



Socioeconomic Status and Current Cigarette Smoking Status: Immigrants' Diminished Returns



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Abstract

Introduction: Although socioeconomic status (SES) resources influence population and individual health behaviors, socially marginalized groups gain significantly less health from their SES indicators, such as education and income, compared to the socially privileged groups. This pattern is called marginalization-related diminished returns (MDRs). However, most of the MDRs literature is derived from studies that have defined marginalization based on race and ethnicity. As a result, more research is needed on MDRs due to immigration. To extend what is known about MDRs due to immigration, the current study compared a national sample of immigrants and non-immigrants for the effects of education and income on current cigarette smoking of adults in the United States.

Methods: This is a cross-sectional study. The 2015 National Health Interview Survey (NHIS) enrolled 14,149 individuals who were either immigrants (n=1977; 14.0%) or non-immigrants (n=12,166; 86.0%). The independent variables (IV) were education and income that were treated as categorical variables. The dependent variable was current cigarette smoking. Age, gender, race, ethnicity, marital status, employment, and region were confounders. Immigration was the moderator. Logistic regression was used for data analysis.

Results: High education and income were associated with lower odds of current cigarette smoking. However, immigration showed significant statistical interactions with both education and income. These interactions were suggestive of smaller protective effects of high education and income on current cigarette smoking for immigrant than non-immigrant adults.

Conclusion: In line with the MDRs, the effects of education and income on tobacco use is weaker for immigrant than non-immigrant adults.

Keywords: Ethnic Groups, Immigration, Immigrants, Socioeconomic Factors, Tobacco Use, Smoking

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Introduction

Extensive theoretical and empirical work has established the strong effects of socioeconomic status (SES) indicators such as education and income on health outcomes.¹⁻³ High education and income are associated with higher happiness⁴ and lower risk of depression,⁵ anxiety,⁶ suicide,⁷ distress,^{8,9} and substance use.^{10,11} In contrast, immigration is associated with lower SES, poor health, and substance use.¹²⁻¹⁵

Marginalized and non-marginalized groups, however, show health effects of SES indicators such as education and income unequally.¹⁶⁻²² According to the Marginalization-related Diminished Returns (MDRs) theory,^{23,24} the effects of education,²⁵ income,²⁶⁻³⁰ employment,^{31,32} and marital status on mental health,^{33,34} physical health,³⁵⁻³⁸ and health behaviors^{25,39-41} are weaker for minority groups than the majority group. This pattern has been established for Blacks,^{17,18} Hispanics,^{26,42} Asian Americans,⁴³ Native Americans,¹⁰ and the LGBT community.⁴⁴⁻⁴⁶ For example, high SES LGBT

individuals remain at high risk of loss of mental well-being,⁴⁴ obesity,⁴⁶ and smoking.⁴⁵

According to the MDRs literature, minority status may reduce the health returns of education,³⁵ income,²⁶⁻³⁰ occupation,^{31,32} and marital status⁴⁷; however, it is yet unknown if the same MDRs can also be seen for immigrants. That is, it is unclear if immigrants and non-immigrants similarly gain health from their SES resources such as education and income. Similar to other sources of marginalization, namely race,³³ ethnicity,^{26,40} and sexual orientation,⁴⁴⁻⁴⁶ immigrants are pushed to the margin of the host society. Given the immigration rules and regulations, border control laws, and the xenophobia pervasive in our society, immigrants are commonly discriminated against and are treated as second-class citizens.⁴⁸⁻⁵²

In this study, the National Health Interview Survey (NHIS), a nationally representative study, was used to compare immigrants and non-immigrants for the effects of education

and income on the current cigarette smoking status of adults in the United States. As suggested by MDRs, immigration was considered as a social identity and social status that reflects marginalization. Thus, weaker effects of education and income on current cigarette smoking of immigrant than non-immigrant people were expected, similar to the pattern observed for Blacks, Hispanics, Asian Americans, Native Americans, and the LGBT community.

Methods

This is a cross-sectional study. 2015 NHIS data was 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 who are civilian, non-institutionalized people. The current analysis is limited to adults.

Participants and Sampling

The NHIS used a multi-stage clustered/stratified random sampling: First was to sample 428 primary sampling units (PSUs) drawn from 1900 geographically defined PSUs. All the 50 US states and the District of Columbia had representative PSUs in the sample. The PSUs were either a metropolitan statistical area, a single county, or a small group of contiguous counties. For this analysis, only data from adults was used.

Process

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

Participants

The total sample in this study was 14,149 adults who were either immigrants ($n=1977$; 14.0%) or non-immigrants ($n=12\,166$; 86.0%). People could be of any race/ethnicity to be included in this study. The study had no exclusion criteria.

Measures

Predictor

Education. Education is shown to be in 4 categorical levels in [Tables 1](#) and [2](#) though.

Income. Annual income was self-reported. This variable was measured as a continuous variable in dollars. For the current analysis, however, a dichotomous variable with a cut-off point of 35 000 USD was used. Individuals with high income were coded as one, and those with lower income were coded as 0.

Moderator

Immigration status. Nativity was self-reported. All participants were asked if they were born in the US. The responses were coded 1 for immigrants and 0 for non-immigrants.

Covariates

Demographic factors included age, gender, region, race, ethnicity, education, marital status, and employment. Age

(years) was a continuous variable. Gender was a dichotomous measure (male=1, female=0). Participants indicated their region as being either the Northeast, Midwest, South, or West. Participants self-identified their race and ethnicity, both of which were operationalized as categorical variables. Race was 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 was Hispanics=1, non-Hispanics=0 (reference category). Participants were asked about the number of years of schooling. Marital status was a dichotomous variable with married coded as 1. Employment status was a dichotomous variable with employed coded as 1.

Dependent Variable

Current Cigarette Smoking. Current cigarette smoking status was the outcome. Smoking status was self-reported. Current cigarette smokers were defined as those who had smoked at least 100 cigarettes, were a smoker at the time of the survey, and reported smoking daily.

Statistical Analyses

Given the NHIS's multi-stage sampling design, SPSS 23.0 (IBM Inc., NY, USA) was applied for data analysis. Using SPSS, adjustments were made for the NHIS survey weights due to the design variables (strata, clusters, and non-response). Taylor series linearization was applied for the re-estimation of standard errors (SE). Weighted means and frequencies were used for descriptive statistics. For multivariable analyses, four logistic regression models were applied. In these models, education and income were the independent variables; current cigarette smoking status was the dependent variable; and demographic factors and race, ethnicity, and region were the control variables. Immigration status was the moderator. The first two models were calculated in the pooled sample that included both immigrants and non-immigrants. *Model 1* did not include immigration by education and income interaction terms. *Model 2*, however, included immigration by education and income interaction terms. *Model 3* and *Model 4* were performed in non-immigrants and immigrants, respectively. Adjusted odds ratio (OR), 95% confidence intervals (CI), SE, and *P* values were reported. A *P* value of less than 0.05 was considered significant.

Results

Descriptive Statistics

The total sample in this study was 14 149 immigrant and non-immigrant American adults 55+ years old. [Table 3](#) depicts the descriptive statistics of the participants overall and based on nativity.

Pooled Sample Logistic Regressions

[Table 1](#) shows the results of two logistic regressions in the pooled sample with education and income as the predictors and current cigarette smoking status as the outcome (dependent variable). *Model 1* included only the main effects of education and income; however, *Model 2* added the interaction terms between immigration status, education, and

Table 1. Logistic Regressions in the Pooled Sample (n = 14 149)

	Model 1				Model 2			
	OR	95% CI		P	OR	95% CI		P
Immigrant	0.70	0.60	0.81	0.000	0.36	0.27	0.47	0.000
Ethnicity (Hispanic)	0.48	0.41	0.55	0.000	0.53	0.46	0.61	0.000
Race				0.000				0.000
White only								
Black/African American only	0.64	0.56	0.73	0.000	0.62	0.54	0.71	0.000
AIAN only	1.01	0.71	1.45	0.941	0.99	0.69	1.41	0.942
Asian only	0.83	0.66	1.05	0.117	0.71	0.56	0.90	0.004
Multiple races	1.03	0.79	1.34	0.847	1.01	0.78	1.32	0.916
Race group not releasable	0.51	0.22	1.21	0.128	0.56	0.24	1.32	0.187
Male	1.27	1.17	1.38	0.000	1.26	1.16	1.38	0.000
Age	0.99	0.99	1.00	0.000	0.99	0.99	1.00	0.000
Region								
West								
Northeast	0.99	0.86	1.13	0.865	0.98	0.86	1.13	0.806
Midwest	1.17	1.04	1.31	0.010	1.16	1.03	1.31	0.013
South	1.17	1.05	1.31	0.005	1.16	1.04	1.30	0.008
Married	0.60	0.55	0.66	0.000	0.61	0.56	0.67	0.000
Employed	0.95	0.85	1.06	0.372	0.96	0.86	1.08	0.495
Education				0.000				0.000
Less than 12 years								
12 years	0.81	0.70	0.94	0.005	0.70	0.60	0.83	0.000
13-15 years	0.51	0.44	0.60	0.000	0.43	0.36	0.51	0.000
16+ years	0.23	0.20	0.27	0.000	0.18	0.15	0.22	0.000
Income ≥ 35000 USD	0.69	0.63	0.76	0.000	0.64	0.58	0.71	0.000
Education x Immigrant								0.000
12 Years x Immigrant					1.30	0.91	1.86	0.149
13-15 years x Immigrant					1.94	1.34	2.81	0.000
16+ Years x Immigrant					2.63	1.81	3.83	0.000
Income ≥ 35000 USD x Immigrant					1.72	1.32	2.25	0.000
Constant	0.82			.084	0.97			0.797

income. Based on *Model 1*, high education and income were linked to lower odds of current cigarette smoking. *Model 2*, however, revealed statistically significant interactions between education and income with immigration status on current cigarette smoking status of adults. The model suggested that the protective effects of education and income against current cigarette smoking status were smaller for immigrant than non-immigrant adults (Table 1).

Stratified Logistic Regressions

Table 2 shows the results of one logistic regression on non-immigrants (*Model 3*) and one logistic regression in immigrants (*Model 4*). In these models, education and income were the predictors, and current cigarette smoking status was the outcome (dependent variable). Based on *Model 3*, high education levels and income were associated with lower odds of current cigarette smoking for non-immigrant adults. *Model 4* did not show protective effects of most education levels and income on current cigarette smoking for immigrant adults (Table 2).

Discussion

Education and income were associated with lower odds of current cigarette smoking status of adults. These effects, however, were larger for non-immigrants than immigrants.

Marginalization, broadly defined, reduces the health return of education and income among other SES indicators. This is supported by the observations that Blacks,³³ Hispanics,^{26,40} Asian Americans,⁴³ Native Americans,¹⁰ and people of the LGBT community⁴⁶ show MDRs. If any type of marginalization reduces the health gains that follow SES indicators such as education and income, similar patterns should be expected for immigrants.⁴⁸⁻⁵² Societal and structural factors such as social stratification, residential segregation, labor market discrimination, and low availability of resources in urban areas may all suggest that immigrants may be less likely to benefit from their education and income fully.

As education and income improve, tobacco use reduces, but less for immigrants than non-immigrants. This finding is an extension of previous literature on MDRs^{23,24} on diminishing returns of education,³⁵ income,²⁶⁻³⁰ occupation,^{31,32} and marital status⁴⁷ on a wide range of mental health outcomes

Table 2. Logistic Regressions in Non-immigrants and Immigrants (n = 14 149)

	Model 3			P	Model 4			P
	OR	95% CI			OR	95% CI		
Ethnicity (Hispanic)	0.52	0.44	0.62	<0.001	0.53	0.38	0.74	<0.001
Race				<0.001				0.028
White only								
Black/African American only	0.64	0.55	0.73	<0.001	0.48	0.31	0.74	0.001
AIAN only	1.05	0.72	1.53	0.819	0.60	0.18	2.01	0.407
Asian only	0.61	0.40	0.92	0.020	0.73	0.52	1.02	0.065
Multiple races	1.04	0.78	1.37	0.791	0.86	0.37	1.98	0.723
Race group not releasable	0.66	0.22	1.93	0.443	0.42	0.10	1.82	0.246
Male	1.13	1.03	1.24	0.008	2.77	2.16	3.56	<0.001
Age	0.99	0.99	1.00	<0.001	1.00	0.99	1.01	0.474
Region								
West								
Northeast	0.98	0.84	1.14	0.780	1.04	0.75	1.45	0.816
Midwest	1.21	1.07	1.37	0.003	0.79	0.54	1.15	0.218
South	1.19	1.06	1.35	0.004	0.97	0.74	1.27	0.811
Married	0.63	0.57	0.69	<0.001	0.49	0.38	0.61	<0.001
Employed	0.96	0.85	1.08	0.519	0.92	0.67	1.28	0.637
Education				<0.001				0.001
Less than 12 years								
12 years	0.70	0.59	0.83	<0.001	0.96	0.69	1.34	0.822
13-15 years	0.42	0.36	0.50	<0.001	0.95	0.66	1.36	0.768
16+ Years	0.18	0.15	0.21	<0.001	0.54	0.37	0.78	0.001
Income ≥ 35000 USD	0.66	0.60	0.73	<0.001	0.95	0.73	1.23	0.684
Constant	1.05			0.694	0.18			<0.001

such as psychological distress,⁵³ depression,^{27,54} suicide,³³ and anxiety.⁴⁷ Similar MDRs are reported for smoking,^{10,41,45,55,56} vaping,³⁹ drinking,^{40,57} diet,⁵⁸ and exercise,¹³ Finally, MDRs are seen for physical health outcomes such as obesity,^{35,36} self-rated health,^{26,34,53} chronic diseases,^{28,29,37} disability,⁵⁹ and mortality.³⁸ Not only educational attainment³⁴ and income,²⁸ but also occupation,³⁸ and marital status⁴⁷ all generate less health for the majority than marginalized people. Social marginalization, regardless of its type, whether it is based on race,⁶⁰ ethnicity,^{26,40} sexual orientation,⁴⁴⁻⁴⁶ or immigration are consistently associated with less health gain from income and other SES indicators.⁶⁰

The robust and consistent nature of the MDRs shifts the blame from the marginalized people to the society that reduces the gain of all vulnerable and disadvantaged groups. Thus, these patterns suggest that the MDRs are due to the function and structure of society. US social institutions treat people differentially based on their color, race, ethnicity, class, heritage, and nativity, resulting in systemic marginalization of non-majority groups. Such marginalization reduces people's chances for enjoying full participation and full benefits from resources that are available to them. The racism, xenophobia, and nationalism embedded in the social fabric of the US society reduce immigrants, LGBTs, and racial and ethnic minorities' ability to fully leverage their human capital and turn it into tangible outcomes. As a result, they show less than expected benefits in the presence of education, income, and

other SES resources.^{23,24}

Implications

To undo MDRs, bold policies are needed that can equalize the health return of education and income as well as other SES indicator cross groups. Such policies should go beyond equal access to education and income and focus on equality in the returns of SES indicators across social groups. Specific policies and programs should help immigrants to more effectively mobilize and leverage their education and income to gain tangible outcomes. Ways by which the purchasing power of immigrants can be enhanced should be studied in future research.

Limitations

The current results should be interpreted with the methodological limitations in mind. First, any cross-sectional study is limited in drawing causal inferences. It cannot be ruled out that excessive health problems influence social mobility and the ability to generate educational mobility and income. Thus, reverse causality cannot be ruled out in this study. Thus, the results should be interpreted not as causation, but as association. Moreover the mechanisms by which MDRs of education and income emerge were not studied. The lower purchasing power of income for immigrants may be the mechanism. Access to the country of origin was not available; nor did we control for type of occupation, wealth, assets,

Table 3. Descriptive Statistics Overall and Based on Immigration (n = 14149)

	All		Non-Immigrant		Immigrant	
	No.	%	No.	%	No.	%
Immigrants						
No	12 166	86.0	12 166	100.0	-	-
Yes	1977	14.0	-	-	1977	100.0
Ethnicity*						
Non-Hispanic	12 698	89.7	11 668	95.9	1026	51.9
Hispanic	1451	10.3	498	4.1	951	48.1
Race*						
White only	11 351	80.2	10 047	82.6	1298	65.7
Black/African American only	1843	13.0	1671	13.7	172	8.7
AIAN only	123	0.9	98	0.8	25	1.3
Asian only	599	4.2	148	1.2	451	22.8
Multiple races	218	1.5	194	1.6	24	1.2
Race group not releasable	15	0.1	8	0.1	7	0.4
Gender						
Women	8079	57.1	6917	56.9	1159	58.6
Men	6070	42.9	5249	43.1	818	41.4
Region*						
Northeast	2531	17.9	2030	16.7	501	25.3
Midwest	3002	21.2	2836	23.3	166	8.4
South	4881	34.5	4262	35.0	617	31.2
West	3735	26.4	3038	25.0	693	35.1
Marital status*						
Non-Married	7769	54.9	6777	55.7	990	50.1
Married	6380	45.1	5389	44.3	987	49.9
Employed						
No	9759	69.0	8429	69.3	1326	67.1
Yes	4390	31.0	3737	30.7	651	32.9
Education*						
Less than 12 years	2257	16.1	1590	13.1	666	34.2
12 years	3898	27.7	3476	28.7	421	21.6
13-15 years	3519	25.0	3210	26.5	309	15.9
16+ years	4388	31.2	3834	31.7	550	28.3
Income > 35 k*						
No	2137	47.9	1790	46.8	347	54.8
Yes	2324	52.1	2038	53.2	286	45.2
Current smoking*						
No	28 126	83.9	22 480	82.3	5631	90.7
Yes	5415	16.1	4836	17.7	576	9.3
	Mean	SD	Mean	SD	Mean	SD
Age*	68.17	9.09	68.28	9.13	67.55	8.80

* $P < 0.05$ for comparison of immigrants and non-immigrants.

or parental education. Future research should replicate and validate these findings using longitudinal data with a more comprehensive list of measures on nativity, country of origin, and other SES indicators. Future research may also include contextual factors such as neighborhoods' ethnic composition, SES, or density of resources as factors that may cause MDRs. It is likely that highly educated and high-income immigrants report poor mental health, because they need to spend more time on the job or they face extra stress to gain such education and income. Finally, there is a need to compare immigrants from Asia, Africa, and Latino countries, as each culture may adopt US culture differently.

Conclusion

While education and income reduce the odds of current

cigarette smoking status of American adults, these influences are weaker for immigrants than non-immigrants. Thus, tobacco use disparities in immigrants are beyond SES inequalities and also diminishing marginal returns of SES indicators such as education and income for immigrants. To eliminate health inequalities that impact immigrants, it is essential to recognize and address MDRs-related inequalities that endure across all SES levels.

Conflict of Interest Disclosures

The author declares no conflicts of interest.

Ethical Approval

All participants signed written consent forms. The NHIS protocol was approved by the CDC Instructional Review

What Is Already Known?

High education and income are associated with lower odds of current cigarette smoking; however, these effects may vary across population sub-groups.

What This Study Adds?

In line with the marginalization-related diminished returns, education and income generate less protection against cigarette smoking for immigrants than non-immigrants in the United States. As a result, we may observe a higher than expected prevalence of smokers among highly educated and high-income immigrants.

Board (IRB). According to the NIH guideline as well as the decision tool regarding human subject research, secondary analyses of publicly available fully de-identified existing data are “Non-Human Subject Research.” The definition of the “Non-Human Subject Research” as well as the decision tool are available here: <https://grants.nih.gov/policy/humansubjects/hs-decision.htm>. Non-human subject research is exempt from the IRB review.

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