of immigrant adults across education levels. In this study immigration was conceptualized as an over-simplistic dichotomous variable due to the data that were available to us. This should be addressed in future research; however, here we partly discuss the intersection of SES, immigration, and health.

While this study relied on MDRs (10, 28, 29), which predominantly focused on diminished returns of SES indicators for marginalized people (100), other frameworks and theories could also help us understand the involved processes that may explain our findings. One related framework is intersectionality (19, 20, 123). Supporting the intersectionality framework (19, 20, 123), we found different predictors of health of population subgroups based on the intersection of immigration status and SES. That is, in the US, intersections of immigration status and SES, rather than each of them separately, have implications for the health of population. In line with the intersectionality theory, we found multiplicative rather than additive effects of immigration status and SES on health. Each intersectional group has a unique set of social identities, resources, risk factors, and social identities. As such, they differ in how their visible and invisible identity markers clash with systems of privilege and marginalization in the US. Acculturation is also another framework that can advance the existing knowledge on the observed MDRs and make sense of the results. Immigrant people integrate to the host country and become more similar to them as time passes since immigration (68, 70, 124). We, however, did not have data on length of time post immigration (67, 68, 125, 126). As individuals lose their attachment to their culture and original identity, and as they acquire the behavioral characters of the host country, their health status becomes more similar to the native-born people (67, 68, 125, 126).

As a result of Xenophobia, and as seen as "foreigners," immigrant people may experience high levels of hate

crime, discrimination, and prejudice (95), which result in marginalization and social isolation. Discrimination is one of the major factors in explaining poor health of immigrant people (16, 45, 47, 49, 127). Immigrant populations face additional difficulties to enter the labor market and secure high-quality jobs, as they compete with native-born people (128). Many immigrant adults work in low-paying jobs and provide uncompensated labor (129). Finally, some immigrant people live in ethnic enclaves and highly segregated areas, and some send money back to their country (130).

The observed MDRs (interaction between education and immigration status) can be attributed to discrimination in the education system (131). Immigrant and native-born individuals do not have the same opportunity for education in the US. They are also not equally treated by the education system (132). Discrimination, second tier education, and systematic marginalization might uniquely contribute to the observed MDRs in the immigration. The labor market may also undervalue their education (133), if education is achieved in their own country not the US (134).

We argue that immigrant individuals are also racialized in the US; however, the effect of immigration status depends on SES, as shown by this study. While the focus of this study was on how immigration status and SES intersect, most previous literature on the intersectionality has focused on race, ethnicity, gender, sexual orientation, and socioeconomic status (18–20). As such, this study extends the previous work to one of the less frequently studied aspects of intersectionality of social identities. Still, the intersectionality framework helps us understand the results as it suggests that the complex and overlapping layers of inequities expose subgroups of the population to unique health risks. In this view, life experiences, sets of exposures, and vulnerabilities are not a function of each by combination of various social identities, as documented by the interactions between various social identities (multiplicative rather than additive effects). Thus, there is always a need to understand the differences in the health status of groups based on the intersections of nativity and SES, as shown here. The same applied to the intersections of race, ethnicity, gender, age, physical ability, and sexual orientation.

Implications

The result of this study has some policy implications. First, the solution to eliminate health inequalities should not be limited to closing the SES gap across social groups. While SES and SDOH are important, it is not just their access but utility and the degree by which they become outcomes. To eliminate health inequality between immigrant and native-born people, it is essential to equalize the health return of educational attainment. Thus, we need to go beyond equal access to education but equality in the returns of educational attainment for social groups. Specific policies and programs should help immigrant adults to more effectively mobilize and leverage their available human capital to gain tangible outcomes. When a policy is designed and implemented, these MDRs should be investigated. These types of evidence suggest that MDRs should be targeted as a part of equitable goals.

Limitations

The current results should be interpreted with the methodological limitations in mind. First, any cross-sectional study is limited in drawing causal inferences. We cannot rule out that excessive health problems would influence social mobility and the ability to attain education. Thus, reverse causality cannot be ruled out in this study. Prospective research is needed to better understand the association between immigration status, educational attainment, and health. Furthermore, future research should examine the mechanisms by which MDRs of educational attainment emerge. We did not have access to the country of origin, or whether education was attained in the US or the origin country. There is a need to compare immigrant subgroups from Asia, Africa, and Latino countries as each culture may differently adopt US culture. We also did not control for the type of college education of other covariates such as wealth or being a first-generation college student. Future research should replicate and validate these findings using longitudinal data, with a more comprehensive list of measures such as country of origin and details of educational attainment. Future research may also include contextual factors such as ethnic composition, SES, or density of resources at the neighborhood level. It is likely that highly educated immigrant individuals still live in areas with low availability of green spaces and parks that are essential for health.

Application of Single-Item Measures

Although this study has some strengths, such as a large *n* and representative sample, it was limited in terms of measurement. While single item is commonly used for overall and physical health, single-item measure of self-rated psychological health is limited in their ability to assess mental health. Thus, we compensated this weakness by including three outcomes that could cover various domains of both physical and mental health. Single-item measures are widely used for overall, general, and physical health (135–143). They are used, but less common to evaluate self-rated psychological health (144–150). Still, these measures reflect mental health, depression, and anxiety, and psychological distress. As they are cost efficient, easy to administer, reliable, valid, and easily understood by the people, they are commonly used in large-scale national surveys. They may, however, be prone to differential validity across demographic groups (151–154). That means, these single items may mean different things for different groups (151–154). It is, however, very unlikely that bias shapes a spurious association regardless of the domain of health. Similarity of the results across outcomes provided additional support and confidence for our findings. Thus, despite our measurement limitations, the

observed MDRs seem to be robust. Still, at interpretation of the results, readers should be aware of the measurement problem in this paper.

Future research should find large and balanced sample sizes of ethnic groups and test for replication of these findings across ethnic groups. The reason we did not run ethnic-specific models was statistical power (e.g., few immigrant Black people) and unequal variance of SES across ethnic groups. Combining all or several years of NHIS data or General Health Survey (GSS) would probably have enough statistical power for such future investigations.

CONCLUSION

In the US, educational attainment better reduces the odds of psychological distress, poor SRH, CDs, and obesity for native-born than immigrant adults. Thus, at least some of the health disparities in the US between immigrant and native-born people are due to inequalities in marginal returns of educational attainment for immigrant population.

DATA AVAILABILITY STATEMENT

The datasets generated for this study are available here: https://www.cdc.gov/nchs/nhis/nhis_2015_data_release.htm.

ETHICS STATEMENT

All participants signed written consent. The NHIS protocol was approved by the CDC Institutional Review Board (IRB).

AUTHOR CONTRIBUTIONS

SA was responsible for the conceptualization, data analysis, preparation of the first draft, and revision. SC and MB were in charge of the revision of the manuscript and approved the final draft. All authors contributed to the article and approved the submitted version.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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