



Research paper

Resilience factors, race/ethnicity and sleep disturbance among diverse older females with hypertension



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ABSTRACT

Background: This study examined the relationships between resilience and sleep disturbance in a diverse sample of older women with a history of hypertension and whether this relationship is moderated by individuals' race/ethnicity.

Methods: Sample includes 700 females from a community-based study in Brooklyn, New York with a mean age of 60.7 years (SD = 6.52). Of the participants, 28.1% were born in the U.S.; 71% were African-descent, 17.4% were European and 11.6% were Hispanics descents. Data were gathered on demographics and sleep disturbance using the Comprehensive Assessment and Referral Evaluation (CARE) and the Stress Index Scale (SIS). Resilience Factors were assessed with both the Index of Self-Regulation of Emotion (ISE) and religious health beliefs. Chi-Square, Anova, Student t-tests, and multilinear regression analysis were conducted to explore associations between resilience factors and sleep disturbance. Associations between resilience factors and sleep disturbance were examined using stratified multilinear regression analysis in three models by race/ethnicity. Regression models was conducted examining the interaction between resilience factors and stress

Results: Resilience factor, ISE emerged as the strongest independent predictor of sleep disturbance [B (SE) = -0.368(0.008); $p < .001$] for African descents. ISE was not a significant predictor of sleep disturbance among Hispanic participants [B(SE) = -0.218(0.022); $p = .052$], however interaction effect analysis revealed that stress level moderates significantly the relationship between ISE, and their sleep disturbance [B (SE) = 0.243(0.001); $p = .036$].

Conclusions: Results of our study suggest that resilience factors might be a more important protective factor for sleep disturbance among diverse older females.

1. Introduction

Overall, the age-adjusted prevalence of hypertension in older females is 75%, and among those aged ≥ 65 , women had a lower rate of hypertension control (Go et al., 2013). These subgroup with hypertension have an increased risk of sleep disturbance (Sandberg et al., 2015). Both hypertension and sleep disturbance increase Cardiovascular Diseases (CVD) risk (e.g. stroke and myocardial infarction). Racial/ethnic and sex/gender differences also exist with sleep disturbance risk, with older African-American females being at higher risk for sleep disturbance. In a review conducted by Jackson et al. (2015), poor sleep appeared to be a powerful contributor to cardiovascular disparities. The researchers called for more diversity in populations enrolled in sleep

research and underscored the need for investigation across racial/ethnic communities of the effect of different types of stress on sleep. In summary, they advocated for a paradigm shift in the direction of sleep health research (Jackson et al., 2015; Buysse, 2014), that may gain insight in investigating protecting factors of sleep and cardiovascular health, particularly the role of resilience (Jackson et al., 2015).

1.1. Resilience and morbidity

Resilience is commonly defined as an individual's capacity to bounce back creatively in the aftermath of Potentially Traumatic Events (PTE) or life adversities. Although there is no consensus among scholars about a single definition of the construct, generally they agree on the

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conceptualization of resilience as a protective factor against stressful events (Pietrzak et al., 2011; Ahmad et al., 2010; Connor and Davidson, 2003).

Bonanno et al. (2011) highlighted key independent “resilience-promoting factors” inherent to the subject, event, and environment such as personality, culture, positive worldview, level of stress exposure, and capacity for positive emotion or social resources (Ehlers and Clark, 2000). Resilience has been studied worldwide in multiple racial/ethnic groups exposed to PTE or stressful events, including populations affected by serious medical conditions, and the general populations. Although inconsistent, studies identified by Davidson (2018) in populations worldwide demonstrated that higher resilience factors are often associated with Socio-Economic Status (SES), age, gender, and lower trauma-related disorders and medical conditions such as breast cancer, lung, liver, arteriosclerosis, orthopedic, post-partum and cardiovascular diseases (CVD). Research examining medical conditions and resilience promoting factors can be summarized in three categories: (1) Psychological factors: self-efficacy, self-esteem, internal locus of control, optimism, mastery, hardiness, hope, self-empowerment, acceptance of illness, and determination; (2) Social support (Sells et al., 2009); and (3) Coping strategies such as positive cognitive appraisal, spirituality, active coping, and mastery. Additionally, self-care, adherence to treatment, health-related quality of life, illness perception, pain perception, exercise adherence, and physical outcomes are among resilience factors strongly associated with physical illness (Stewart and Yuen, 2011).

1.2. Resilience, ethnicity, and cardiovascular health in later life: the implication of religious beliefs

Religion and spirituality play a central role in later life. The Pew Forum on Religion and Public Life reported that 69% of seniors of 65 years or older indicate religion as “very important” in their lives, compared with 45% of people under 30 years of age ($N = 34,695$; 2008). There is evidence that religious beliefs become more important as people aged and experience morbidity (Reed, 1987). Among elderly patients admitted to the hospital, more than 40% of them spontaneously mention religion as their source of coping. In this regard, spirituality and religion may serve as a pathway of resilience in later adulthood (Pargament et al., 2001). Religious coping such as prayer, scripture study, and seeking religious health and comfort) is also among dimensions that are believed to be associated with resilience, ethnicity, blood pressure (BP), and sleep disturbances. Thus, BP was hypothesized to be the mechanism by which religion may be connected to wellbeing. For instance, a study conducted by Steffen et al. (2001) demonstrated that compared to whites, African-Americans scored higher at the measure of religious coping, which was simultaneously linked to lower both awake and sleep ambulatory blood pressure (ABP) assessment. There is a burgeoning literature that suggests that religious beliefs may also be significantly associated with disturbances in sleep quality (White et al., 2018; Ellison et al., 2019; Hill et al., 2018).

Data that address the relationship between resilience and sleep disturbance for patients affected by high BP from a racial/ethnic and gender perspective are scarce. The pathways and impact of behavioral and psychosocial factors on cardiovascular disease vary individually, racially and ethnically. Previous research has found that women and some racial/ethnic groups experienced lower rates of disease or later onset compared to what is expected due to their risk profiles. These outcomes may be due to the lack of including resilience factors (Ruiz et al., 2018). The rationale for focusing on the role of resilience on sleep disturbance among patients affected by cardiovascular diseases, namely hypertension is because apart from being a positive trait, it is quite mutable and definitely underlies the ability of individuals to cope and perhaps even manage health challenges, such as sleep duration. In addition, resilience lends itself to intervention at the individual level

given the rather difficult and long-term nature of structural social factors.

This study draws from Wister et al. (2016) which illustrates how risk or protective traits, resources, and processes occur over an individual's lifetime to promote resilience. After a hypertension diagnosis, older women may experience a disruption in their sleep patterns. The individual must develop a sense of motivation to utilize her social and environmental resources. In turn, she may become resilient against the burden of hypertension and sleep disturbance by using specific coping mechanisms such as self-regulation of emotion and religious coping. Over time, the woman may regain some sort of optimal wellbeing (Wister et al., 2016). However, race/ethnicity can play an integral role in potentially interrupting this concept at each stage after the disruption.

As illustrated, the Lifecourse Model of Multimorbidity Resilience demonstrates the key areas of focus and associated interactions using eight stages and eight directional over time arrows as follows:

Stage 1: Adverse event

Stage 2: Perception (stressful)

Stage 3: Disruption

Stage 4: Energy motivation access

Stage 5: Activation of resources

Stage 6: Coping processes and emotional regulation

Stage 7: Reintegration

Stage 8: Wellness, recovery, growth.

In summary, Wister's lifecourse model of multimorbidity resilience was adopted in this study to conceptualize the issues related to sleep disturbance among older women living with hypertension, while delineating clear parameters and boundaries for the entire study.

Consequently, the present secondary analysis seeks to understand the relationships between resilience factors -that we defined as the ability to regulate emotion and to use of religious coping- with sleep disturbance in a diverse sample of older women with a history of hypertension, and whether this relationship is moderated by individuals' race/ethnicity. We hypothesized that resilience factors will be an independent predictor of sleep disturbance, jointly with other covariates such as age, Body Mass Index (BMI), place of birth (US-born versus born outside of the US), income and stress among hypertensive females. The strength of the association between sleep disturbance and resilience will differ based on participant race/ethnicity.

2. Method

2.1. Participants

We used data from a larger community-based study in Brooklyn, New York (NY), which included 700 older women from 50 to 70 years old. The majority 71% ($N = 497$) characterized a group of African-descents (e.g., US-born African Americans and Caribbean Americans, including women born in Haiti, Barbados, Trinidad and Tobago, and Jamaica). The remaining consisted of 17.4% ($N = 122$) European-descent, which consisted of U.S.-born European-descent women and Eastern-European women from Russia, Ukraine, and Belarus and 11.6% ($N = 81$) Hispanics. Respondents were recruited based on a stratified-cluster-sampling strategy based on the Household Income and Race Summary Tape File 3A of the 1990 Census files.

2.2. Procedures

Data were gathered during face-to-face interviews by trained interviewers of the same racial/ethnic background as the respondents that lasted about 1.5 h and took place in the respondent's home or elsewhere. The measures were administered in a standard fashion for all participants.

2.3. Measures

Measures for our analysis include demographics, health risk factors (age, education, income, BMI, smoking status, alcohol consumption, history of CVD, etc.), stress, resilience factors such as Index of Self-Regulation of Emotion and health beliefs (religious coping), and sleep, etc.

2.3.1. Physical health and history of cardiovascular disease

Physical health and history of CVD were measured by trained study-staff from a similar ethnic background as the volunteers with the Comprehensive Assessment and Referral Evaluation (CARE). The CARE is a semi-structured interview guide and an inventory of defined ratings. It was designated comprehensive because it covers psychiatric, medical, nutritional, economic and social problems, and three items related to CVD: Heart Disease, Stroke, and Hypertension (Golden et al., 1984). The CARE had good construct validity and predictive validity with Cronbach alpha for hypertension of 0.92 and for sleep disorders of 0.85.

2.3.2. Stress

Experience of stressful events is assessed by the Stress Index Scale that was used initially by the National Survey of Black Americans (Jackson et al. 1996). Respondents rated on a 4-point scale the degree to which a set of 10 items provoked stress in the past month or two. These stress-induced life events were health, money, job, and problems with family or marriage, problems with people outside the family, children, crime, police, love life, and racial conflict. Each domain is rated based on the intensity of stress associated ranging from 0 (*not at all*) to 4 (*very much*) yielding an overall stress score from 0 to 29. The α in our sample was 0.81.

2.3.3. Resilience factors

As previously demonstrated, resilience is a multidimensional and dynamic process that embodies individual characteristics such as psychological factors (personality traits, positive worldviews, ability to regulate emotion, etc.), environment and cultural aspects. There is no consensus among authors on the definition of resilience which has created considerable challenges when developing an operational definition of resilience. The multiplicity of approaches in the measure of the concept has led to inconsistencies as it pertains to the nature of potential risk factors and protective processes, and in estimates of prevalence. Among the 19 resilience scales reviewed by Windle et al. (2011); four of these were a revision of the original measure. Methodological issues were identified for all measures. Broadly, the Connor-Davidson Resilience Scale, the Resilience Scale for Adults and the Brief Resilience Scale exhibited the strongest psychometric properties. The conceptual and theoretical adequacy for a portion of the scales was controversial.

In the context of older patients with high blood pressure, resilience can be conceived as a dynamic process that involves actively coping with experiences of considerable adversity. As such, drawing from Wister et al. (2016)'s lifecourse model of multimorbidity resilience, in our study, resilience factors were assessed with both the Index of Self-Regulation of Emotion (ISE) and with a measure of religious coping (health beliefs) as a proxy. The goal was to capture the dynamic between a group of factors that are commonly associated with Resilience and subsequent sleep health outcomes among women affected by chronic diseases. Mendolia (2002) demonstrated with the ISE that individuals regulate their physiological responses to self-threatening negative and positive emotional events and that ISE can be a reliable predictor of repressive behaviors. Mendolia proposed a measurement strategy to identify the tendency in all individuals to exhibit distancing behavior namely repressive coping (Mendolia, 1999; Mendolia et al., 1996). Drawing from Mendolia's repression model, in the larger study (Consedine et al., 2004), a composite score for ISE ranges from 0 to 52

measures repressive coping by combining “defensiveness” (items such as “I have never hated anyone- I have never intensely disliked anyone”) from the Crowne-Marlowe Social Desirability Scale: $\alpha = 0.73$ (Crowne and Marlowe, 1960) with “anxiety” ($\alpha = 0.75$) (items such as “I feel nervous and restless”) from the anxiety subscale of the State-Trait Anxiety Inventory- (Bieling et al., 1998) scores. Higher scores demonstrating stronger defensiveness/repressive coping (Consedine et al., 2004).

Spirituality/religious beliefs are among the cultural factors associated with resilience dimensions among populations exposed to stressful events (Blanc et al. 2016). Emerging literature suggests that religious beliefs may also be associated with disturbances in sleep quality (White et al., 2018; Ellison et al., 2019; Hill et al., 2018). Therefore we created a linear composite score with 8 religious health beliefs questions (e.g., “praying helps me when I have problems - when someone gets seriously ill, they should just trust in God - at times, a voodoo priest can be helpful in dealing with evil”) to measure religious coping. Participants were asked to indicate how strongly they disagree (1) or agree with each statement (7). Higher scores indicated greater religious health beliefs ranging from 8 to 56. In our sample, this scale showed good internal consistency with a Cronbach's alpha of 0.75.

2.3.4. Sleep

The area of sleep symptoms among respondents was measured by a sleep disorder questionnaire, which comprised the five most common symptoms of insomnia such as “Do you depend on medicine to sleep?” “Do you have difficulty falling asleep?” “Do you wake up often during the night?” “Do you wake up early and wake up feeling tired?” “Do you sleep during the day? These five “Yes (1) or No (0) questions reflect the most frequently used insomnia symptoms, specifically, difficulty initiating sleep (DIS), difficulty maintaining sleep (DMS), and early morning awakening. Sleep disturbance score ranges from 0 to 5. In our sample, Cronbach's alpha was 0.70.

3. Data analysis

Participant characteristics were reported for the total sample, by race/ethnicity. Comparisons of characteristics by race/ethnicity status were conducted using ANOVA and independent samples t-tests for continuous variables and Chi-square tests for categorical variables. Characteristics were reported as means with standard deviation or as percentages with frequencies. Factors found to not be significantly associated with sleep or resilience factors were not considered for later stages of analyses.

Associations between resilience factors and sleep disturbance were examined using stratified multilinear regression analysis in 3 models by race/ethnicity. Model 1 examined the association between both resilience factors (ISE and Health beliefs) and sleep disturbance adjusting for all covariates. The strength of the association between resilience factors and sleep disturbance was evaluated by interpreting the strength of the regression parameter for resilience factors in Model 2 as well as the additional variance in sleep disturbance explained by the addition of resilience factors (ISE and health beliefs) to the model (defined as the R^2 change between Models 1 and 2). A third regression model was conducted examining the interaction between resilience factors and stress, to examine whether this variable moderated the association between resilience factors and sleep disturbance.

Statistical analysis: Chi-Square, Student t-tests, Anova-one way, Pearson Correlations, and multilinear regression analysis were conducted to explore associations between demographics, resilience factors and sleep disturbance. The effect of resilience factors on sleep disturbance was evaluated by adding ISE and Health beliefs as predictors to the full covariate-adjusted model and interpreting R^2 adjusted. Interaction effects analysis between resilience factors and potential moderators (race/ethnicity and stress) were also examined.

Table 1Participant's characteristics by race/ethnicity (** = $P < 0.05$), $N = 700$.

Participant Characteristics	TOTAL	Race N(%) or M(SD) African-Descent (A-D) 497(71%)	European-Descent (E-D) 122(17.4%)	Hispanics 81(11.6%)	P
Age, Mean (SD)	60.7 (6.5)	60.6(6.5)	61.6(6.2)	59.6(6.4)	.105
Place of birth					.000
US-born, N (%)	197(28.1)	154(78.2)	43(21.8)	0(0)	
Non-Us born, N(%)	503(71.9)	343 (68.2)	79(15.7)	81(16.1)	
Marital status					.000
Married (Legally), N(%)	241(34.1)	140(58.1)	57(23.7)	44(18.3)	
Married, living together, N(%)	8(1.1)	6(75.0)	1(12.5)	1(12.5)	
Divorced, N(%)	91(13.0)	63 (69.2)	18 (19.8)	10(11.0)	
Widowed, N(%)	156(22.3)	103(66)	37(23.7)	16(10.3)	
Separated, N(%)	52(7.4)	46(88.5)	2(3.8)	4(7.7)	
Single, not living w/partner, N(%)	152(21.7)	139(91.4)	7(4.6)	6(3.9)	
Income M(SD)	10.795(9846)	11.722(10,168)	5.257(4.1)	13.453(10.9)	.000
BMI, Mean (SD)	30.1(5.78)	30(5.6)	29(6.6)	28(4.7)	.028
Heart problem within last month N (%)	338(48.3)	200 (59.2)	82(24.3)	56(16.6)	.000
Report Health Stressor N (%)	589(84.1)	412(69.9)	107(18.2)	70(11.9)	.358
Overall Stress M(SD)	9.7(6.17)	9.26(6.3)	10.12(5.5)	11.98(5.1)	.001
Resilience Factors					
Index of Self-Regulation M(SD)	35(7.7)	37.5(6.8)	29.04(7.48)	37.08(7.71)	.000
Religious Health Beliefs M(SD)	32.8(92)	34.94(7.64)	22.12(9.1)	35.96(7.28)	.000
Sleep disturbance M(SD)	2.0 (2.1)	1.59(1.91)	3.27(2.06)	3.25(2.26)	.000

4. Results

4.1. Participant's characteristics

The sample comprised 700 females who reported using anti-hypertensive medications from a community-based study in Brooklyn, New York. The mean age was 60.7 years ($SD = 6.52$). In total, 28.1% were born in the U.S.; 71% were of African-descent, 17.4% were of European-descent and 11.6% were Hispanics.

As shown in [Table 1](#), African-descent participants reported fewer stress issues than their European-descent and Hispanic counterparts. Resilience factors such as ISE and religious health beliefs were higher among women of African and Hispanics descent compared to their European peers. Sleep disturbance was higher among women of European-descent and Hispanics compared to women of African descent.

According to the results displayed in [Table 2](#), there was no correlation found between stress and sleep disturbance scores ($r = 0.057$; $p > .05$). However, ISE correlated negatively but weakly with stress ($r = -0.16$; $p < .01$). However, while there was a moderate and negative correlation between ISE and sleep disturbance ($r = -0.43$; $p < .01$), the correlation was very weak among religious health beliefs and sleep disturbance ($r = -0.10$; $p < .01$).

5. The moderating role of race/ethnicity in the relationship between resilience factors and sleep disturbance

Stratified multilinear regression analyses were conducted to explore associations between demographics (marital status, income, BMI, place

of birth), resilience factors and sleep disturbance by race/ethnicity. Interaction effects between resilience factors and potential moderator (such as stress) were conducted to examine which populations benefitted most from the buffering effects of a significant resilience factor.

As seen in [Table 3](#), when each resilience factor was entered in the final models along with significant covariates, ISE emerged as the strongest independent predictor of sleep disturbance [$\beta = -0.368$, $SE = 0.008$; $p < .001$] for African descents. In this group, resilience accounted for a significant amount of variance in sleep disturbance (R^2 change = 0.132; $p < .001$) even after adjustment for age, place of birth, marital status, income, and BMI. Additionally, interaction effects between resilience factors and potential moderator (race/ethnicity coded categorically as a three-level variable) were conducted to examine which populations benefitted most from the buffering effects of a significant resilience factor. As ISE levels were significantly associated with sleep disturbance, we examined the potential moderating effect of race/ethnicity on this association. This interaction effect analysis shows that the association between ISE, the strongest resilience factor, and sleep disturbance may be moderated by race/ethnicity [$B(SE) = 0.32(0.007)$; $p = .046$]. The significant interaction between ISE and race/ethnicity indicates that non-Whites have an increase of 0.32 more on the sleep disturbance scale than Whites for every unit increase in ISE scores."

Finally, as stress correlated with ISE levels which were also significantly associated with sleep disturbance, we examined the potential moderating effect of stress level on the relationship between ISE and sleep disturbance. Although resilience factor such as ISE was not a significant predictor of sleep disturbance among Hispanic participants

Table 2Correlation Matrices of Pearson with demographics and health outcomes, $N = 700$.

	Age	BMI	Income	Stress	Index of Self-Regulation	Religious Health Beliefs	Sleep disturbance
Age	1	−0.104**	−0.104**	−0.206**	−0.003	−0.01	0.042
BMI		1	0.017	−0.002	−0.05	−0.011	.100**
Income			1	.095*	.139**	.186**	−0.194**
Stress				1	−0.160**	−0.063	0.057
Index of Self-Regulation					1	.106**	−0.426**
Religious Health Beliefs						1	−0.104**
Sleep disturbance							1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 3Summary of multilinear regression analysis by race/ethnicity with demographics and resilience factors as predictors of sleep disturbances, $N = 700$.

	African Descents (A.D)				European Descents (E.D)				Hispanics Descents (H.D)			
	Beta	95%CI		P Value	Beta	95%CI		P Value	Beta	95%CI		P Value
Model 1												
BMI	0.077	−0.184	1.068	0.166*	−0.353	2.073	0.163**		0.606	4.913	0.013***	
Marital status	−0.025	−0.002	0.036	0.074	−0.353	2.073	0.003		−0.068	−0.094	0.05	0.548
Place of birth	0.313	−0.07	0.038	0.551	0.017	0.087	0.818		0.028	−0.173	0.222	0.808
Income	−0.093	0.619	1.097	.000	−0.139	0.175	0.037		−0.124	.000	.000	0.277
Model 2												
BMI	1.99	.000	0.034	−0.046	−1.014	−0.031	0.625		−0.305	5.89	0.077	
BMI	0.071	−0.001	0.033	0.073	−0.216	3.336	0.085		−0.071	−0.093	0.048	0.523
Marital status	−0.015	−0.059	0.04	0.709	0.002	−0.154	0.158		0.032	−0.167	0.223	0.776
Place of birth	0.237	0.414	0.884	.000	−0.149	−0.925	0.099		−0.103	.000	.000	0.357
Income	−0.102	.000	.000	0.011	−0.052	.000	.000		0.58	−0.103	.000	0.357
Health Beliefs	0.016	−0.011	0.016	0.691	0.072	−0.015	0.036		0.415	0.174	−0.01	0.082
ISE	−0.368	−0.084	−0.05	.000	−0.16	−0.061	0.004		0.085	−0.184	−0.08	0.008
Model 3												
BMI	−0.366	3.173	.000	−0.16	−0.061	0.004	0.085		−0.184	−0.08	0.008	0.104
BMI	0.072	−0.001	0.033	0.07	0.231	0.011	0.081		0.119	−0.253	5.802	0.072
Marital status	−0.01	−0.056	0.043	0.797	−0.003	−0.157	0.153		0.056	−0.142	0.241	0.608
Place of birth	0.22	0.361	0.843	.000	−0.116	−0.839	0.197		0.222	−0.113	.000	0.304
Income	−0.097	.000	.000	0.016	−0.048	.000	.000		0.606	−0.113	.000	0.304
Health Beliefs	0.001	−0.014	0.014	0.977	0.066	−0.016	0.035		0.451	0.11	−0.024	0.069
ISE	−0.362	−0.083	−0.05	.000	−0.187	−0.066	−0.001		0.046	−0.218	−0.087	.000
ISE X Stress	−0.068	−0.001	.000	0.101	0.155	.000	0.003		0.084	0.243	.000	0.004

* Models 1 and 2: ($R^2 = 0.135$; $p = 0.000$; $R^2 = 0.132$; $p = 0.000$).** Model 1: ($R^2 = 0.105$; $p = 0.011$).*** Model: ($R^2 = 0.022$; $p = 0.629$). Additionally, there was a significant interaction effect ($p = .046$) between race/ethnicity and Index of Self-Regulation (ISE) on sleep disturbances.

[$B(SE) = -0.218(0.022)$; $p = .052$], however, interaction effect analysis revealed that stress level moderates significantly the relationship between ISE, and their sleep disturbance [$B(SE) = 0.243(0.001)$; $p = .036$]. Among them, the interaction effect between ISE and stress accounted for a significant amount of variance in sleep disturbance (R^2 change = 0.053; $p = .036$).

6. Discussion

Resilience is the ability to maintain, or regain, mental health in the face of significant adversity, including physical illness. This capacity is developmentally and culturally determined. Research addressing resilience and aging suggests that the elderly are capable of strong resilience despite socioeconomic backgrounds, personal experiences, and declining health. Important resilience factor has also been linked to positive outcomes, including successful aging, fewer depressive symptoms, and life expectancy. This study examined the relationship between resilience factors and sleep disturbance in a diverse sample of older women with a history of hypertension and whether this relationship is moderated by race/ethnicity. Our sample was predominantly African-descent hypertensive older females that were part of a larger community-based study sample in Brooklyn, New York. Among the African descents group, our hypothesis was verified, as we found that higher resilience factors, particularly self-regulation, were strongly associated with fewer sleep disturbance symptoms, independent of BMI, age, income, and place of birth, etc. These observations align with recent finding (Hughes et al., 2018) that indicates that poor sleeping Veterans had lower resilience, and suboptimal sleep was associated with higher psychological distress controlling for health and demographic characteristics. For the poor sleeping Veterans, resilience factors had significant buffering effects on the relationship between suboptimal sleep and psychological distress, suggesting that resilience may protect against negative health outcomes (Hughes et al., 2018).

Furthermore, stratified multilinear regression analysis shows that the association between ISE, the strongest resilience factor, and sleep disturbance could be moderated by race/ethnicity. And among our sample, both resilience factors –self-regulation and religious coping– were higher among hypertensive women of African-descent and

Hispanics compared to whites. This is consistent with previous studies that documented the higher degree of repressive and religious coping among non-hypertensive older African-descent compared to European-descent (Jean-Louis et al., 2007; Steffen et al., 2001). For African-Americans, religious coping correlated negatively with both awake and sleep Ambulatory Blood Pressure (ABP) measures, and was the second-robust predictor of ABP (Steffen et al., 2001). It has been demonstrated that Mexican immigrants in the United States utilized religiosity and spirituality to cope with migration and acculturation adversities (Read-Wahidi and DeCaro, 2017). We have also noticed that self-reported sleep disturbance was higher among women of European-descent and Hispanics compared to African-American Women. Similarly, Jean-Louis et al. (2007) found that the relationships between race/ethnicity and sleep disturbance were jointly dependent on the level of repressive coping. The authors suggested that older African-descent women might be reporting lower sleep disturbance symptoms than their peers, because of a stronger capacity to cope with negative emotions. It seemed that African-descents cope with sleep difficulties within a positive self-regulatory perspective. At the same time, the observed association between resilience and sleep disturbances could be due to other related factors (at least partly), such as more optimism and less psychosocial distress. For example, in one recent study, sleep quality measured by the Pittsburgh Sleep Quality Index correlated significantly with many positive (mindfulness habits, purpose in life, and optimism), and negative (anxiety, depression) psychosocial factors (Huang et al., 2019).

Our study sample was composed predominantly of older African-descent women immigrants. As such, we noted a significant difference in stress between African-descent women compared with Hispanics and European-Descent women. This finding resonates with heterogeneity in mental health between natives versus foreign-born in Bas-Sarmiento et al. (2017)'s conclusions of their systematic review on immigrant populations' mental health compared to natives. The authors suggested that immigrants may experience more depression, anxiety, and somatic disorders that may be due to the stressful conditions faced in the host countries; nonetheless, immigration does not generate automatically psychopathology. These results align with Read-Wahidi and Decaro's (2017) biocultural analysis of the immigration experience within the stress-buffering framework (Cohen and Wills 1985), which posits that stressors alter physical and mental health but the adverse

outcome is buffered by positive inputs that reinforce resilience. Perhaps the greater degree of resilience factors and fewer sleep disturbance symptoms observed among diverse African-descent participants could be the consequences of specific cultural protective factors such as positive worldview, health conception, sleep health literacy, and ability to use religious coping. In African migrants, religiosity was proven a pillar of resilience (Batunde-Solwale, 2016:). Furthermore, it was documented in African women immigrants in Canada that cognitive approaches and subjective resilience were efficient to face immigration challenges (Rashid and Gregory, 2014).

Although, Hispanic's stress level moderated significantly the association between their self-regulation and sleep disturbances, overall, there was no significant or direct association between stress and sleep disturbance in the entire sample. This unexpected result contrasts with extensive evidence documenting the reciprocal interaction between stress and sleep disorders in contemporary society (Han et al., 2012). Although, the mechanism of this bidirectional relationship between stress and sleep disturbance appeared to be complex and the stress responses differ according to the nature of stress and the individual's physiological responses (Hirotsu et al., 2015; Han et al., 2012). One plausible explanation of our surprising finding of the absence of association between stress and sleep disturbance may be related to the way stress was captured (concept, period and intensity) by the Stress Index Scale (Jackson et al. 1996) used in this present study.

The results of this work must be considered in light of their own limitations. There was an over-representation of African-descent and foreign-born women among our sample. Data were collected only with self-reported sleep disturbances. It is possible that stress and resilience may influence how women perceived their sleep. Similarly, a lack of sleep health literacy or the cultural representation of sleep may have impacted the appraisal of sleep health by African-descent and/or the foreigners' participants. Social, cultural and religious parameters determine sleep schedule and representation in general (Williams et al., 2015). Accordingly, in the United States, there is an average of one hour of disparities in subjective sleep duration compared to objective measures. Population-based studies have shown that individuals belonging to minority racial/ethnic groups are more inclined to experience self-reported extremes in sleep duration than white individuals are (See for review: Williams et al. 2019). For example, in the observational Study of Women's Health Across the Nation (SWAN), which includes postmenopausal women from European, African, Chinese, Japanese, and Hispanic descent who participated in a week-long actigraphy and daily diary study, it was reported that sleep duration in European-descent women was superior to other groups. They woke up less after sleep onset (WASO) than their African and Hispanics descent counterparts. In addition, European-descent women reported greater sleep quality compared to African, Chinese, and Japanese descent (Matthews et al., 2019) which contrasts with our main findings.

6.1. Conclusion and clinical implication

Among older populations, sleep disturbances are frequently associated with more serious mental disorders and cardiovascular outcomes such as mortality of coronary heart disease, stroke, incident hypertension, and metabolic syndrome (increased blood pressure, high blood sugar, excess body fat around waist, and abnormal cholesterol or triglyceride) (Crowley, 2011; Troxel et al., 2010). Sleep disturbances in elderly populations are often a reflection of age-related, normal changes that occur in sleep architecture and sleep patterns from processes such as modifications in brain structure and function that reduce the capacity of the aging brain to create the adequate sleep needed (Crowley, 2011). Nevertheless, outside of normal age-related processes and body mass index (BMI), socioeconomic status, race/ethnicity, and sex/gender, are important determinants of sleep disturbances and cardiovascular diseases (CVD) in older populations. In this study, we found that resilience factors appear to have a buffering effect against sleep

disturbance among older hypertensive women of African descent, an important cardiovascular disease risk factor particularly in later life.

We recognize that there is probably a bidirectional relationship between resilience factors and sleep disturbances. (e.g., sleep quality may be affecting emotional regulation or religious coping). Understanding how resilience factors such as the ability to regulate emotion and to use religious coping interact with sleep disturbance in older women with hypertension are critical for developing resilience interventions that can capitalize on the dimensions we identified as protective measures against sleep problems in the elderly.

Author statement

Judite Blanc

Dr. Blanc conceived the manuscript, performed all statistical analysis, drafted and finalized the paper

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Dr. Seixas contributed to the analytical plan and the revision of the entire paper.

Tiffany Donley

Helped revising the paper

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Declaration of Competing Interest

The Authors have no conflict of interest to disclose regarding this paper.

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