

# **Adherence to the American Heart Association's Life's Essential 8 Guidelines in Young African American Women**

Zachary Wilder, Kimberly Garcia, Shalan John, Sophana Srisak, Sarah Eisouh, Sparkle  
Springfield, PhD

## **Introduction**

Cardiovascular disease (CVD) is the leading cause of death for women in the United States (Ferdinand et al., 2020). Annually, more than 1 in 4 American women's deaths are caused by CVD (Heron, 2021). Despite increased research and interventions into the modification of preventative lifestyle behaviors, disparities in prevalence of CVD persist. Such disparities disproportionately affect African American women. African American women have the highest burden of disease compared to women of other racial and ethnic groups, with at least 47.3% of this population affected by CVD (Ebong & Breathett, 2020). Compared to white women, African American women experience earlier onset of CVD risk factors, develop CVD at younger ages, and have higher overall CVD mortality rates (Carnethon et al. 2017; Kalinowski et al., 2020; Vatsa et al., 2021). Furthermore, despite mortality rates declining overall, younger African Americans are experiencing slowing annual declines in CVD mortality (Kalinowski et al., 2020).

The American Heart Association (AHA) developed the Life's Essential 8 (LE8) to promote ideal cardiovascular health (Lloyd-Jones et al., 2022). The LE8 is comprised of the eight most important strategies for heart health maintenance. This includes four modifiable health behaviors (smoking cessation, being physically active, eating healthy, and getting healthy amounts of sleep) and four health factors (maintaining a healthy weight, cholesterol maintenance, blood pressure management, and blood glucose control). Adhering to the LE8 guidelines has been shown to be effective at reducing the lifetime risk of CVD morbidity and mortality, although African American women are less likely to meet 4 or more ideal levels of the LE8 compared with white women (Folsom et al., 2011; Folsom et al., 2015).

Research has identified African American women's adherence to certain CVD prevention guidelines – including to strategies of the AHA guidelines (Fongwa et al., 2008; Smith & White, 2021). However, almost no research has addressed *young* African American women (aged 18-35). It is unclear whether young African American women are adhering to the CVD prevention strategies of the LE8. Research is therefore essential in order to understand the baseline adherence to these preventative guidelines amongst this population. This study aims to address this obvious research gap by evaluating young African American women's adherence to the LE8 through the assessment of survey data. Doing so will inform future lifestyle interventions targeted at improving health outcomes for this at-risk group.

## **Methods**

### *Study Design*

We performed a secondary cross-sectional analysis of 2021 survey data designed to assess stressors, resilience, and dietary behaviors amongst young African American women across the United States. Eligible participants included self-identified young African American women aged 18-35 years (n=512). The recruitment process was facilitated by Qualtrics, a reputable private research and marketing company with access to diverse research panels consisting of pre-existing groups of verified individuals. The participants were invited to

participate in the survey via email by clicking on a provided link. Upon clicking the link, potential participants were first presented with an informed consent page. Once they provided their consent, they were directed to the survey page to complete the questionnaire. The survey study was conducted with the approval of Loyola University Chicago's institutional review board.

### *Study Measures and Scoring Approach*

The AHA's Life's Essential 8 (LE8) consists of eight evidence-based strategies to improve heart health and prevent CVD (Lloyd-Jones et al., 2022). We operationalized each of these strategies, resulting in subsequent scoring components: (1) smoking, (2) BMI, (3) physical activity, (4) healthy diet pattern, (5) cholesterol, (6) blood pressure, (7) blood sugar, and (8) healthy sleep. As previous studies have replicated, adherence to each component was scored from 0 to 2 points: 2 points for ideal adherence, 1 point for intermediate adherence, and 0 points for poor adherence (Folsom et al., 2015; Nève et al., 2022). Therefore, the final health score had the potential to range from 0 to 16. Scoring 0–5 points was considered poor, 6–10 intermediate, and 11–16 ideal. Variables from the stress, resilience, and diet survey that were used to operationalize LE8 strategies, as well as detailed scoring information are provided in Table 1 and described below.

### *Smoking*

The LE8 recommends cessation of smoking, and states that “quitting is the best thing you can do for your health” (Lloyd-Jones et al., 2010). Our survey data asked respondents whether they currently smoke cigarettes. Respondents were given the option to reply “Yes” or “No.” Current smokers were then assigned a score of 0 for non-adherence to the guidelines, and non-current smokers were assigned a score of 2 for ideal adherence.’

### *BMI*

Maintaining a healthy body weight was scored through 3 levels of adherence, with higher BMI's being associated with lower adherence scores. Given BMI's direct correlation to risk of cardiovascular disease – particularly as a mediating factor amongst African American women – the LE8 defines poor, intermediate, and ideal BMI, with higher BMI associated with lower adherence scores (Howard et al., 2018; Lloyd-Jones et al., 2010). These definitions have been directly lifted from Lloyd-Jones et al. for our analysis.

### *Physical Activity*

Physical activity is a known preventative behavior for CVD (Divens & Chatmon, 2019). Combinations of moderate and strenuous activity have been recommended by the LE8. Our survey utilized the Physical Activity Questionnaire to assess the number of hours per week on average participants spent performing a variety of exercises. These included walking for exercise, moderate activity (e.g., housework, gardening), and strenuous activity (e.g., recreational sports, running). Respondents earned scores correlating to higher numbers of

**Table 1: AHA's Life's Essential 8 Strategy Definitions, Recommendations, and Operationalized Scoring Criteria\***

LE8 Strategy	Definition for Ideal Adherence	LE8 Scoring Criteria		
		0 = Poor Adherence	1 = Intermediate Adherence	2 = Ideal Adherence
Quit smoking <sup>†</sup>	Never smoke or quit >12 months to decrease risk of developing cardiovascular disease.	Current smokers	-	Non-current smokers
Control your weight	Maintain a BMI between 18.5-25 kg/m <sup>2</sup> to reduce burden on heart, lungs, blood vessels and skeleton.	≥30 kg/m <sup>2</sup>	25-29.99 kg/m <sup>2</sup>	18.5-25 kg/m <sup>2</sup>
Be physically active	Partake daily physical activity to increase length and quality of life.	None	1-149 min/week moderate or 1-74 min/week moderate or 1-149 min/week moderate + vigorous	≥150 min/week moderate or ≥75 min/week vigorous or ≥150 min/week moderate + vigorous
Eat healthy <sup>‡</sup>	Eat a heart-healthy diet to improve your chances for feelings good and staying healthy.	0-1 dietary components	2-4 dietary components	5-7 dietary components
Control cholesterol <sup>†</sup>	Maintain a total cholesterol level <200 mg/dL to prevent blockage of arteries.	Diagnosed with high cholesterol	-	Never diagnosed with high cholesterol
Manage blood pressure <sup>†</sup>	Maintain a blood pressure <120 mmHg / <80 mmHg to reduce strain on heart, arteries, and kidneys.	Diagnosed with hypertension	-	Never diagnosed with hypertension
Reduce blood sugar <sup>†</sup>	Maintain a fasting plasma glucose level <100 mg/dL to prevent damage to heart, kidneys, eyes, and nerves.	Diagnosed with diabetes	-	Never diagnosed with diabetes
Get healthy sleep <sup>§</sup>	Sleep between 7-9 hours each night to promote healing, improve brain function and reduce the risk for chronic diseases.	≤5 hours/night	5 - <7 hours or ≥10 hours /night	7 - 9 hours / night

Abbreviations:  
 - AHA: American Heart Association  
 - LE8: Life's Essential 8  
 - BMI: Body Mass Index

\* Scoring criteria adapted from Lloyd-Jones et al., 2010, unless otherwise indicated

<sup>†</sup>Intermediate adherence not scored due to survey limitations

<sup>‡</sup>Scoring criteria adapted from Lichenstein et al., 2021 and operationalized through adherence to components of the Stanford Wellness Living Laboratory (WELL) Diet Score. The 7 operationalized components are:  
 - Fruits: ≥2x per day  
 - Vegetables: ≥4x per day  
 - Whole grains and whole grain products: 2-5x per day  
 - Nuts, seeds, or nut butter: 1-3x per day  
 - Red meat or processed meat: ≤1x per month  
 - Sugar-sweetened beverages or 100% fruit juice: Never  
 - High sodium processed foods: Never

<sup>§</sup>Scoring criteria adapted from Lloyd-Jones et al., 2022

physical activity per week.

### *Dietary Pattern*

In their 2021 scientific statement on diet and lifestyle recommendations, the AHA cited the strong positive association of adherence to heart-healthy dietary patterns and optimal cardiovascular health (Lichtenstein et al., 2021). These evidence-based dietary guidelines emphasized the importance of adopting and maintaining healthy diets throughout the life course, especially early in life. The LE8 reflects this emphasis on maintaining a healthy diet, citing it as one of the evidence-based strategies for promoting ideal cardiovascular health (Lloyd-Jones et al., 2010). Our analysis operationalized this strategy through the utilization of the Stanford Wellness Living Laboratory (WELL) Diet Score. The WELL survey is a 76-question tool focusing on 10 domains of well-being, including 12 diet-related questions (Springfield et al., 2020). Participants were asked how frequently they consumed a variety of diet-related items (see Supplemental Table 1). Participants then received scores between 0-10 for each item which were subsequently combined to generate a total WELL Diet Score.

We operationalized 7 of the subcomponents of the WELL Diet Score in line with the AHA's diet and lifestyle recommendations (Lichtenstein et al., 2021; Springfield et al., 2020). This resulted in the following scored dietary components: (1) fruits, (2) vegetables, (3), whole grains, (4) nuts and legumes, (5), red or processed meats, (6) sugar-sweetened beverages, and (7) high sodium processed foods. Adherence to the LE8 healthy dietary strategy was then measured by earning a max WELL Score for the selected dietary components. Participants meeting the criteria for 0-1 components earned a score of 0 for poor adherence, participants meeting the criteria for 2-4 components earned a score of 1 for intermediate adherence, and participants meeting the criteria for 5-7 components earned a score of 2 for ideal adherence.

### *Cholesterol*

Heightened cholesterol levels have been associated with high rates of obesity, hypertension, heart disease, and cardiovascular mortality (Allan Williams et al., 2021). The LE8 recommends maintaining a cholesterol level below 200 mg/dL to prevent artery damage and subsequent disease (Lloyd-Jones et al., 2010). Our survey data asked respondents whether they had ever been diagnosed with high cholesterol. Those responding "Yes" were assigned a score of 0 for non-adherence to the guidelines, and those responding "No" were assigned a score of 2 for ideal adherence.

### *Blood Pressure*

Hypertension – a medical condition in which the force of blood against artery walls is too high – is the most prevalent CVD risk factor in the U.S., contributing to nearly 1/3rd of all CVD deaths among African Americans (Ferdinand et al., 2020; Divens & Chatmon, 2019). Managing an ideal blood pressure level (<120 mmHg/<80mmHg) has been identified as a key strategy in the LE8 (Lloyd-Jones et al., 2010). Our survey data asked respondents whether they had ever

been diagnosed with hypertension, with those responding “Yes” earning a score of 0 for non-adherence to the guidelines, and those responding “No” earning a score of 2 for ideal adherence.

### *Blood Sugar*

Fasting plasma glucose levels are blood sugar measurements that can be used to diagnose diabetes. The AHA identifies fasting plasma glucose levels as a risk factor for cardiovascular disease since prolonged high levels of blood sugar can damage one’s heart (Lloyd-Jones et al., 2010). Fasting plasma glucose levels of  $\geq 126$  mg/dL is a biometric indicator of diabetes, with levels of 100 to 125 mg/dL indicating prediabetes, and 99 mg/dL or lower being normal (CDC, 2023). The LE8 identified levels of  $\geq 126$  mg/dL as being poor while  $< 100$  mg/dL as being ideal. Survey participants were asked whether they have ever been diagnosed with diabetes. Those that responded “Yes” received a score of 0 for non-adherence to guidelines, and those that responded “No” received a score of 2 for ideal adherence.

### *Sleep*

Inadequate sleep has been found to have a similar association with CVD risk as the other LE8 strategies (Lloyd-Jones et al., 2022). Research has also found that several CVD risk factors – such as obesity, diabetes mellitus, coronary heart disease, hypertension, and stroke – are strongly associated with inadequate sleep duration (St-Onge et al., 2016). Study participants were asked how many hours of sleep they received each night, on average. We then utilized the LE8 definitions of healthy sleep to categorize participants into poor, intermediate, and ideal levels. Specifically, participants reporting an average of  $\leq 5$  hours of sleep received a score of 0 for non-adherence to guidelines, those that responded with 5- $< 7$  hours or  $\geq 10$  hours of sleep received a score of 1 for intermediate adherence, and those that responded with 7-9 hours received a score of 2 for ideal adherence.

### *Statistical Analysis*

Standard descriptive statistics such as mean, median, standard deviation, and range, were calculated for component LE8 scores. Participants were assigned adherence scores using our scoring approach for LE8 guidelines. Participants were then divided into a low adherence and high adherence group based on median LE8 total adherence scores. Student’s *t* and Chi-Squared ( $\chi^2$ ) tests were employed to determine socio-demographic, health, and anthropometric differences amongst groups for continuous and categorical variables. All analyses were conducted using SAS version 9.4

## **Results**

Of the participants in the survey, 453 had data necessary to assign operationalized LE8 adherence scores. The mean age of eligible participants was 23.89 (see Table 2). A significant proportion of the participants were high school graduates or had some college education. Most of the participants were single (72.85%), and slightly over half reported having no children

**Table 2:** Socio-demographic, health, and anthropometric characteristics of young African American women from 2021 nationwide survey data (n=453)

Characteristics	453 Young African American Women
Age, $\mu$ (95% CI)*	23.89 (4.87)
Education, % (n)	
Less than high school	3.75% (17)
High school graduate	29.80% (135)
Some college	34.88% (158)
4-year college degree	20.75% (94)
Graduate or professional degree	10.82% (49)
Marital Status, % (n)	
Single	72.85% (330)
Married or living as married	24.06% (109)
Divorced	1.55% (7)
Widowed	1.55% (7)
Children, % (n)	
0	53.86% (244)
1	46.14% (209)
Depression, $\mu$ (95% CI)†	
Never diagnosed	63.33% (285)
Diagnosed	36.67% (165)
Perceived Stress Score, $\mu$ (95% CI)‡,§	7.61 (2.85)
Social Support Score, $\mu$ (95% CI)	1.66 (0.92)
Discrimination Life Score, $\mu$ (95% CI)#	6.60 (5.48)
Of the participants in the survey, 453 had data necessary to assign operationalized LE8 adherence scores.	
*Age n = 450	
† Depression n = 450	
‡ Perceived Stress Score n = 452	
§ Measured using the global measure of perceived stress. Scores ranging from 0-13 are considered low stress (Cohen et al., 1983)	
Measured using the single item measure of social support. Scores ranged from 0-4. Scores of 1 indicate low tangible assistance, scores of 2 indicate intermediate tangible assistance (i.e., number of people that the participant can readily count on for help in times of difficulty) (Lagana et al., 2011)	
# Measured using a 6-item summary measure of summary stressors. Scores ranged from 0-24 with higher scores indicating a greater number of discrimination life events.	

(53.86%). More than one-third of the participants reported being diagnosed with depression. The mean total perceived stress score – a widely used measure of the degree to which situations in one’s life are considered stressful – was 7.61 out of a possible score of 13 (Table 2; Cohen et al., 1983). Mean total social support score was 1.66 out of a possible score of 4 (Laganà et al., 2011). Mean discrimination life score was 6.60 out of a potential score of 24 (Sterntal et al., 2011). Detailed socio-demographic and anthropometric characteristics of the study participants are summarized in Table 2.

The majority of participants exhibited overall ideal adherence to the LE8 guidelines, with only 5.30% poor adherence (see Table 3). The average adherence score was 10.52 (10.29-10.79 95% CI) and the median was 11. Most participants were ideally adherent to quitting smoking, being physically active, managing blood pressure, controlling cholesterol, and reducing blood sugar (Table 3). Nearly 1/3<sup>rd</sup> of participants adhered to maintaining the recommended weight and getting the recommended amount of sleep. When it comes to healthy eating, we measured the intake frequency of seven dietary components. 81.90% of participants exhibited poor adherence to this strategy, with only a single participant meeting the requirements for ideal adherence.

On average, young African American women below the median adherence score exhibited distinct socio-demographic and anthropometric characteristics when compared to women who scored above the median (see Table 4). The group with higher adherence scores tended to be single, had no children, and had a lower prevalence of diagnosed depression. On the other hand, the group with the lower adherence scores tended to have higher perceived stress and discrimination life scores. Each of these characteristics achieved significance at  $\alpha < 0.05$ . No additional significant differences were detected between the groups.

**Table 3: Percentage and Frequency of Young African American Women's Adherence to LE8 Guidelines (n=453)\***

Overall Adherence Scores				
Poor Adherence (0-5)	Intermediate Adherence (6-10)	Ideal Adherence (11-16)	Median Score	Average Score <sup>†</sup>
5.30% (24)	36.20% (164)	58.50% (265)	11	10.52 (10.29-10.76)
Individual Adherence Scores				
LE8 Strategy	0 = Poor Adherence	1 = Intermediate Adherence	2 = Ideal Adherence	Average Score <sup>†</sup>
Quit smoking <sup>‡</sup>	14.35% (65)	-	85.65% (388)	1.71 (1.65-1.78)
Control your weight	43.93% (199)	24.28% (110)	31.79% (144)	0.88 (0.80-0.96)
Be physically active	3.09% (14)	35.10% (159)	61.81% (280)	1.59 (1.54-1.64)
Eat healthy <sup>§</sup>	81.90% (371)	17.88% (81)	0.22% (1)	0.18 (0.15-0.22)
Control cholesterol <sup>‡</sup>	18.76% (85)	-	81.24% (368)	1.62 (1.55-1.70)
Manage blood pressure <sup>‡</sup>	17.44% (79)	-	82.56% (374)	1.65 (1.58-1.72)
Reduce blood sugar <sup>‡</sup>	13.25% (60)	-	86.75% (393)	1.74 (1.67-1.80)
Get healthy sleep	15.01 (65)	54.97% (249)	30.02% (136)	1.15 (1.09-1.21)

Of the participants in the survey, 453 had the data necessary to assign operationalized LE8 adherence scores.

Abbreviations:

-LE8: Life's Essential 8

\* Data are displayed as % (n) unless otherwise indicated

† Data are displayed as  $\mu$  (95% CI)

‡ Intermediate adherence not scored due to survey limitations

§ Adapted from Lichenstein et al., 2021 and operationalized through adherence to components of the WELL Diet Score



**Table 4:** Comparison of the mean socio-demographic, health, and anthropometric characteristics by median LE8 operationalized adherence scores in young African American women (n=453)

Characteristics	LE8 Adherence Score		P Value	
	Below Median Score <11 (n=188)	Above Median Score ≥11 (n=265)		
Age <sup>†</sup>	24.35 (4.90)	23.56 (4.83)	0.09	
Education			0.27	
	Less than high school	58.82% (10)	41.18% (7)	
	High school graduate	45.93% (62)	54.07% (73)	
	Some college	39.24% (62)	60.76% (96)	
	4-year-college degree	35.11% (33)	64.89% (61)	
	Graduate or professional degree	42.86% (21)	57.14% (28)	0.48
Marital Status			0.04*	
	Single	37.88% (125)	62.12% (205)	
	Married or living as married	49.54% (54)	50.46% (55)	
	Divorced	71.43% (5)	28.57% (2)	
	Widowed	57.14% (4)	42.86% (3)	
Children			0.0005***	
	0	34.02% (83)	65.98% (161)	
	1	50.24% (105)	49.76% (104)	
Depression <sup>‡</sup>			0.02*	
	Never diagnosed	36.84% (105)	63.16% (180)	
	Diagnosed	51.52% (85)	48.48% (80)	
Perceived Stress Score <sup>§</sup>	8.00 (2.72)	7.34 (2.91)	0.015*	
Social Support Score	1.66 (0.91)	1.66 (0.92)	1	
Discrimination Life Score	8.16 (5.65)	5.49 (5.08)	<0.0001****	

Student's t test and  $\chi^2$  tests were used to determine differences between groups for continuous and categorical variables

\*Indicates a P value  $\leq 0.05$

\*\*Indicates a P value  $\leq 0.01$

\*\*\*Indicates a P value  $\leq 0.001$

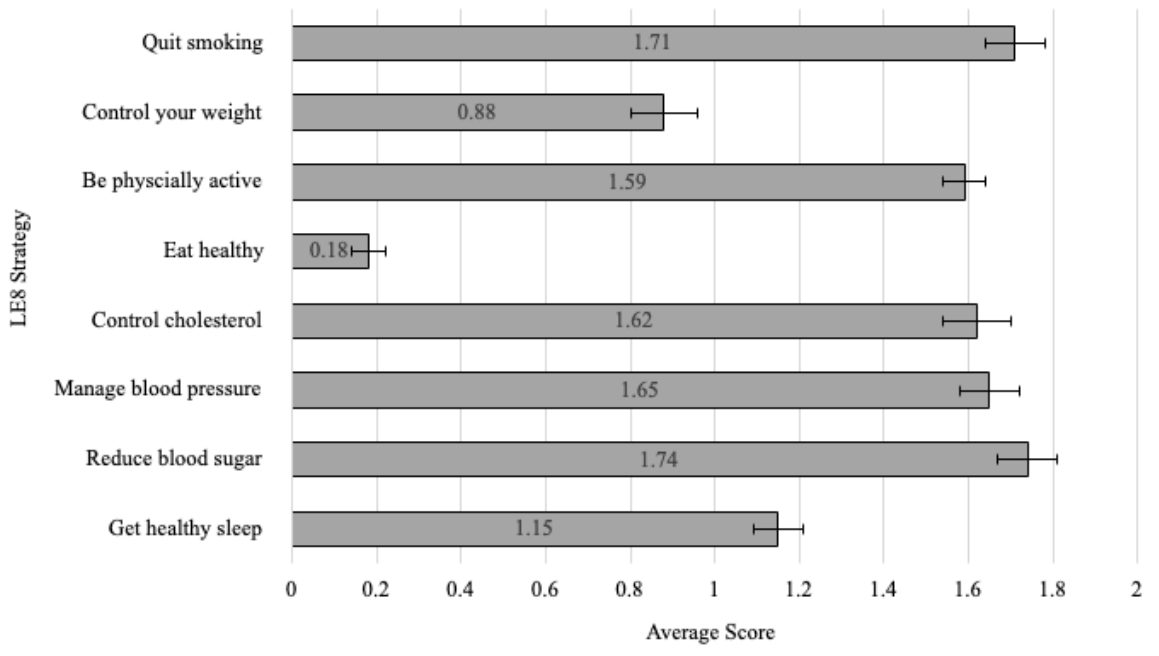
\*\*\*\*Indicates a P value  $\leq 0.0001$

<sup>†</sup> Age n = 450

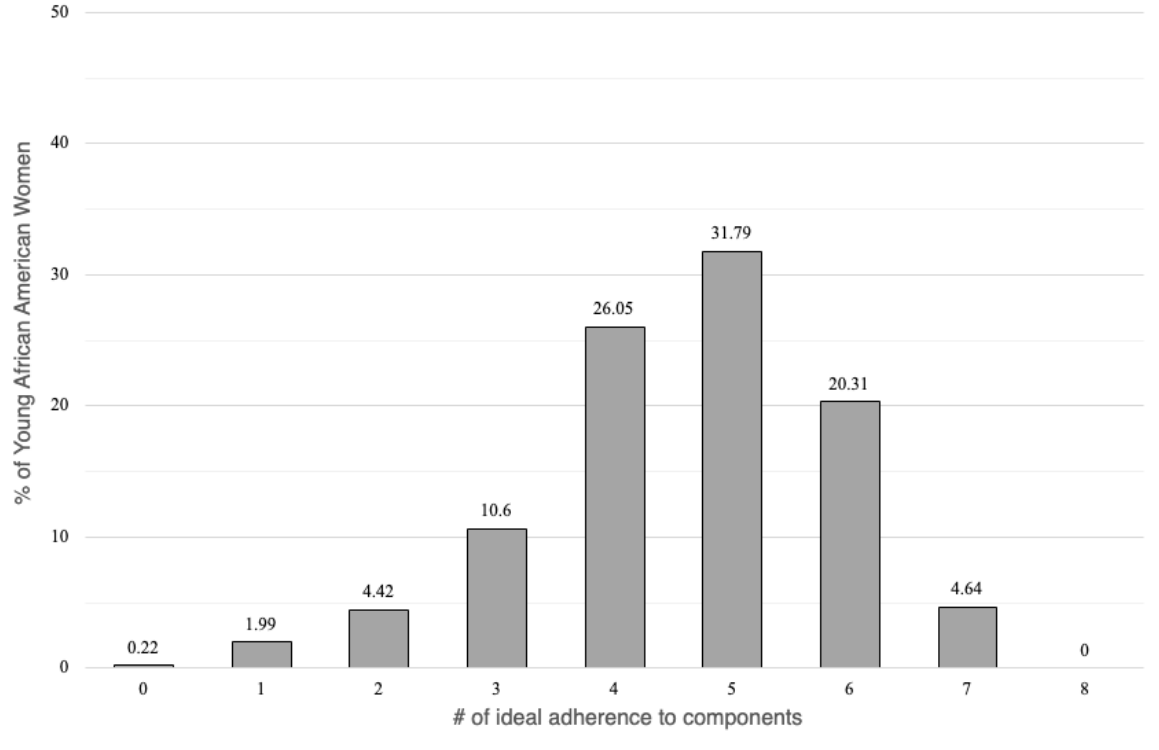
<sup>‡</sup> Depression n = 450

<sup>§</sup> Perceived Stress Score n = 452

**Figure 1: Average Scores for Young African American Women's Adherence to LE8 Guidelines with 95% CI**



**Figure 2: Percentage of Young African American Women's Ideal Adherence to Individual Components of LE8 Guidelines**



## **Discussion**

### *Overall Adherence to LE8 Guidelines*

No known studies have examined adherence to the AHA's Life's Essential 8 in young African American women, despite heart disease being the leading cause of death for this group (Heron, 2021). Based on AHA's definitions of ideal cardiovascular health, we operationalized the LE8 strategies into a quantitative score and assessed young African American women's adherence (Lichtenstein et al., 2021; Lloyd-Jones et al., 2010; Lloyd-Jones et al., 2022). Our sample averaged 10.52 out of a potential 16 points (10.29-10.79 95% CI), indicating intermediate adherence overall. A large majority (78.15%) of our participants exhibited ideal adherence to 4-6 strategies of the LE8 (see Figure 2). This is encouraging for a number of reasons. Historically, studies have found that African American women are less likely to meet 4 or more ideal levels of LE8 strategies compared to white women (Folsom et al., 2011). Our findings do not reflect this. Additionally, increased adherence to LE8 strategies has been shown to be effective at reducing the lifetime risk of CVD morbidity and mortality (Folsom et al., 2015). In fact, a study conducted by Spahillari and colleagues found that African Americans who had ideal adherence to  $\geq 4$  LE8 strategies had a 61% lower risk of incident heart failure compared to those adherent to only 0-2 strategies (Spahillari, et al. 2017).

Many of our participants met the LE8 ideal recommendations for smoking, physical activity, blood pressure, cholesterol, and blood sugar. Notably, our participants' rates of ideal adherence to these strategies were greater than that found in the general US population aged 20-39 (Tsao et al., 2022). Limitations in our survey data prevented us from stratifying operationalized scoring criteria for several strategies, so ideal adherence is likely to be overestimated. Nevertheless, our findings are a clear indication that young African American women have a strong adherence to several heart-healthy strategies of the LE8. Future research on interventions addressing areas where young African American women struggle with adherence may prove to be especially effective in improving lifetime CVD risk.

### *Issues with Healthy Diet Adherence Amongst African American Women*

The majority of our participants exhibited poor adherence to the operationalized LE8 healthy diet strategy. Studies have consistently identified African American women as having low adherence to healthy dietary guidelines (Epstein et al., 2012; Howard et al., 2018). This is concerning because poor diet quality is a leading risk factor for chronic diseases and is strongly associated with an increased lifetime risk of CVD mortality (Micha et al., 2017; Richards Adams et al., 2019). One study conducted by Folsom and colleagues investigated adherence to the AHA definitions for ideal cardiovascular health amongst adults aged 45-64 years (Folsom et al., 2011). Like our study, Folsom and colleagues reported high rates of poor healthy diet adherence amongst African American participants (36.5%; n=3,107). Low ideal adherence was similarly found in our study, although our participants displayed substantially higher rates with 81.90% of participants exhibiting poor adherence to the healthy diet strategy. This strategy score was by far the lowest of any of the LE8, indicating that poor dietary health may be the single greatest driver

of the earlier onset of CVD risk factors in African American women. Poor adherence to dietary guidelines has also been linked to higher rates of obesity and hypertension, which are both found to be disproportionately prevalent in African American women overall (Allan Williams et al., 2021; Howard et al., 2018; Sterling et al., 2018). Recognizing this correlation, our findings further underscore the need for dietary-focused interventions targeting young African American women in order to decrease the lifetime risk of CVD morbidity and mortality.

It is important to note that poor adherence to dietary guidelines has also been identified as a significant driver of the racial CVD risk disparity. One study investigated behaviors amongst white and African American women and concluded that poor diet quality was the single greatest mediating factor in the racial disparity for incident hypertension – the most prevalent CVD risk factor in the U.S. (Divens & Chatmon, 2019; Howard et al., 2018). Another study conducted by Epstein and others reported African Americans as having lower adherence to the Dietary Approaches to Stop Hypertension (DASH) diet than white Americans, even after intervention (Epstein et al., 2012). Our study exclusively included African American women, so no analysis of differences in adherence by race or ethnicity was capable of being conducted. Future research will therefore be essential to understand whether these racial disparities in healthy dietary adherence are also found amongst younger Americans.

### *Barriers to Adherence Between High and Low Groups*

Comparing the sociodemographic, health, and anthropometric characteristics by median adherence scores allowed us to observe potential factors that could present barriers to adherence to LE8 guidelines. Among our study participants, we found that higher perceived stress scores were associated with lower overall adherence to LE8 guidelines. (RR = 1.09,  $p = 0.015$ ). This is consistent with the findings of several studies that identified stress as a barrier to several cardiovascular health-related strategies, in African American women. (Brewer et al., 2018; Smith & White, 2021; Tomfohr et al., 2016; White, 2021). African American women experience disproportionate and consistent exposure to several psychosocial stressors, such as racial residential segregation, financial instability, and employment insecurity (Barber et al., 2016; Kang et al., 2018). One study conducted by Smith and White investigated adherence to AHA CVD guidelines among African American women living in public housing (Smith & White, 2021). Their results specifically identified chronic stress as a barrier to achieving intermediate or ideal LE8 scores for smoking and blood pressure management. While both the higher and lower adherence groups displayed low stress scores overall, our findings indicate that stress presents a significant barrier to CVD prevention guidelines for young African American women.

We also found that higher discrimination life scores were strongly associated with lower overall adherence to LE8 guidelines (RR = 1.49,  $p = <0.0001$ ). This finding is also consistent with studies that have shown that discrimination, is correlated with poorer cardiovascular health outcomes in African Americans (Brewer et al, 2018; Sims et al. 2016; Tomfohr et al., 2016). Specifically, African American women experiencing everyday discrimination were associated with higher rates of smoking, consumed greater percentages of dietary fat, and had fewer hours

of sleep per night (Sims et al. 2016). Discrimination has an undeniable role in affecting healthy behaviors, which is a finding that was evident among our participants. Interventions targeted at the root causes of discrimination amongst young African American women will therefore be necessary to improve cardiovascular health and eliminate the disparity.

### *Future Direction*

Our findings provide necessary data to inform future interventions addressing CVD risk in young African American women. As previously stated, poor dietary health may be the single greatest driver of the earlier onset of CVD risk factors in this population. One study, conducted by Alan Williams and colleagues, provided African Americans with plant-based meals in line with CVD dietary guidelines (Allan Williams et al., 2021). After the intervention, authors reported a remarkable 19.4% decrease in CVD risk reduction, leading them to boldly state that this intervention could “possibly eradicate the racial disparity in [CVD] events and mortality.” Our findings indicate that a similar intervention may have a profound impact on results decreasing the lifetime risk of CVD amongst young African American women. Additionally, interventions addressing stress and dietary quality may be highly efficacious. A future intervention could observe the effects on adherence after providing young African American women with stress management techniques and dietary principles, similar to that employed by other studies (Katsarou et al., 2014).

While our study should serve to inform future interventions, the reliability of our findings can be improved upon. One area for future research could focus on improving our scoring of dietary adherence. While the WELL guidelines – which we utilized in our study – have been shown to be positively and significantly correlated with other diet quality scores, future research could address adherence to other guidelines, such as the AHA’s recommended DASH diet (Epstein et al., 2012; Springfield et al., 2020). Additionally, there is a need for studies to investigate the impact that race has on adherence to guidelines in this younger population. The methodology of studies like that conducted by Howard et al. could serve as a model for future studies, stratifying young women by race or CVD prevalence and assessing potential mediating factors in differences to adherence (Howard et al., 2018).

Overall, ambitious future research and interventions are necessary to further understand the factors impacting young African American women’s adherence to ideal cardiovascular health guidelines.

### *Strengths and Limitations*

While this study provides much needed investigation into the adherence to cardiovascular disease prevention guidelines amongst young African American women, it is not without limitations. Reporting bias is especially prevalent among overweight and African American women, which may underestimate adherence to certain strategies (Alcantara et al., 2015). There is also a potential for selection bias, considering that participants self-selected into the survey. Participants who entered the survey may be healthier overall, and therefore not representative of

the overall population of young African American women. Additionally, limitations in several survey questions prevented us from assigning intermediate adherence scores for four of the LE8 strategies, which may have resulted in an overestimation of ideal adherence in these strategies. Future research could improve upon our scoring criteria by designing surveys to specifically measure adherence to the LE8. Strengths of our study include focusing on a previously unresearched and underserved population, the investigation of adherence utilizing newly updated AHA CVD prevention guidelines, and the inclusion of tests for association amongst high and low adherence groups.

## **Conclusion**

Young African American women exhibited strong levels of adherence to several strategies of the AHA's Life's Essential 8 guidelines. Low adherence was found for the healthy dietary strategy, which represents a particularly prevalent issue in this younger population. Targeted dietary interventions may have a significant impact on reducing long-term cardiovascular disease morbidity and mortality. Additionally, higher rates of perceived stress and discrimination events represent significant barriers to adherence of the LE8 guidelines. These barriers have been known to disproportionately impact African American women, although further research will be necessary to understand whether these same disparities act as a mediating factor for differences in adherence in these younger populations. It is our hope that these findings can serve as a catalyst for an increased focus on research into CVD risk amongst this vulnerable group, as well as inform future interventions and policy initiatives addressing the earlier development of CVD in African American women.

## **Acknowledgments**

We want to acknowledge the young African American women who participated in the stress, resilience, and diet survey. We would also like to thank Dr. Justin Harbison for his guidance in the development of this manuscript. Finally, the Parkinson School of Health Sciences and Public Health at Loyola University Chicago should also be acknowledged for their continued support and dedication to improving healthy equity through evidence-based research.

## Supplemental Tables:

<b>Supplemental Table 1: AHA's evidence-based dietary guidance and operationalized WELL Diet Score definitions and criteria</b>			
Dietary Component	AHA's Dietary Guidelines*	Applicable WELL Diet Question†	Criteria for max WELL Diet Score (10)
<b>Operationalized Components</b>			
Fruits and vegetables	Eat plenty of fruits and vegetables, choose a wide variety	How often did you eat vegetables? How often did you eat fruit? Include fresh, frozen, or canned fruit. Do not include fruit juice	≥4x day ≥2x day
Whole grains and whole grain products	Choose foods made mostly with whole grains rather than refined grains	How often did you eat whole grains and grain bread or muffins, whole grain rice (i.e., brown rice), bulgur, whole grain pasta, or whole grain cereal?	2-5x day
Nuts, seeds, or nut butter	Choose healthy sources of protein: mostly protein from plants (legumes and nuts)	How often did you eat nuts, seeds, or nut butter, such as peanut butter or almonds?	1-3x day
Red meat or processed meat	Choose healthy sources of protein: if meat or poultry are desired, choose lean cuts and avoid processed forms	How often did you eat red meat or processed meat, such as bacon, sausage, bologna, ground beef, steak, beef ribs, roast beef, or hamburger sandwich?	≤1x month
Sugar sweetened beverages of 100% fruit juice	Minimize intake of beverages and foods with added sugars	How often did you drink sugar sweetened beverages or 100% fruit juice? Include soda, sweetened energy drinks, sweetened fruit drinks, or coffee/tea that you add sweetener to. Do not include diet drinks.	Never
High sodium processed foods	Choose and prepare foods with lite or no salt	How often did you eat high sodium processed foods like canned soup, pizza, prepared pasta dishes, and savory snacks (chips, popcorn, pretzels)?	Never
<b>Non-Operationalized Components</b>			
Fish and seafood	Choose healthy sources of protein: fish and seafood	How often did you eat fish?	≥1x week
Low-fat and fat-free dairy products	Choose healthy sources of protein: low-fat or fat-free dairy products instead of full-fat dairy products	n/a	-
Liquid plant oils	Use liquid plant oils rather than tropical oils (coconut, palm, and palm kernel), animal fats (eg, butter and lard), and partially hydrogenated fats	n/a	-
Processed foods	Choose minimally processed foods instead of ultra-processed foods	n/a	-
Alcohol	If you do not drink alcohol, do not start; if you choose to drink alcohol, limit intake	n/a	-
Location	Adhere to this guidance regardless of where food is prepared or consumed	How often did you prepare your own meal (cook food)?	≥2x day
* Lichtenstein et al., 2021			
† Springfield et al., 2020			

## Works Cited

- Allan Williams, K., et al. (2021). "Nutrition Intervention for Reduction of Cardiovascular Risk in African Americans Using the 2019 American College of Cardiology/American Heart Association Primary Prevention Guidelines." *Nutrients* 13(3422).
- Barber, S., et al. (2016). "Neighborhood Disadvantage, Poor Social Conditions, and Cardiovascular Disease Incidence Among African American Adults in the Jackson Heart Study." *American Journal of Public Health* 106(12): 2219-2226.
- Brewer, L. C., et al. (2018). "Stress and achievement of cardiovascular health metrics: the American heart association life's simple 7 in blacks of the Jackson heart study." *Journal of the American Heart Association* 7(11).
- Carnethon, M. R., et al. (2017). "Cardiovascular Health in African Americans: A Scientific Statement From the American Heart Association." *Circulation* 136(21): e393-e423.
- CDC (2023). "Diabetes Tests." Retrieved 16 April, 2023, from <https://www.cdc.gov/diabetes/basics/getting-tested.html>.
- Cohen, S., T. Kamarck, and R. Mermelstein, *A global measure of perceived stress*. *Journal of health and social behavior*, 1983: p. 385-396.
- Divens, L. L. and B. N. Chatmon (2019). "Cardiovascular Disease Management in Minority Women: Special Considerations." *Critical Care Nursing Clinics of North America* 31(1): 39-47.
- Ebong, I. and K. Breathett (2020). "The Cardiovascular Disease Epidemic in African American Women: Recognizing and Tackling a Persistent Problem." *Journal of Women's Health* 29(7): 891-893.
- Epstein, D. E., et al. (2012). "Determinants and Consequences of Adherence to the DASH Diet in African American and White Adults with High Blood Pressure: Results from the ENCORE Trial." *Journal of the Academy of Nutrition and Dietetics* 112(11): 1763-1773.
- Ferdinand, K., et al. (2020). "Contemporary and Future Concepts on Hypertension in African Americans: COVID-19 and Beyond." *Journal of the National Medical Association* 112(3): 315-323.
- Ferdinand, D. P., et al. (2020). "Hypertension in African Americans: advances in community outreach and public health approaches." *Progress in cardiovascular diseases* 63(1): 40-45.
- Folsom, A. R., et al. (2011). "Community Prevalence of Ideal Cardiovascular Health, by the AHA Definition, and Relation to Cardiovascular Disease Incidence." *Journal of the American College of Cardiology* 57(16): 1690-1696.
- Folsom, A. R., et al. (2015). "American Heart Association's Life's Simple 7: Avoiding Heart Failure and Preserving Cardiac Structure and Function." *The American journal of medicine* 128(9): 970-976.e972.
- Fongwa, M. N., et al. (2008). "Adherence to treatment factors in hypertensive African American women." *Vascular Health and Risk Management* 4(1): 157-166.
- Heron, M. (2021). "Deaths: Leading Causes for 2018." *National Vital Statistics Report* 70(4): 5-13.
- Howard, G., et al. (2018). "Association of Clinical and Social Factors With Excess Hypertension Risk in Black Compared With White US Adults." *Journal of the American Medical Association* 320(13): 1338-1348.
- Kalinowski, J., et al. (2019). "Why Are Young Black Women at High Risk for Cardiovascular Disease?" *Circulation* 139(8): 1003-1004.
- Kang, A. W., et al. (2018). "Stress, adherence, and blood pressure control: A baseline examination of Black women with hypertension participating in the SisterTalk II intervention." *Preventive medicine* 12: 25-32.



- Katsarou, A., Vryonis, M., Protogerou, A., Alexopoulos, E., Achimastos, A., Papadogiannis, D., . . . Darviri, C. (2014). Stress management and dietary counseling in hypertensive patients: A pilot study of additional effect. *Primary Health Care Research & Development*, 15(1), 38-45.
- Laganà, L., Maria L. Bratly, and Ioakim Boutakidis., The validation of a new measure quantifying the social quality of life of ethnically diverse older women: two cross-sectional studies.. *BMC geriatrics* 2011. 11(1): p. 1-13
- Lichtenstein, A. H., et al. (2021). "2021 Dietary Guidance to Improve Cardiovascular Health: A Scientific Statement from the American Heart Association." *Circulation* 144(23): e472-e487.
- Lloyd-Jones, D. M., et al. (2010). "Defining and Setting National Goals for Cardiovascular Health Promotion and Disease Reduction." *Circulation* 121(4): 586-613.
- Lloyd-Jones, D. M., et al. (2022). "Life's Essential 8: Updating and Enhancing the American Heart Association's Construct of Cardiovascular Health: A Presidential Advisory From the American Heart Association." *Circulation* 146(5): e18-e43.
- Micha, R., et al. (2017). "Association Between Dietary Factors and Mortality From Heart Disease, Stroke, and Type 2 Diabetes in the United States." *Journal of the American Medical Association* 317(9): 912-924.
- Nève, G., et al. (2022). "Adherence to Life's simple 7 is associated with better carotid properties." *Atherosclerosis* 360: 21-26.
- Richards Adams, I. K., et al. (2019). "An Examination of Demographic and Psychosocial Factors, Barriers to Healthy Eating, and Diet Quality Among African American Adults." *Nutrients* 11(3): 519-533.
- Sims, M., et al. (2016). "Perceived discrimination is associated with health behaviours among African-Americans in the Jackson Heart Study." *J Epidemiol Community Health* 70(2): 187-194.
- Smith, I. and B. M. White (2021). "Barriers and Facilitators to Adhering to the American Heart Association's Life's Simple 7 for African American Women Living in Public Housing." *Journal of Health Care for the Poor and Underserved* 32(4): 2012-2029.
- Spahillari, A., et al. (2017). "Ideal Cardiovascular Health, Cardiovascular Remodeling, and Heart Failure in Blacks." *Circulation: Heart Failure* 10(2).
- Springfield, S., et al. (2020). "The WELL diet score correlates with the alternative healthy eating index-2010." *Food Science & Nutrition* 8(6): 2710-2718.
- Sterling, S., et al. (2018). "Dietary patterns among overweight and obese African-American women living in the rural South." *Journal of racial and ethnic health disparities* 5(1): 141-150.
- Sternthal, M.J., N. Slopen, and D.R. Williams, RACIAL DISPARITIES IN HEALTH: How Much Does Stress Really Matter? I. Du Bois review: social science research on race, 2011. 8(1): p. 95.
- Cozier, Y., et al., Racial discrimination and the incidence of hypertension in US black women. *Annals of epidemiology*, 2006. 16(9): p. 681-687.
- St-Onge, M.-P., et al. (2016). "Sleep Duration and Quality: Impact on Lifestyle Behaviors and Cardiometabolic Health: A Scientific Statement from the American Heart Association." *Circulation* 134(18): e367-e386.
- Tomfohr, L. M., et al. (2016). "Mediators of the relationship between race and allostatic load in African and White Americans." *Health Psychology: Official Journal of the Division of Health Psychology* 35(4): 322-332.
- Tsao, C. W., et al. (2022). "Heart Disease and Stroke Statistics—2022 Update: A Report From the American Heart Association." *Circulation* 145(8).
- Vatsa, N., et al. (2021). "Cardiovascular Risk Factors in Younger Black Women: Results from the 10,000 Women Community Screening Project." *American Heart Journal Plus: Cardiology Research and Practice* 8.
- White, M. J., et al. (2021). "The significant places of African American adults and their perceived influence on cardiovascular disease risk behaviors." *BMC Public Health* 21(1): 12.

