Association of American Identity with Cardiovascular Health in South Asian Americans: The MASALA Study

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Background: Ethnic and national identity may influence cardiovascular health (CVH)-related behaviors, such as dietary preference. To better understand how acculturation is related to CVH among South Asian American adults, we evaluated the association of self-rated American identity with CVH factors among participants of the Mediators of Atherosclerosis in South Asians Living in America (MASALA) Study.

Methods: Multivariable linear regression quantified the associations of self-rated American identity [1 (low American identity) to 10 (high American identity)] with CVH factors, including measures of cholesterol, blood pressure, and blood glucose. The role of diet quality, physical activity, and social support in mediating these associations was evaluated.

Results: Participants ($n = 771$) lived in the United States for an average of 27 (SD 11) years. The mean self-rated American identity score was 5.5 (2.4). After adjustment, a 5-point higher American identity score was associated with 6.5 mg/dL higher low-density lipoprotein cholesterol, 6.6 mg/dL higher total cholesterol, 2.9 mmHg higher systolic blood pressure, and 1.4 mmHg higher diastolic blood pressure. Accounting for diet quality, physical activity, or social support does not alter these associations.

Conclusions: Higher self-rated American identity is associated with worse CVH factors among South Asian American adults.

Key Words: American identity ▪ South Asian ▪ immigrant ▪ cardiovascular health ▪ lipids ▪ blood pressure ▪ risk factors

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People who identify as South Asian (with origin from Bangladesh, India, Nepal, Pakistan, or Sri Lanka) comprise one of the fastest-growing populations in the United States (US). South Asian individuals experience disproportionately more cardiovascular disease (CVD) at younger ages compared with other racial and ethnic groups.[1–3] Sociocultural factors related to immigration may influence cardiovascular health (CVH), leading to a disproportionate burden of CVD in this group. For instance, acculturation (the process of retaining, adopting, and integrating beliefs, values, and behaviors between two cultures) has been linked to health behaviors among South Asian Americans.[4]

An analysis of participants from the Mediators of Atherosclerosis in South Asians Living in America (MASALA) Study showed that South Asian women who employed acculturation strategies that incorporated either a similar preference for South Asian and American culture or a preference for American culture had more favorable CVH than women who had a preference for South Asian culture.[5] This analysis by Al Sofiani and colleagues evaluated three acculturation strategies, namely, separation (preference for South Asian culture over American culture), integration (similar preference for South Asian and American culture), and assimilation (preference for American culture over South Asian culture). Acculturation may shape ethnic identity and national identity. Ethnic identity is a concept related to acculturation but can develop independently of acculturation. Ethnic identity refers to the strength of

POPULAR SCIENTIFIC SUMMARY

- Higher self-rated American identity is associated with worse LDL cholesterol, total cholesterol, systolic blood pressure, and diastolic blood pressure
- These associations were independent of participants' exercise, diet quality, or social support
- There was no association between American identity and HbA1c or overall CVH score

the connection between an immigrant and their native ethnic group, while national identity reflects integration with a host nation. Both may influence psychosocial factors and health behaviors, including diet, physical activity, and social support (Fig. 1).[6–11] However, there is limited evidence describing the role of ethnic and national identity on CVH factors in South Asian Americans.

Identifying the association of ethnic or national identity with CVH may help better understand the role of acculturation in health among South Asian Americans. We investigated the association of self-rated American identity and CVH in participants of the MASALA Study. Given prior evidence, we hypothesized that higher self-rated American identity would be associated with better CVH, after accounting for self-rated South Asian identity. We further explored if these associations were modified by sex and mediated by exercise, diet, and social support.

METHODS
Participants

The MASALA Study is an observational, prospective cohort of South Asian adults living in the United States.[12] The MASALA baseline study enrolled 906 South Asian men and women aged 40–79 years between 2010 and 2013, from the Chicago metropolitan region and the San Francisco Bay Area. For this analysis, 771 MASALA participants who completed an ancillary social networks survey and had clinical data for CVH measures at a follow-up visit (2015–2018) were included. Survey data collection occurred in English and several South Asian languages, at the participants' preference. Participants were excluded in individual statistical models where data were missing [n = 92 missing composite CVH score, n = 60 missing low-density lipoprotein (LDL) cholesterol, n = 56 missing total cholesterol (TCH), n = 54 missing systolic blood pressure (SBP), n = 54 missing diastolic blood pressure (DBP), n = 59 missing hemoglobin A1c (HbA1c), and n = 56 missing self-rated health].

Variable definitions

Self-rated American identity was defined as a response to the survey question 'How American do you feel?' on a scale of 1–10, with 10 being the highest self-rated American identity. Self-rated South Asian identity was defined as a response to the survey question 'How South Asian do you feel?' on a scale of 1–10, with 10 being the highest self-rated South Asian identity. The two identity scores were independent (not summative, i.e., were not required to sum to 10). CVH measures included a composite CVH score based on the American Heart Association Life's Simple 7 score[13] [1 (low CVH) to 14 (high CVH)] and individual clinical factors, including TCH and LDL (mg/dL), SBP and DBP (mmHg), and HbA1c (%). Participants self-rated their own health [1 (poor) to 10 (optimal)]. Covariates included age in years, sex, study site, number of years lived in the United States, South Asian identity score, self-reported exercise (MET-min/week), body mass index (BMI, kg/m²), social support (self-rated answer to 'How supported do you feel?': none/a little of the time, some of the time, most of the time/all of the time), dietary quality as measured by AHEI-2010 score [score 0 (poor diet quality) to 110 (optimal diet quality)], smoking status (current versus former/never smoker), and alcohol use (yes or no).

Statistical analysis

Summary statistics including means (standard deviation) and frequencies of sociodemographic characteristics, identity measures, CVH measures, and covariates were calculated. These measures were compared across sex using t-tests and chi-square tests. A Pearson correlation coefficient was calculated to evaluate the relationship between the American identity score and the South Asian identity score. Multivariable linear regression estimated the association of a 5-point (approximately two-standard deviation) higher self-rated American identity score with the composite CVH score and individually with LDL, TCH, SBP, DBP, and HbA1c. Regression models were adjusted for age, sex, self-rated South Asian identity, BMI, study site, and number of years lived in the United States.

In mediation analysis, we evaluated exercise, diet quality, and social support individually as potential mediators. Mediation was defined as clinically meaningful if the inclusion of the variable in the regression model resulted in a change of the beta coefficient of the American identity score by ± 20%, compared with the beta coefficient of the American identity variable prior to variable inclusion. Interactions between sex and American identity in association with CVH outcomes were also modeled. Statistically significant associations were identified with two-sided
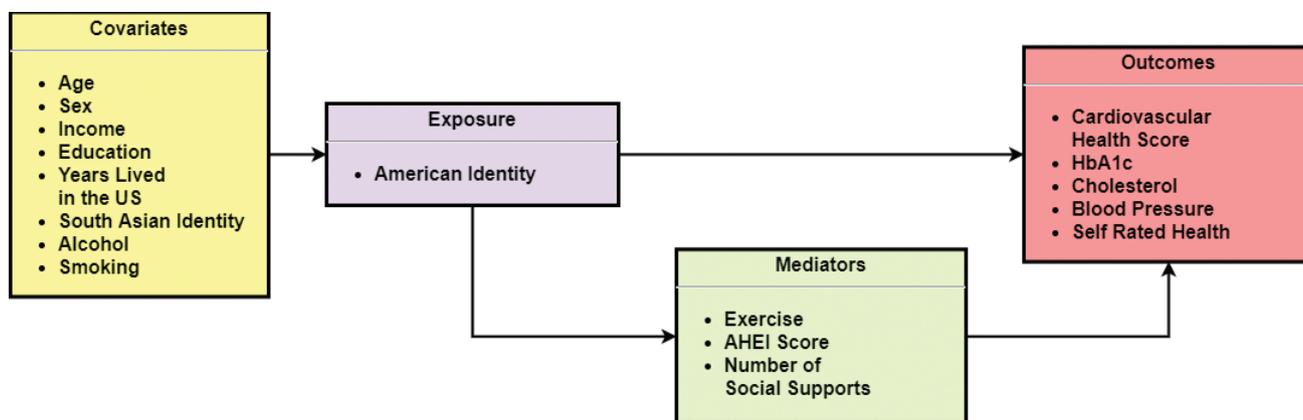
Figure 1. Conceptual model for the relationship between American identity and cardiovascular health in South Asian Americans. AHEI, Alternative Healthy Eating Index; SES, socioeconomic status; US, United States; HbA1c, hemoglobin A1c.

Table 1. MASALA participant characteristics.

	Overall (N = 771)		Women (N = 340)		Men (N = 441)		
	n	%	n	%	n	%	P
Age, years, mean (SD)	55.3	9.2	54.2	8.5	56.2	9.6	<0.01
Years lived in the United States, mean (SD)	27.3	11.0	26.5	11.0	27.9	10.9	0.07
Bachelor's degree or higher (%)	473	61	187	55	286	66	<0.01
Annual family income ≥$75,000/year, N (%)*	570	74	253	74	317	73	0.56
English speaking ability, N (%)							0.12
Not at all or poorly	24	3	39	12	35	8	
Fairly well	67	9	10	3	7	2	
Well or very well	680	88	291	86	389	90	
BMI, kg/m², mean (SD)	26.4	4.0	26.7	4.3	26.2	3.8	0.13
Smoking, N (%)							<0.01
Former/never	743	96	336	99	407	94	
Current	28	4	4	1	24	6	
Alcohol use, N (%)	268	35	68	20	200	46	<0.01
Site, N (%)							<0.01
San Francisco Bay Area	449	58	219	64	230	53	
Chicago metropolitan area	322	42	121	36	211	47	

BMI, body mass index.

*Frequencies may not add to 100% due to missing data.

t-tests at $\alpha = 0.05$. Analyses were conducted with R version 4.0.1.

RESULTS

Among the 771 participants included, the mean age was 55.3 [standard deviation (SD) 9.2] years and 44% were women (Table 1). Participants lived in the United States for an average of 27.3 (SD 11.0) years. Most participants had educational attainment beyond a bachelor's degree (61%), and 88% of participants reported that they spoke English 'Well' or 'Very Well'.

The mean self-rated American identity score was 5.5 (SD 2.4), and the mean self-rated South Asian identity score was 7.9 (SD 2.2) with 32% of participants self-rating their South Asian identity score as 10 (Fig. 2). The correlation coefficient between the American identity score and the South Asian identity score was −0.07 ($P = 0.04$). CVH measures and covariates are summarized in Table 2. Women had a higher mean composite CVH score than men, but higher mean LDL and TC. Men had a higher mean SBP, DBP, HbA1c, and self-rated health score.

American identity and South Asian identity were self-rated by participants on a scale of 1−10, answering the question 'How American do you feel?' or 'How South Asian do you feel?' respectively.
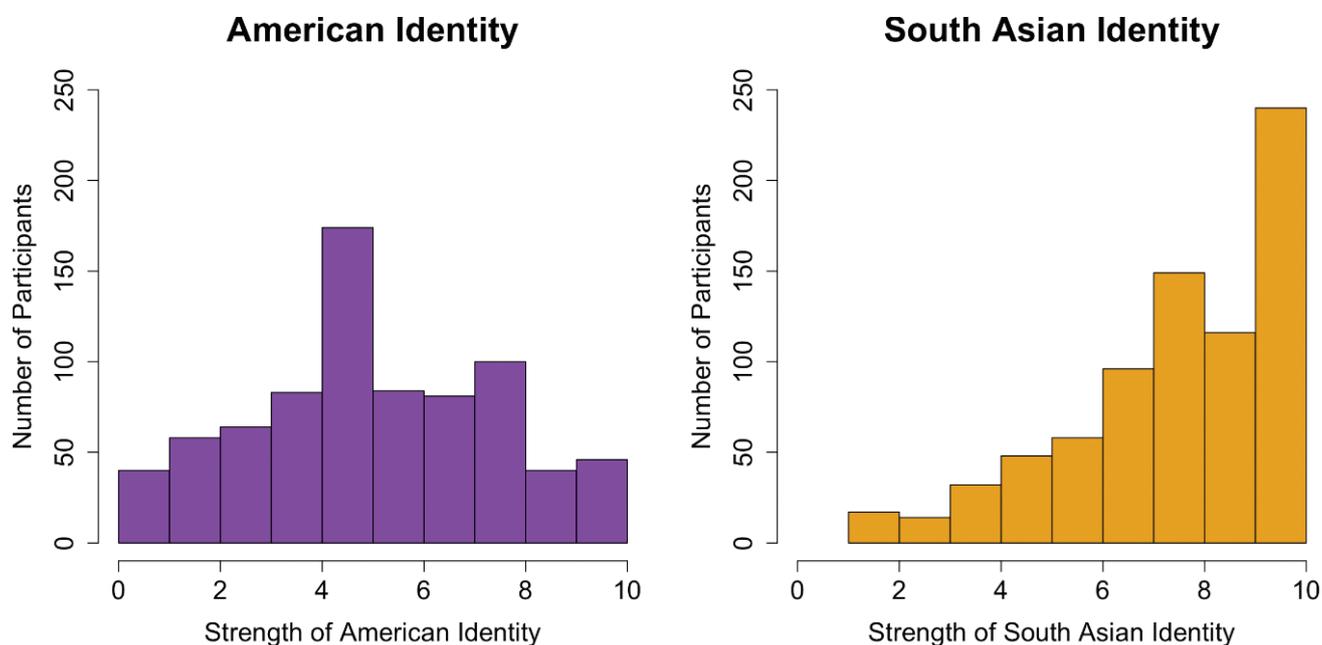
Figure 2. Distribution of self-rated American and South Asian identity scores in the mediators of atherosclerosis in South Asians living in America participants.

Table 2. Identity and cardiovascular health measures in the mediators of atherosclerosis in South Asians living in America participants.

	Overall (*N* = 771)	Women (*N* = 340)	Men (*N* = 441)	*P*
American identity score, mean (SD)	5.5 (2.4)	5.2 (2.4)	5.7 (2.4)	<0.01
South Asian identity score, mean (SD)	7.9 (2.1)	8.0 (2.0)	7.9 (2.2)	0.41
AHEI diet quality score, mean (SD)	72.4 (6.8)	73.0 (6.4)	72.0 (7.1)	0.04
Exercise, MET-min/week, mean (SD)	1,521 (1,434)	1,472 (1,327)	1,559 (1,514)	0.41
Social support score, *N* (%)				0.13
0–9, none/a little of the time	46 (6%)	22 (7%)	24 (6%)	
10–16/some of the time	145 (19%)	74 (22%)	71 (17%)	
17–24 most/all of the time	580 (75%)	244 (72%)	336 (78%)	
CVH score, mean (SD)	8.9 (1.9)	9.4 (1.8)	8.5 (1.9)	<0.01
Systolic blood pressure, mmHg, mean (SD)	128 (17)	125 (19)	130 (16)	<0.01
Diastolic blood pressure, mmHg, mean (SD)	75 (9.53)	73 (9)	77 (9)	<0.01
HbA1c, %, mean (SD)	6.2 (0.9)	6.1 (0.8)	6.3 (0.9)	<0.01
LDL cholesterol, mg/dL, mean (SD)	111 (34)	116 (34)	106 (37)	<0.01
Total cholesterol, mg/dL, mean (SD	186 (42)	197 (38)	178 (42)	<0.01
Self-rated health score, mean (SD)	7.8 (1.4)	7.7 (1.4)	7.9 (1.4)	0.05

AHEI, Alternative Healthy Eating Index; CVH, cardiovascular health; HbA1c, hemoglobin A1c; LDL, low-density lipoprotein.

*Frequencies may not add to 100% due to missing data.

The association of self-rated American identity with CVH is shown in Table 3. A five-point higher self-rated American identity score was associated with 2.9 mmHg (95% CI 0.4, 5.4) higher SBP, a 1.4 mmHg (95% CI 0.02, 2.9) higher DBP, a 6.6 mg/dL (95% CI 0.3, 13) higher TC, and 6.5 mg/dL (95% CI 0.9, 12) higher LDL. Self-rated American identity was not significantly associated with the composite CVH score, self-rated health score, or HbA1c. For the CVH measures that were significantly associated with American identity, mediation analysis was performed. Diet, exercise, or social support did not significantly alter the association between American identity and any CVH measure. Additionally, no interaction effect by sex on American identity was noted on CVH outcomes.

Table 3. Association of self-rated American identity and clinical cardiovascular health factors.

	Difference in CVH measure per 5-point higher American identity score (95% confidence interval)	P
CVH Score (range 0−14)	−0.05 (−0.3, 0.2)	0.58
LDL cholesterol, mg/dL	6.5 (0.9, 12)	0.02
Total cholesterol, mg/dL	6.6 (0.3, 13)	0.04
Systolic blood pressure, mmHg	2.9 (0.4, 5.4)	0.03
Diastolic blood pressure, mmHg	1.4 (0.02, 2.9)	0.05
Hemoglobin A1c, %	−0.07 (−0.2, 0.1)	0.35
Self-rated health (range 1−10)	0.11 (−0.1, 0.3)	0.31

CVH, cardiovascular health; LDL, low-density lipoprotein. Associations adjusted for age, sex, self-rated South Asian identity, body mass index, study site, number of years lived in the United States, smoking, and alcohol status.

DISCUSSION

Among immigrant South Asian American adults in the MASALA Study, self-rated American identity was associated with worse LDL cholesterol, TCH, SBP, and DBP after adjustment for ethnic South Asian identity, sociodemographic factors, and BMI. These associations were not influenced by participants' exercise, diet quality, or social support. Our findings suggest that American identity may be related to these CVH factors in this community, which lends support to the constructs of identity as important dimensions of acculturation that influence health among immigrant populations in the United States. Notably, we did not observe an association between American identity and HbA1c or overall CVH score, which may indicate that American identity is not as strongly linked to mechanisms influencing diabetes risk in this population. While the clinical significance of the magnitude of difference in CVH factors associated with higher American identity at the population level is unclear, these data suggest that national American identity (as one measure of acculturation) may be related to differences in CVH among South Asian Americans. The mechanisms by which American national identity may affect CVH factors remain to be clarified.

The relationship between higher self-rated American identity and worse CVH factors is discordant with previous findings in other ethnic groups suggesting that greater American identity is related to better health. Research suggests that a strong national identity, in addition to a strong ethnic identity, is associated with better psychosocial well-being, but that these associations vary by the host country and by an immigrant group. For instance, Japanese Americans with a strong national and ethnic identity had favorable measures of optimism, subjective well-being, and satisfaction with life in comparison to other groups that did not form a bicultural identity.[14] Latinx individuals with a stronger national and ethnic identity had lower measures of perceived stress.[15] Among racial and ethnic minority college students, higher national identity was related to fewer depressive symptoms.[16] Importantly, the conception of national identity is likely unique in different ethnic groups and may be unique at an individual level, so these described findings may not be generalizable outside the studied group or community. While stronger national identity may represent integration and acceptance into the host American society, it may also comprise the adoption of American cultural norms or joining social networks that have a less favorable impact on CVH.[17]

Our mediation analysis suggests that the relationship between American identity and CVH factors in South Asian Americans may not operate through physical activity, diet quality, or social support. Prior analyses in MASALA have shown both positive and negative associations between acculturation-related factors and CVH.[5,18] One study in this population found that South Asian Americans with weaker traditional cultural beliefs consumed a higher quality diet, as measured by AHEI score, but simultaneously consumed more animal protein, which is related to higher BMI and waist circumference.[18] Importantly, American identity and traditional cultural beliefs are not necessarily measures of the same concept. We found that self-rated American identity was minimally correlated with self-rated South Asian identity in this participant sample, aligned with prior work showing that ethnic identity is distinct from national identity in South Asian Americans.[4] It is plausible that individuals could have a strong American identity and simultaneously adhere to traditional South Asian cultural beliefs and practices. These data are hypothesis-generating and will inform future work to understand how acculturation influences health-related beliefs and behaviors.

Our study has several potential limitations. First, the available data are cross-sectional, limiting causal inference. Future prospective studies of this association, for example, evaluating how self-rated American identity changes over time, would be informative. Second, these data are from South Asian Americans in two US metropolitan areas, so may not reflect regional influences among South Asian adults in other areas of the United States. Third, the MASALA Study participants are primarily Asian Indian, and the small sample size of participants from other South Asian countries precludes the evaluation of differences in American identity in South Asian subgroups. Fourth, multiple measures of

CVH behaviors, including physical activity and diet quality, are self-reported so may be subject to recall bias. Nevertheless, these data in a large community-based sample inform a better understanding of acculturation and health among South Asian American adults.

In conclusion, we observed that a higher self-rated American national identity was associated with worse CVH factors in South Asian American adults, independent of ethnic South Asian identity. While the mechanisms of these associations remain to be identified, these exploratory findings suggest that the development of a stronger American identity may sub-optimally influence health in South Asian American adults. Identifying how the development of American identity influences psychological and behavioral pathways to health outcomes in this population may inform intervention strategies to improve CVH and reduce health disparities.

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