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Sociodemographic Indictors of Social Position and Self-care Maintenance in Adults with Heart Failure

Foster Osei Baah, MS-PhD, RN[1], **Jesse Chittams**[2], **Beverly Carlson, PhD, RN**[3], **Kristen A. Sethares, PhD, RN**[4], **Marguerite Daus, BSN, RN**[2], **Debra K. Moser, PhD, RN**[5], **Barbara Riegel, PhD, RN, FAHA, FAAN**[2]

[1]National Institute of Health, Bethesda, MD, USA

[2]University of Pennsylvania, Philadelphia, USA

[3]San Diego State University, CA, USA

[4]University of Massachusetts, Dartmouth, USA

[5]University of Kentucky, USA

Abstract

Social determinants of health (SDH) are known to influence health. Adequate self-care maintenance improves heart failure (HF) outcomes. However, the relationship between self-care maintenance and SDH remains unclear. Explore the relationship between sociodemographic indicators of social position and self-care maintenance in adults with HF. This was a secondary analysis of data from a cross-sectional descriptive study of 543 adults with HF. Participants completed the Self-Care of HF Index and a sociodemographic survey. We used multiple regression with backward elimination to determine which SDH variables were determinants of self-care maintenance. Marital status ($p = .02$) and race ($p = .02$) were significant determinants of self-care maintenance. Education ($p = .06$) was highest in Whites (35.6%). These variables explained only 3.8% of the variance in self-care maintenance. Race, education, and marital status were associated with HF self-care maintenance. SDH is complex and cannot be explained with simple sociodemographic characteristics.

Keywords

social determinants of health; social position; heart failure; self-care

Introduction

Social determinants of health (SDH) include sociodemographic, political and environmental structures that define not only where people are born, but also where they live, work, and age

Corresponding Author: Foster Osei Baah, Marshal W. Nirenberg Postdoctoral Fellow, Social Determinants of Obesity and Cardiovascular Risk Laboratory, National Heart, Lung and Blood Institute, National Institute of Health, 10 Center Drive, Room 5-5330, Bethesda, MD 20892, USA., foster.oseibaah@nih.gov; fosterbaah@gmail.com.

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(Havranek et al., 2015; Palmer et al., 2019). SDH reflect the availability, affordability, accessibility, and the equitable distribution of basic and health promoting resources used to combat illness (Havranek et al., 2015). These basic and health promoting resources influence the risk of poor health outcomes in disadvantaged groups. Unfortunately, these disadvantaged population groups cluster in geographical areas with limited access to health-promoting resources, further increasing their predisposition to chronic cardiovascular diseases such as heart failure (HF) (Baah et al., 2019).

As explained by Baah et al. (2019), social position is the central concept of SDH. Social position reflects a place in society where individuals are relegated based on their experiences, identity, and environment. Several factors, including economic stability, social and community context, neighborhood, and built environment, in addition to sociodemographic factors (e.g., education) influence social position (Maness & Buhi, 2016). This position in society determines an individual's access to health promoting resources, thus defining the person's risk of poor health. The person-specific sociodemographic indicators of social position (e.g., education, income, and race) independently predict the risk of HF even after adjusting for age, gender, and comorbid conditions (Diaz-Toro et al., 2015). For instance, compared to Whites (49%), a greater percentage of HF risk in Blacks (68%) is due to modifiable risk factors (Virani et al., 2020), which are commonly determined by the environment. Further, recent evidence suggests that indicators of social position are independently associated with both diet quality and weight gain (Virani et al., 2020), two key indicators of self-care maintenance. Together, these studies suggest that social position is key to reducing disparities in cardiovascular diseases such as HF (Diaz-Toro et al., 2015; Havranek et al., 2015).

The relationship between self-care and HF outcomes is well established (Riegel et al., 2017). Adequate self-care is known to prevent exacerbations of HF and hospitalizations and reduce mortality (Buck et al., 2015). Self-care is conceptualized as entailing a process of maintenance, symptom perception, and management (Riegel et al., 2016). Self-care maintenance involves healthy behaviors and adherence to a plan of care to maintain physiological stability and prevent symptoms (Riegel et al., 2016). Symptom perception addresses the monitoring behaviors essential for the detection of signs and symptoms of illness progression. Self-care management involves the response to symptom perception. In this study we focused on self-care maintenance because it is described as the initial step in the self-care process.

Although self-care is known to improve outcomes in patients with HF, the evidence linking SDH, and specifically sociodemographic indicators of social position, and HF self-care remains unclear (Jaarsma et al., 2017). Prior research testing sociodemographic variables associated with self-care found inconsistent results between these variables and HF self-care (Ausili et al., 2016; Koirala et al., 2020; Oosterom-Calo et al., 2012; Pancani et al., 2018; Sedlar et al., 2017; Siabani et al., 2016; Vellone et al., 2017). One study found a significant association between age, gender, and self-care maintenance (Cocchieri et al., 2015). A recent review of factors related to HF self-care found inconsistent evidence to support age and gender as influencing self-care behavior (Jaarsma et al., 2017). Knowing the sociodemographic indicators of social position that are related to self-care would help

clinicians predict which patients may have difficulty mastering self-care. Hence, the aim of this secondary analysis was to explore the relationship between the sociodemographic variables of age, gender, race, education, marital status, income adequacy, and employment and HF self-care maintenance.

Methods

We performed a secondary analysis of cross-sectional data collected for psychometric testing of the Self-Care of Heart Failure Index (SCHFI v7.2) between 2016 and 2017. The methods and procedures for the parent study have been reported elsewhere (Riegel et al., 2019). In brief, all participants completed the SCHFI v7.2 and a sociodemographic questionnaire. The sociodemographic data collected included age, gender, race, education, marital status, income adequacy, and employment.

Sample

A sample of 631 adults was enrolled in the parent study. That sample included clinically stable patients over 18 years of age who were diagnosed with chronic HF and could read and write in English. They were recruited from in-patient and out-patient settings at five sites in the northeast, southeast, and southwestern United States. While automated hospital records and referrals from clinicians were used to identify potential participants in the hospital setting, outpatients were recruited from cardiology clinics and cardiac rehabilitation settings (Riegel et al., 2019). Prior to data collection, Institutional Review Board approval was obtained for all sites. After potential participants who met inclusion criteria and agreed to participate provided informed consent, they completed a survey packet administered by a member of the research team. As all patients with HF must perform self-care, patients with any type of HF were included in the parent study.

Institutional Review Board approval was obtained for this secondary analysis. Any participant who had missing data on any of the key SDH variables ($N = 84$) was excluded from this analysis, resulting in a final sample of 543. All these participants had complete data on all variables. Asian and mixed race were combined because there were so few participants in these groups. There were no differences between participants who were excluded from analysis and those who were included.

Measures

Self-care was assessed using the revised 29-item SCHFI v7.2 which measures self-care maintenance, symptom perception, and self-care management. For this analysis, we only used the self-care maintenance scale of the SCHFI, the process thought to initiate self-care. Scores were standardized from 0 to 100, with higher scores indicating better self-care maintenance, with a score ≥70 reflecting adequate self-care maintenance (Riegel et al., 2019). The Self-Care Maintenance scale was found to be multidimensional in a prior study (Barbaranelli et al., 2014). When the dimensionality and reliability of the SCHFI v7.2 were tested with data from this sample, the global reliability for multidimensional scales was 0.75 (Riegel et al., 2019).

In this study, we focused on sociodemographic indicators of SDH captured in the sociodemographic questionnaire, categorizing the variables in this manner: (1) age group (age ≤ 64 or age ≥ 65), (2) gender (male or female), (3) race (White, Asian/Mixed, or Black), (4) education (high school or less, trade school, or college), (5) marital status (single, married/partnered, or divorced/separated/widowed), (6) income adequacy (more than enough [comfortable], just enough, or not enough to make ends meet), and (7) employment status (employed or unemployed/retired). Income adequacy reflects an individual's perception of how adequate the income is in meeting the household needs of the family regardless of the actual income value (Riegel et al., 2019). Our rational for dichotomizing age into two groups (age ≤ 64 and age ≥ 65) was that the risk of developing heart failure increases with age (Virani et al., 2020) and older age is also associated with poor self-care maintenance (Cocchieri et al., 2015).

Statistics

All statistical analyses were conducted using the Statistical Analysis System (SAS v9.4) (SAS Institute, Cary, NC). Descriptive statistics were used to portray the sample. Histograms and cross tabulations were created for data visualization. We placed Asian or mixed-race participants in the same group because our sample did not adequately represent Asian/mixed race participants with HF. Prior to the main analysis, we performed bivariate analyses between each determinant variable and the outcome variable. We treated self-care maintenance as a dichotomous variable (adequate self-care maintenance [maintenance score ≥70] and inadequate self-care maintenance [maintenance score <70]) to identify the bivariate relationships which existed within our sample using chi square tests.

Prior to analysis, we assessed for model assumptions surrounding multiple regression (e.g., normality using a scatter plot and collinearity using variance inflation factor), which were found to have been met. For the main analysis, we performed multiple regression with backward elimination using age group, gender, race, education, marital status, income adequacy, and employment as potential determinants of self-care maintenance. Although not all variables were found to be statistically significant in bivariate analysis, we force-entered all our variables because of the inconsistency that exist in the literature surrounding the sociodemographic factors that influence HF self-care maintenance. The least contributing variable was then removed from the model iteratively until the remaining variables were significant at the alpha level of .2. This way, we achieved the most parsimonious model with variables best related to self-care maintenance. In post hoc analyses we used the Bonferroni criterion adjusted for an alpha level of .017 (.05/3) to determine which level within each categorical variable was driving the result. Lastly, we explored the two-way interaction effects between each of the variables included in our final model.

Results

The sample (Table 1) was predominantly white (72.0%) and male (63.9%), with a mean age (range 20–97) of 64.6 ± 14.3 years. Most of the participants were married or partnered (57.3%) and unemployed or retired (80.7%). A large proportion had a high school or less education (39.0%) and just enough income to make ends meet (45.9%). Self-care

maintenance scores were generally adequate among all the participants based on the mean score (73.45 ± 16.79) with a range of 10 to 100 (median = 75, IQR = 62.50–87.50).

For the bivariate analysis, we found that race ($p = .018$) and marital status ($p = .038$) were significantly associated with self-care maintenance. A larger percentage of Asian/mixed participants (82.86%) had adequate self-care maintenance compared to Whites (60.87%) and Blacks (56.41%). A larger percentage of married/partnered participants (65.27%) also had adequate self-care maintenance compared to their single (50.57%) or Divorced/Separated/Widowed counterparts (59.31%). Race ($p = .002$) was significantly associated with education. Particularly, a larger proportion of Whites (35.6%) had a college education compared to both the Black (20.5%) and Asian/mixed (14.3%) participants.

In the first four steps of the backward elimination process, age group ($p = .48$), gender ($p = .37$), income adequacy ($p = .83$), and employment status ($p = .32$) were removed from the model based on our pre-determined significance level of $p = .2$. This process resulted in our most parsimonious model (Table 2) with race ($p = .021$), education ($p = .061$) and marital status ($p = .024$) as the best determinants of self-care maintenance. This parsimonious model ($F[6, 542] = 3.57$, $p = .002$) explained only 3.8% of the variance in self-care maintenance.

Two-way interaction terms between race, education, and marital status variables were not found to be significant. In our second model ($F[18, 542] = 2.03$, $p = .008$), race ($p = .007$), education ($p = .055$), marital status ($p = .432$), race-education interaction ($p = .475$), race-marital status interaction ($p = .114$) and the education-marital status interaction ($p = .269$) (Table 2) were used as independent variables. Results were consistent when each interaction was tested in a separate model.

Table 3 presents results from post-hoc analysis. First, although Asian/mixed participants had significantly higher self-care maintenance scores (mean difference = 7.32, 95%CI [0.31, 14.34]) compared to White participants, there was no statistically significant difference in self-care maintenance between Asian/Mixed participants and Blacks. Second, participants with some college education had significantly higher self-care maintenance scores (mean difference = 4.13, 95%CI [0.03, 8.24]) compared to those with high school or less education, but not those with trade school education. Third, married/partnered participants had significantly higher self-care maintenance scores (mean difference = 5.56, 95%CI [0.73, 10.38]) compared to single participants, but not those who were divorced, separated, or widowed.

Discussion

In this study we explored the relationship between sociodemographic variables known to be indicators of SDH and HF self-care maintenance. We found that marital status, race, and education were the best determinants of self-care maintenance in our sample, but the amount of variance explained was small. There was no statistical evidence of any interaction between our independent variables and self-care maintenance. We found that having some college education, being of Asian/mixed race, and being married or partnered were all associated with relatively higher self-care maintenance. A larger proportion of Whites had a

college education compared to both the Black and Asian/mixed participants. Age group, gender, income adequacy, and employment were not related to self-care maintenance.

Although the association between education and self-care maintenance observed in this study was marginal, it is consistent with previous studies. Prior researchers have found a positive association between formal education and self-care maintenance (Riegel et al., 2009; Siabani et al., 2016). Vellone et al. (2017) found that less formal education was associated with low self-care maintenance adherence behaviors in Italian patients with HF. In this study, we found that participants with some college education had higher self-care maintenance scores compared to those with high school or less education. This evidence suggests that interventions that compensate for low education levels may be particularly important in reducing disparities in HF outcomes.

Few studies have explored racial differences in self-care maintenance and the evidence surrounding the relationship between race and self-care maintenance is mixed. In this study, race was significantly associated with self-care maintenance in both bivariate and multiple regression analysis (controlling for education and marital status). This finding differs from those of Graven et al. (2019) who found no statistically significant association between race and self-care maintenance. We know that not only are racial minorities disproportionately burdened by poor health and that they are also more likely to live in geographical areas with poor SDH (Virani et al., 2020). As the ability of community dwelling patients with HF to perform self-care maintenance is influenced by social position and social position defines self-care choices, further research is needed to explore how race influences the self-care choices of patients with HF. Future research should focus on identifying possible mechanisms through which race influences HF self-care.

We found an association between marital status and self-care maintenance. Participants who were married/partnered had higher self-care maintenance scores compared to those who were single. This finding supports those of prior studies that found an association between marital status and HF knowledge (Cavalcante et al., 2018). Others have also found that relationship type was an important determinant of HF self-care (Bidwell et al., 2015). Because social support is known to positively influence self-care (Koirala et al., 2020), assuming mainly a positive influence, support from spouses (e.g., alternate access to resources and shared HF knowledge) may partly explain the association between marital status and HF self-care. Our findings suggest that individuals with lack of support from spouses may be at risk for inadequate self-care behavior.

Prior studies found an interaction between race and marital status (Assari & Bazargan, 2019) and race and education (Vable et al., 2019). Among Blacks and Latinos, better educational quality was associated with lower obesity, higher rates of stroke, heart disease, and smoking (a poor self-care maintenance behavior) (Vable et al., 2019). Additionally, Blacks mostly lived in states with lower state-level educational quality than Whites and Latinos. However, we found that the relationship between education and self-care maintenance did not differ by race or marital status. The relationship between marital status and self-care maintenance also did not differ by race. Consistent with the findings of Vable et al. (2019), there was an association between race and education. We found that a larger proportion of Whites had a

college education compared to both Black and Asian or mixed participants. This finding indicates that Blacks and Asian or mixed-race participants were overly represented among those with lower education. Clearly, there is an association between race and education, but the mechanistic pathway of sociodemographic indicators of SDH on self-care behaviors remain unclear. Thus, further studies examining the pathway(s) through which SDH affect self-care behavior is needed. Identifying these mechanistic pathways may suggest opportunities for reducing disparities in HF outcomes.

We found no evidence of age group, gender, income adequacy, and employment as determinants of self-care maintenance although prior research has shown that unemployed patients had better self-care maintenance compared to their employed counterparts (Dickson et al., 2008). Our results differ from prior studies demonstrating a significant association between age, gender, and self-care maintenance (Cocchieri et al., 2015) or inconsistent evidence (Jaarsma et al., 2017). Despite these inconsistencies, age, gender and employment remain important determinants of health outcomes (Havranek et al., 2015), so further study of these factors is needed to determine if self-care maintenance is mediating the relationship between SDH and HF outcomes. A mixed methods approach may yield more evidence and improve our understanding of how these factors are related.

Our findings relating to income adequacy were not surprising even though they are inconsistent with previous studies that found a negative association between self-care maintenance and financial status in patients with HF (Wu et al., 2017). Our finding may be explained by the distinction between financial status and perceived income adequacy. Financial status is typically measured as income earned while income adequacy reflects the perception of how well one’s income meets one’s needs. This form of measurement may not fully explain the broader effect of income on self-care behavior.

Limitations

Although we had a relatively large sample for this study, our findings should be interpreted with caution because we conducted a secondary analysis of existing data that were collected without our research question in mind (Cheng & Phillips, 2014). Therefore, we were limited in the full range of known indicators of SDH that may influence self- care behavior (e.g., residential segregation). As already explained, only a small proportion of our participants self-identified as Asian or mixed race. Therefore, we placed these participants in the same group for this analysis. This approach prevented us from exploring the nuanced relationship between race and self-care. Future studies should include more racial diversity to better explain the relationship between race and HF self-care.

Conclusion

The amount of variance in HF self-care maintenance explained by the sociodemographic variables was small, which was not surprising because SDH include a vast array of factors reflecting one’s social position. SDH is complex and cannot be explained with simple sociodemographic characteristics. Sociodemographic variables are only a small proportion of the factors known to influence behavior. Clearly factors such as access to care and social support are important determinants of self-care in persons with HF (Lee et al., 2019). Future

studies that capture the full range of SDH indicators and are grounded in theory are warranted to explain the intricate relationships between SDH and HF self-care behavior.

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Author Biographies

Foster Osei Baah, MS-PhD, RN is a Marshal W. Nirenberg Postdoctoral Fellow at the Social Determinants of Obesity and Cardiovascular Risk Laboratory at the National Heart, Lung and Blood Institute (NHLBI) at the National Institute of Health (NIH).

Jesse Chittams, MS is a Senior Biostatistician at the Biostatistics, Evaluation, Consultation, Collaboration, Analysis (BECCA) laboratory at the University of Pennsylvania School of Nursing.

Beverly Carlson, PhD, RN, FAHA is an Associate Professor of Nursing at San Diego State University.

Kristen A. Sethares, PhD, RN, CNE, FAHA, FHFSA is a Professor of Nursing at the University of Massachusetts Dartmouth.

Marguerite Daus, BSN, RN is a PhD Candidate at the University of Pennsylvania School of Nursing.

Debra K. Moser, PhD, RN, FAHA, FAAN is a Professor and Linda C. Gill Chair of Cardiovascular Nursing at the University of Kentucky.

Barbara Riegel, PhD, RN, FAHA, FAAN is Edith Clemmer Steinbright Professor of Gerontology at the University of Pennsylvania School of Nursing.

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Table 1.

Sociodemographic Characteristics of Study Sample ($N = 543$).

	Total sample (Mean ± *SD* or *n* [%])	Adequate self-care maintenance (*n* = 333)	Inadequate self-care maintenance (*n* = 210)	Chi square *p* value
Age (years)	64.55 ± 14.32			
Age ≤ 64	263 (48.43)	157 (59.70)	106 (40.30)	.450
Age ≥ 65	280 (51.57)	176 (62.86)	104 (37.14)	
Gender				
Male	347 (63.90)	204 (58.79)	143 (41.21)	.106
Female	196 (36.10)	129 (65.82)	67 (34.18)	
Race				
Black/African American	117 (21.55)	66 (56.41)	51 (43.59)	.018 *
Asian/Mixed	35 (6.45)	29 (82.86)	6 (17.14)	
White	391 (72.01)	238 (60.87)	153 (39.13)	
Educational level				
High school or less	212 (39.04)	122 (57.55)	90 (42.45)	.104
Trade school	163(30.02)	97 (59.51)	66 (40.49)	
College (Associate, Bachelor's, Master's, Professional or Doctoral degree)	168 (30.94)	114 (67.86)	54 (32.14)	
Marital status				
Single	87 (16.02)	44 (50.57)	43 (49.43)	.038 *
Married/Partnered	311 (57.27)	203 (65.27)	108 (34.73)	
Divorced/Separated/Widowed	145 (26.70)	86 (59.31)	59 (40.69)	
Self-reported income adequacy				
Comfortable (More than enough to make ends meet)	186 (34.25)	120 (64.52)	66 (35.48)	.116
Just enough to make ends meet	249 (45.86)	156 (62.65)	93 (37.35)	
Do not have enough to make ends meet	108 (19.89)	57 (52.78)	51 (47.22)	
Employment ($N = 584$)				
Employed	105 (19.34)	62 (59.05)	43 (40.95)	.594
Unemployed/Retired	438 (80.66)	271 (61.87)	167 (38.13)	

* significance at $p < .05$.

Table 2.

Most Parsimonious Regression Including Race, Education, and Marital Status.

Dependent variable: self-care maintenance				
Predictors	***df***	**Mean square**	***F***	**Statistical significance**
Model 1	6	978.96	3.57	.002**
Race	2	1066.07	3.89	.021*
Education	2	771.98	2.82	.061
Marital Status	2	1025.63	3.74	.024*
Error	536	274.13		
Corrected	542			
R squared = .038				
Model with interaction effect of race and education				
Model 2	18	552.76	2.03	.008**
Race	2	1340.92	4.92	.007*
Education	2	794.55	2.91	.055
Marital Status	2	228.91	0.84	.432
Education × Race	4	240.19	0.88	.475
Education × Marital status	4	354.25	1.30	.269
Race × Marital status	4	510.868	1.87	.114
Error	524	272.63		
Corrected	542			
R squared = .065				

Note.

* significance at $p < .05$.

** significance at $p < .01$.

Table 3.

Results of Pairwise Comparison from Most Parsimonious Model using Bonferroni Criterion.

Education comparison			
Some college—Trade school	2.864	−1.507	7.236
Some college—High school/less	4.132	0.025	8.239***
Trade school—Some college	−2.864	−7.236	1.507
Trade school—High school/less	1.268	−2.874	5.410
High school/less—Some college	−4.132	−8.239	−0.025***
High school/less—Trade school	−1.268	−5.410	2.874
Race comparison			
Mixed/Asian—White	7.321	0.306	14.336***
Mixed/Asian—Black	7.577	−0.083	15.238
White—Mixed/Asian	−7.321	−14.336	−0.306***
White—Black	0.256	−3.934	4.446
Black—Mixed/Asian	−7.577	−15.238	0.083
Black—White	−0.256	−4.446	3.934
Marital status comparison			
Married/Partnered—Divorced/Separated/Widowed	3.432	−0.566	7.430
Married/Partnered—Single	5.557	0.734	10.379***
Divorced/Separated/Widowed—/Partnered	−3.432	−7.430	0.566
Divorced/Separated/Widowed—Single	2.125	−3.268	7.517
Single—Married/Partnered	−5.557	−10.379	−0.734***
Single—Divorced/Separated/Widowed	−2.125	−7.517	3.268

*** *Note*. Comparisons significant at the 0.05 level are indicated by.