

# A Cross-Sectional Analysis of Differences in Physical Activity Levels between Stroke Belt and Non-Stroke Belt US Adults

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*Background:* The Stroke Belt is a region of the United States with elevated stroke incidence and prevalence of stroke risk factors. Physical inactivity is an important stroke risk factor, but little is known about whether current physical activity levels differ between Stroke Belt and non-Stroke Belt states. In this nationally representative study, we determined whether unadjusted and adjusted physical activity levels differ between the Stroke Belt region and the rest of the United States. *Methods:* Using 2017 Behavioral Risk Factor Surveillance System data, we conducted bivariate analyses to obtain unadjusted physical activity levels in Stroke Belt and non-Stroke Belt states. Logistic regressions that controlled for sociodemographic and stroke risk factors were created to estimate adjusted associations between Stroke Belt residence and physical activity. *Results:* A higher percentage of Stroke Belt residents were inactive (Stroke Belt: 35.3%, non-Stroke Belt: 29.4%) and failed to meet physical activity guidelines (Stroke Belt: 53.7%, non-Stroke Belt: 47.8%) compared to non-Stroke Belt residents. Stroke Belt residence was significantly associated with lower odds of meeting physical activity guidelines in a model that adjusted for sociodemographic factors only (odds ratio [OR]: 0.85, 95% confidence interval [CI]: 0.78-0.91) and one that adjusted for both sociodemographic and stroke risk factors (OR: 0.87, 95% CI: 0.81-0.93). *Conclusions:* The considerably lower physical activity levels and likelihood of meeting physical activity guidelines in Stroke Belt residents compared to their non-Stroke Belt counterparts demonstrates a need for clinician attention and public health interventions to increase regular physical activity as part of a stroke reduction strategy in this region.

**Key Words:** Stroke belt—physical activity—behavioral risk factor surveillance system—logistic regression

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## Introduction

The Stroke Belt is a United States (US) region where elevated stroke incidence and mortality have been observed since the 1940s.<sup>1-4</sup> Among people with more than or equal to 65 years who are most at risk for stroke, the 2015 stroke hospitalization and mortality rate was 25.7 cases of 1000 people and 302.5 deaths of 100,000 people, respectively, in

Stroke Belt states compared to 20.2 cases of 1000 people and 248.8 deaths out of 100,000 people in non-Stroke Belt states.<sup>5,6</sup> Additionally, the prevalence of stroke risk factors such as high blood pressure (Stroke Belt: 48.9%, non-Stroke Belt: 39.2%), smoking (Stroke Belt: 17.1%, non-Stroke Belt: 14.2%), diabetes (Stroke-Belt: 17.3%, non-Stroke Belt: 12.2%),

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Received August 17, 2019; revision received September 18, 2019; accepted September 20, 2019.

*Disclosures:* None.

*Funding:* There was no funding for this study.

*Ethical approval:* This article does not contain any studies with human or animals participants performed by any of the authors. All data that was used is publicly available and anonymized.

*Informed consent:* This is not applicable to the study.

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1052-3057/\$ - see front matter

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<https://doi.org/10.1016/j.jstrokecerebrovasdis.2019.104432>

obesity (Stroke Belt: 33.3%, non-Stroke Belt: 29.1%), and high cholesterol (Stroke Belt: 46.0%, non-Stroke Belt: 41.7%) in 2015 was greater in the Stroke Belt region than in other parts of the US.<sup>3,5,7-10</sup>

Physical inactivity is highlighted as a major stroke risk factor by the Centers for Disease Control and Prevention (CDC) and the American Stroke Association.<sup>11,12</sup> However, in contrast to other prominent stroke risk factors, there is little work exploring whether differences in physical activity levels exist between Stroke Belt and non-Stroke Belt states.<sup>13</sup> What little work there is on this topic mainly focuses on describing physical activity levels in the Stroke Belt during the previous decade, leaving a gap for a study that compares current physical activity levels between this region and the rest of the United States.<sup>13</sup>

In this study, we examined whether physical activity levels differ between adults living in the Stroke Belt and those in other United States areas using national survey data from 2017. We also determined if these patterns continued to exist after adjusting for sociodemographic and stroke risk factors. Findings from this study offer a comprehensive look at an important modifiable stroke risk factor in the Stroke Belt, which can guide development of interventions to reduce the high stroke incidence and mortality in this region.

## Methods

### *Study Population*

The Behavioral Risk Factor Surveillance System (BRFSS) is a nationally representative cross-sectional annual survey conducted through a concerted effort between the CDC and state public health departments that collects information on survey participants' demographics, chronic conditions, and health behaviors.<sup>14</sup> These surveys have been extensively validated since they were first carried out in 1984 and serve as an important resource for health research.<sup>14-17</sup> The BRFSS administers the survey questionnaire via landline or cell phone to noninstitutionalized adults residing in all 50 states and the District of Columbia.<sup>14</sup> As there may be low numbers of minority groups in certain geographic areas, the BRFSS performs oversampling to ensure that all racial groups are adequately represented in the survey.<sup>14</sup> BRFSS survey data is completely anonymized and is publicly available online for download and use at the CDC's website: [https://www.cdc.gov/brfss/data\\_documentation/index.htm](https://www.cdc.gov/brfss/data_documentation/index.htm).<sup>14</sup> Our study population consists of 2017 BRFSS survey participants with recorded physical activity information. We chose this BRFSS survey year because it is the most recent survey that contains physical activity data.

### *Stroke Belt Status*

We categorized all 50 states as being either Stroke Belt states (SB) or non-Stroke Belt states (NSB) using geographic boundaries laid out by the Reasons for Geographic and Racial Differences in Stroke study.<sup>1,2,8</sup> In total, 8 states

(North Carolina, South Carolina, Georgia, Tennessee, Mississippi, Alabama, Louisiana, and Arkansas) were designated as Stroke Belt states while the remaining 42 were non-Stroke Belt States.<sup>1,2,8</sup>

### *Outcome and Covariates*

The study outcome was a calculated BRFSS physical activity (`_PACAT1`) variable based on how many minutes each week an individual engaged in physical activity.<sup>18,19</sup> People were considered inactive if they had no physical activity in the last 2 weeks, insufficiently active if they had some physical activity but less than 150 minutes/week of moderate-intensity equivalent physical activity, active if they had 150-300 minutes/week of moderate-intensity equivalent activity, and highly active if they had more than 300 minutes/week of moderate-intensity equivalent physical activity.<sup>18,19</sup> Inactive and insufficiently active individuals were considered to have not met physical activity guidelines set by the US Department of Health and Human Services (HHS) and the American Heart Association (AHA), and active and highly active individuals were considered to have met them.<sup>20,21</sup> Following what is commonly done in CDC conducted studies using BRFSS data, survey participants who were not asked about how many minutes of physical activity they engaged in each week or had missing data for this measure were excluded from the study.<sup>22,23</sup>

A number of sociodemographic (age, sex, race, household income, education, marital status, health care coverage, have personal doctor or health care provider) and stroke risk factors (body mass index (BMI), high blood pressure, high cholesterol, diabetes, and smoking status) were identified as potential confounders from literature on physical activity and stroke.<sup>3,24-39</sup> Sociodemographic and stroke risk factor variables were defined using the 2017 BRFSS codebook, and variable categories are as follows: age (18-24, 25-34, 35-44, 45-54, 55-64, 65 or older), sex (Male, Female), race (White, Black, Hispanic, Asian, Native Hawaiian or Pacific Islander, American Indian/Alaskan Native, Other Race), household income (<\$15,000, \$15,000-<\$25,000, \$25,000-<\$35,000, \$35,000-<\$50,000, >\$50,000), education (Did not graduate High School, High school graduate, Some college or technical school, College graduate), marital status (Divorced, Widowed, Separated, Never Married, Married, A member of an unmarried couple), health care coverage (Yes, No), have personal doctor or health care provider (Yes, No), BMI (Underweight [BMI < 18.50 kg/m<sup>2</sup>], Normal Weight [18.50 kg/m<sup>2</sup> ≤ BMI < 23.00 kg/m<sup>2</sup>], Overweight [23.00 kg/m<sup>2</sup> ≤ BMI < 27.50 kg/m<sup>2</sup>], Obese [BMI ≥ 27.50 kg/m<sup>2</sup>]), high blood pressure (Yes, No), high cholesterol (Yes, No), diabetes (Yes, No), and smoking status (Smokes every day, Smokes some days, Former smoker, Never smoker).<sup>19,40</sup> These variables were adjusted for analyses to reduce the potential for biased study estimates.<sup>41</sup> Study participants were not excluded if they had missing values for any of the sociodemographic or stroke risk factors.

**Table 1.** Sociodemographic factors among eligible study participants in the 2017 Behavioral Risk Factor Surveillance System survey (n = 444, 523)

Covariates	Stroke Belt		Non-Stroke Belt	
	(n = 50,587)		(n = 393,936)	
	n	%	n	%
<i>Age</i>				
18-24	2589	5.2	23,135	5.9
25-34	4938	9.9	41,516	10.5
35-44	5530	11.0	45,767	11.6
45-54	7709	15.4	61,125	15.5
55-64	10,587	21.1	84,920	21.6
65 or older	18,734	37.4	137,473	34.9
Refused/missing	0		0	
<i>Sex</i>				
Male	20,667	41.3	175,623	44.6
Female	29,389	58.7	218,061	55.4
Refused/missing	31	0.1	252	0.1
<i>Race</i>				
White	33,782	67.5	303,204	77.0
Black	11,208	22.4	24,533	6.2
Hispanic	1674	3.3	30,824	7.8
Asian	408	0.8	9024	2.3
Native Hawaiian or Pacific Islander	55	0.1	953	0.2
American Indian/Alaskan Native	639	1.3	7740	2.0
Other Race	1199	2.4	10,046	2.6
Refused/missing	1122	2.2	7612	1.9
<i>Household income</i>				
<\$15,000	5481	10.9	30,297	7.7
\$15,000-<\$25,000	8263	16.5	52,368	13.3
\$25,000-<\$35,000	4620	9.2	34,571	8.8
\$35,000-<\$50,000	5708	11.4	46,954	11.9
>\$50,000	16,639	33.2	165,016	41.9
Refused/missing	9376	18.7	64,730	16.4
<i>Education</i>				
Did not graduate High School	5255	10.5	26,439	6.7
High school graduate	14,943	29.8	105,916	26.9
Some college or technical school	13,535	27.0	109,641	27.8
College graduate	16,173	32.3	150,436	38.2
Refused/missing	181	0.4	1,504	0.4
<i>Marital status</i>				
Divorced	24,734	49.4	205,540	52.2
Widowed	7222	14.4	53,455	13.6
Separated	7396	14.8	46,566	11.8
Never Married	1540	3.1	7694	2.0
Married	7739	15.5	64,955	16.5
A member of an unmarried couple	1142	2.3	12,922	3.3
Refused/missing	314	0.6	2804	0.7
<i>Health care coverage</i>				
Yes	44,809	89.5	362,213	92.0
No	5046	10.1	30,189	7.7
Refused/missing	233	0.5	1534	0.4
<i>Have personal doctor or health care provider</i>				
Yes, only one	37,142	74.2	299,321	76.0
More than one	4896	9.8	28,532	7.2
No	7851	15.7	64,481	16.4
Refused/missing	198	0.4	1602	0.4

(Continued)

**Table 1** (Continued)

Covariates	Stroke Belt		Non-Stroke Belt	
	(n = 50,587)		(n = 393,936)	
	n	%	n	%
<i>BMI</i>				
Underweight (BMI < 18.50)	809	1.6	6018	1.5
Normal Weight (18.50 ≤ BMI < 23.00)	13,271	26.5	113,854	28.9
Overweight (23.00 ≤ BMI < 27.50)	16,139	32.2	130,933	33.2
Obese (BMI ≥ 27.50)	15,780	31.5	111,075	28.2
Don't know/not sure/missing	4088	8.2	32,056	8.1
<i>High blood pressure</i>				
Yes	25,997	51.9	238,332	60.5
No	23,948	47.8	154,364	39.2
Don't know/not sure/missing	142	0.3	1240	0.3
<i>High cholesterol</i>				
Yes	19,628	39.2	136,976	34.8
No	27,338	54.6	228,669	58.1
Don't know/not sure/missing	3121	6.2	28,291	7.2
<i>Diabetes</i>				
Yes	8832	17.6	53714	13.6
No	41160	82.2	339539	86.2
Don't know/not sure/missing	95	0.2	683	0.2
<i>Smoking status</i>				
Smokes everyday	5551	11.1	38,552	9.8
Smokes somedays	2551	5.1	16,076	4.1
Former smoker	13,113	26.2	107,428	27.3
Never smoker	26,639	53.2	215,490	54.7
Don't know/not sure/missing	2233	4.5	16,390	4.2

### Statistical Analyses

We determined distributions of each sociodemographic and stroke risk factor by Stroke Belt status. Bivariate analyses were used to examine the unadjusted prevalence of physical activity in Stroke Belt states and non-Stroke Belt states. A logistic regression model was fit to assess whether living in the Stroke Belt was associated with physical activity after adjustment for sociodemographic and stroke risk factors. We modeled the outcome of having met physical activity guidelines in a 2-step process. In the first step, we adjusted for sociodemographic factors (age, sex, race, household income, education, marital status, health care coverage, have personal doctor or health care provider) and then we adjusted for both sociodemographic and stroke risk factors (BMI, high blood pressure, high cholesterol, diabetes, smoking status) in step 2. Survey weights were applied to the model to account for the BRFSS's intricate survey design and unequal weighting process.<sup>19,40</sup> Indicator variables for each covariate with missing data were created and included in the model. Results for these indicator variables are not presented since they serve only to ensure statistically accurate estimates.<sup>42</sup> We also tested second order interactions between Stroke Belt status and associated stroke risk factors (Stroke Belt status\*BMI, Stroke Belt status\*high blood

pressure, Stroke Belt status\*high cholesterol, Stroke Belt status\*diabetes, Stroke Belt status\*smoking status). However, as none of these interactions were statistically significant ( $P$  value > .05), we do not report interaction results. All statistical analyses were run in SAS 9.4.<sup>43</sup>

### Results

Our study consisted of 444,523 individuals, 50,587 of which lived in Stroke Belt States and the other 393,936 in non-Stroke Belt states. Stroke Belt residents were mainly more than or equal to 45 years (73.9%), female (58.7%), White (67.5%), had an annual household income greater than or equal to \$15,000 (70.3%), earned at least a high school education (89.1%), were divorced (49.28%), had healthcare coverage (89.5%), had a personal doctor or health care provider (84.0%), were overweight or obese (63.7%), did not have high cholesterol (54.6%), did not have diabetes (82.2%), and had never smoked (53.2%; Table 1). The distribution of sociodemographic and stroke risk factors was also similar among non-Stroke Belt residents, with the exception of high blood pressure prevalence (60.5%), as they were mostly more than or equal to 45 years (72.0%), female (55.4%), White (77.0%), had an annual household income greater than or equal to \$15,000 (75.9%), earned at least a high school education (92.9%),

**Table 2.** Unadjusted prevalence of physical activity in Stroke Belt states and non-Stroke Belt states

Covariates	Inactive		Insufficiently active		Active		Highly active	
	n	%	n	%	n	%	n	%
Stroke Belt	15,361	35.3	8001	18.4	7095	16.3	13,078	30.0
Non-Stroke Belt	102,276	29.4	64,013	18.4	63,374	18.2	118,465	34.0

  

Met physical activity guidelines	Yes		No	
	n	%	n	%
Stroke Belt	20,173	46.3	23,362	53.7
Non-Stroke Belt	181,839	52.2	166,289	47.8

were divorced (52.18%), had healthcare coverage (92.0%), had a personal doctor or health care provider (83.2%), were overweight or obese (61.4%), did not have high cholesterol (58.1%), did not have diabetes (86.2%), and had never smoked (54.7%). The unadjusted prevalence of being inactive (SB: 35.3%, NSB: 29.4%) was higher in Stroke Belt states compared to non-Stroke Belt states while the opposite was true for being active (SB: 16.3%, NSB: 18.2%) and highly active (SB: 30.0%, NSB: 34.0%; Table 2). A greater percentage of Stroke Belt than non-Stroke Belt residents failed to meet physical activity guidelines (SB: 53.7%, NSB: 47.8%).

We present adjusted associations between Stroke Belt residence and physical activity levels in Table 3. Adjusting for sociodemographic factors, we found that living in the Stroke Belt was significantly associated with lower odds of meeting physical activity guidelines (odds ratio [OR]:

0.85, 95% confidence interval [CI]: 0.78-0.91) compared to residing in non-Stroke Belt states. Significantly lower odds of meeting physical activity guidelines (OR: 0.87, 95% CI: 0.81-0.93) in Stroke Belt residents continued to be observed when controlling for both sociodemographic and stroke risk factors. When adjusting for sociodemographic and stroke risk factors, age, sex, race, household income, education, marital status, have personal doctor or health care provider, BMI, high blood pressure, high cholesterol, diabetes, and smoking status were observed to be significantly associated ( $P$ value < .05) with physical activity (Table 4). Being male, having a higher household income, having at least a high school education, having health care coverage, having a personal doctor or health care provider, being normal weight, not having high blood pressure, not having high cholesterol, having diabetes, and being a former smoker corresponded with higher odds of meeting physical activity guidelines.

**Table 3.** Adjusted associations between Stroke Belt residence and physical activity levels

	Met physical activity guidelines Odds ratio (95% CI)
<i>Model adjusted for sociodemographic factors*</i>	
(ref: non-Stroke Belt)	
Stroke Belt	0.85 (0.78, 0.91)
<i>Model adjusted for sociodemographic and stroke risk factors†</i>	
(ref: non-Stroke Belt)	
Stroke Belt	0.87 (0.81, 0.93)

\*Covariates adjusted for include age, sex, race, household income, education, marital status, health care coverage, have personal doctor or health care provider.

†Covariates adjusted for include age, sex, race, household income, education, marital status, health care coverage, have personal doctor or health care provider, BMI, high blood pressure, high cholesterol, diabetes, smoking status.

## Discussion

In this large representative study of US adults, we examined whether current unadjusted and adjusted physical activity levels differ between the Stroke Belt region and the rest of the country. Our unadjusted estimates revealed that a higher percentage of Stroke Belt residents were inactive and failing to meet physical activity guidelines compared to non-Stroke Belt residents. Even after adjustment for sociodemographic and stroke risk factors, Stroke Belt residence was still significantly associated with lower odds of meeting physical activity guidelines.

The relatively little work on physical activity in the Stroke Belt that exists does not examine differences in physical activity levels between Stroke Belt and non-Stroke Belt states. We had comparable estimates of physical inactivity in Stroke Belt residents (35.3%) as a Reasons for Geographic and Racial Differences in Stroke study by McDonnell et al (33%) who described physical activity levels between 2003 and 2007 in Whites and Blacks living in this region.<sup>13</sup> Slight differences between these 2 numbers may be due to our inclusion of

**Table 4.** Associations between sociodemographic and clinical factors and meeting physical activity guidelines\*

Covariates	Met physical activity guidelines
	Odds ratio (95% CI)
<i>Stroke Belt status (ref: non-Stroke Belt)</i>	0.87 (0.81, 0.93)
Stroke Belt	
<i>Age (ref: 35-44)</i>	
18-24	1.19 (1.11, 1.28)
25-34	0.92 (0.88, 0.98)
45-54	1.09 (1.04, 1.14)
55-64	1.26 (1.20, 1.32)
65 or older	1.71 (1.46, 2.00)
<i>Sex (ref: Female)</i>	
Male	1.23 (1.14, 1.34)
<i>Race (ref: White)</i>	
Black	0.82 (0.77, 0.86)
Hispanic	0.93 (0.88, 0.99)
Asian	0.69 (0.64, 0.75)
Native Hawaiian or Pacific Islander	0.91 (0.70, 1.19)
American Indian/Alaskan Native	0.99 (0.88, 1.11)
Other race	1.05 (0.96, 1.15)
<i>Household income (ref: &lt;\$15,000)</i>	
\$15,000-<\$25,000	0.99 (0.92, 1.07)
\$25,000-<\$35,000	1.04 (0.95, 1.14)
\$35,000-<\$50,000	1.52 (1.11, 2.09)
>\$50,000	1.33 (1.20, 1.46)
<i>Education (ref: High school graduate)</i>	
Did not graduate High School	0.84 (0.78, 0.90)
Some college or technical school	1.43 (1.20, 1.70)
College graduate	1.51 (1.44, 1.58)
<i>Marital status (ref: Married)</i>	
Divorced	0.88 (0.78, 0.98)
Widowed	0.81 (0.68, 0.97)
Separated	0.86 (0.77, 0.96)
Never Married	0.95 (0.88, 1.02)
A member of an unmarried couple	1.02 (0.92, 1.12)
<i>Health care coverage (ref: No)</i>	
Yes	1.01 (0.95, 1.06)
<i>Have personal doctor or health care provider (ref: No)</i>	
Yes, only one	1.16 (1.09, 1.22)
More than one	1.01 (0.95, 1.07)
<i>BMI (ref: normal weight (18.50 &lt; BMI &lt; 23.00))</i>	
Underweight (BMI < 18.50)	0.72 (0.65, 0.80)
Overweight (23.00 ≤ BMI < 27.50)	0.93 (0.85, 1.03)

**Table 4 (Continued)**

Covariates	Met physical activity guidelines
	Odds ratio (95% CI)
Obese (BMI ≥ 27.50)	0.56 (0.56, 0.62)
<i>High blood pressure (ref: no)</i>	
Yes	0.94 (0.82, 1.07)
<i>High cholesterol (ref: no)</i>	
Yes	0.79 (0.68, 0.92)
<i>Diabetes (ref: no)</i>	
Yes	1.41 (1.28, 1.57)
<i>Smoking status (ref: never smoker)</i>	
Smokes everyday	0.72 (0.69, 0.75)
Smokes somedays	0.96 (0.90, 1.02)
Former smoker	1.09 (0.96, 1.24)

\*Covariates adjusted for include age, sex, race, household income, education, marital status, health care coverage, have personal doctor or health care provider, BMI, high blood pressure, high cholesterol, diabetes, smoking status.

Hispanics, Asians, Native Hawaiian or Pacific Islanders, American Indians/Alaskan Natives, and those from other races in addition to Whites and Blacks as well as a more contemporary dataset.<sup>13</sup> However, since McDonnell et al only included individuals from the Stroke Belt in their study, it is difficult to know if differences in physical activity levels between the Stroke Belt region and the rest of the US seen in our 2017 study data were present during the early 2000s.

The persistence of lower physical activity levels in the Stroke Belt than in non-Stroke Belt areas even after accounting for sociodemographic and stroke risk factors demonstrates a critical need for public health interventions to increase physical activity engagement in these 8 states and for clinicians in the Stroke Belt to highlight the importance of exercise in stroke prevention for patients who may have one or more stroke risk factors. If we apply the BRFSS weights to the sample, 53.7% translates into 2,735,592 people in the Stroke Belt with suboptimal exercise levels. Multiple studies indicate that regular physical activity is key to decreasing stroke incidence as physically active individuals have a stroke risk that is 27% lower (RR: 0.73, 95% CI: 0.67-0.79) compared to those who are physically inactive.<sup>18,44-53</sup> As individuals 65 and older are at highest risk for stroke, the large numbers of middle aged and elderly Stroke Belt residents who are currently physically inactive and possess several stroke risk factors may contribute to a substantial increase in this region's stroke burden in the coming decades.<sup>54,55</sup> Interventions to increase physical activity, a modifiable stroke risk factor, in the Stroke Belt should focus on ways to overcome common barriers such as lack of resources, limited time to exercise, and little support from family and friends that often make regular exercise difficult.<sup>56</sup> Although it is beyond the

scope of this study to determine specific barriers to physical activity in the Stroke Belt, this topic should be explored in future work in order to inform development and implementation of effective interventions to promote physical activity as part of a stroke reduction strategy in this region.

The study's main limitations are addressed below. Owing to the self-reported nature of BRFSS data, some misclassification of physical activity levels and sociodemographic and stroke risk factors is unavoidable.<sup>16,57-59</sup> However, BRFSS validation studies indicate good correlation between BRFSS data on obesity and diabetes and measurements of these conditions taken in person ( $R^2 = 74\text{--}82\%$ ) in addition to high concordance between electronic health records (EHR) and BRFSS data on prevalence of obesity (EHR: 22.8%, BRFSS: 23.8%), hypertension (EHR: 26.3%, BRFSS: 29.6%), diabetes (EHR: 9.4%, BRFSS: 9.7%), and smoking (EHR: 13.5%, BRFSS: 14.7%).<sup>16,57-59</sup> With regard to self-reported physical activity, studies show a tendency for people to overreport how much they exercise, meaning that actual physical activity levels are probably lower than what we report in our study.<sup>60</sup> Any misclassification of BRFSS data is likely nondifferential which would result in our study estimates being biased towards the null.<sup>61</sup> It is nearly impossible to entirely remove the influence of residual confounding from our study. In order to strike a balance between minimizing the impact of residual confounding on study estimates and controlling for too many factors which results in sparse strata and unstable estimates, we chose to control only for covariates that other physical activity studies have included in their adjustment process.<sup>62-67</sup> Despite the study's limitations, it offers an unprecedented examination of current physical activity levels in Stroke Belt states and how they compare with those in non-Stroke Belt states in a large national sample of US adults.

## Conclusions

Our study of current physical activity levels in the Stroke Belt makes it evident that adult Stroke Belt residents have markedly lower physical activity levels and are less likely to meet physical activity guidelines than their non-Stroke Belt counterparts. Additional efforts should be made by clinicians in the Stroke Belt to discuss the role of exercise in stroke prevention with their patients and by public health practitioners to design interventions targeted towards addressing the specific boundaries in this region that make engaging in regular physical activity difficult. As physical inactivity is a major modifiable stroke risk factor, improving physical activity levels in the Stroke Belt has the potential to greatly reduce stroke incidence and ease the burden that is currently being placed on this region's emergency rooms and primary stroke centers.

## Conflicts of Interest

Phoebe Tran declares that she has no conflict of interest. Lam Tran declares that he has no conflict of interest. Liem Tran declares that he has no conflict of interest.

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