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Internalized Shame and Social Stress-Induced Blood Pressure Patterns among Young Black Women

Amber J. Johnson, PhD, MPH[1];
Guido G. Urizar Jr., PhD[2]

Background: The increasing prevalence of hypertension among young Black women warrants further exploration of hypertension risk factors in this population. Social cognitive pathways that increase hypertension risk have been understudied among Black women. Shame, an emotional response to social evaluative threats, may be important to understanding the contribution of social emotions to hypertension risk. The current study examined the association of internalized shame on systolic (SBP) and diastolic blood pressure (DPB) patterns of reactivity and recovery in a sample of Black women.

Methods: Black women (N=32) aged 18-22 were recruited from a public university in August 2019 and January 2020. Participants completed the Internalized Shame Scale, Self-Esteem subscale, and the Perceived Stress Scale. All participants completed the Trier Social Stress Test (TSST) and subsequent blood pressure readings were recorded at baseline and 1 min, 15 min, 30 min, 45 min, and 60 min post-TSST. Two separate repeated measures ANOVAs examined time and group effects of low shame (ISS score ≤ 39.9) vs high shame (ISS score ≥ 40) on blood pressure reactivity patterns.

Results: A significant effect of shame on DBP responses to the TSST was observed (P=.020). DBP for women in the low shame group peaked immediately following the TSST relative to baseline (M =81.2 mm Hg vs M =72.2 mm Hg) and remained stable during 60-minute recovery. DBP for women in the high shame group did not peak until 45 min post-TSST relative to baseline (M =84.2 mm Hg vs M =68.0 mm Hg) only slightly decreasing at 60 min post-TSST.

Implications: These results highlight the need to further examine the role of shame on hypertension risk among young Black women.

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[1] California State University, Department of Health Science, Long Beach, CA
[2] California State University, Department of Psychology, Long Beach, CA

Address correspondence to Amber Johnson, PhD, MPH; California State University, Long Beach, 1250 Bellflower Blvd FOA-13, Long Beach, CA 90840; amber.johnson@csulb.edu

Introduction

Forty-nine percent of Black women aged ≥20 years have been diagnosed with cardiovascular disease (CVD) while more than 40% have hypertension.[1] National population-based studies suggest that hypertension prevalence is increasing among young Black adults.[2,3] In fact, a recent study found that Black women aged 18 to 35 years were 58% more likely to develop hypertension compared with White women.[4] Thus, further exploration of hypertension risk factors among young Black women is warranted.

A recent review necessitated a continued focus on the effects of excessive sympathetic nervous system (SNS) activity on the pathophysiology of hypertension.[5] Prolonged SNS activity has been shown to exaggerate and sustain elevated blood pressure responses to stress.[6–8] Additionally, individuals with heightened blood pressure reactivity to stressful conditions have shown greater hypertension risk than those exhibiting relatively smaller responses.[9,10] Prior studies examining racial differences in blood pressure reactivity indicate Black populations exhibit greater blood pressure responses to stress.[11,12] This heightened stress reactivity in Black adults has been linked to social stressors, such as discrimination, prompting the need to better elucidate the psychological processes that lead to these outcomes.[12]

Shame, Black Women, and Stress Reactivity

Recent work has highlighted the role of social cognition (ie, individual thoughts of self, others,

and the world) on stress reactivity.[13] One variable that may be vital to understanding the social cognitive pathways that increase hypertension risk among Black women is the emotion of shame. Dickerson and colleagues (2004) defined shame as an emotional response to perceived social evaluative threats derived from circumstances that threatened individual self-esteem, acceptance, and/or social status.[14] Black women may be particularly susceptible to shame as perceived social evaluative threats eliciting shame often stem from competing sociocultural interpretations of roles and expectations ascribed to a given identity (eg, gender, race, class).[15] Black women are often subject to racially stigmatized identities, promoting negative racial and gender expectations.[16] Harmful racial and gender expectations support negative stereotypes for Black women, increasing opportunities for social rejection and unacceptance. For example, the Angry Black women stereotype reinforces negative gender and racial suppositions that depict Black women as hostile, aggressive, domineering, and irrational.[17] This stereotype and other sources of devaluing (eg, hair, sexuality, intellect) can elicit shame that is pervasive for Black women who are frequently exposed to stigmatized identities via social interactions, mass media, and institutional policies.[18]

Examining the association between shame and stress reactivity may depict an understudied social cognitive pathway in which chronic sympathetic nervous system activation contributes to hypertension risk among Black women.

Prior studies examining stress reactivity suggest social stressors such as racism, anger, and hostility predict poor diastolic and systolic blood pressure reactivity and recovery in Black populations.[12,19] For example, Lepore and colleagues (2006) found Black women demonstrated greater diastolic blood pressure responses that were longer in duration than their White counterparts when exposed to racial stress.[12] Though there is some evidence that suggests shame exposures elicit blood pressure reactivity,[20] to our knowledge, no studies have examined associations between shame and blood pressure responses to stress within Black populations. Investigating shame and blood pressure responses to stress in this population may further explain the social cognitive mechanisms contributing to chronic SNS activation and subsequent hypertension risk among young Black women.

Two important factors, perceived stress and self-esteem, have been shown to influence both internalized shame and blood pressure reactivity. Shame has been associated with greater perceived stress and lower overall self-esteem.[21,22] While positive self-esteem has been shown to buffer cardiovascular reactivity to laboratory stress,[23] poor self-esteem has been shown to reduce physiological stress recovery.[23,24] The influence of reported stress has been mixed but significant as some studies have shown perceived stress predicts greater blood pressure reactivity, particularly among Black populations.[25] Other studies have shown perceived stress is inversely associated with systolic blood pressure.[19,22] Given the importance of self-esteem and perceived stress on shame and blood pressure in prior research, these variables should be considered when examining the association of shame and blood pressure reactivity and recovery.

Present Study

Examining the association between shame and stress reactivity may depict an understudied social cognitive pathway in which chronic SNS activation contributes to hypertension risk among Black women. The present study sought to examine whether blood pressure recovery to a laboratory stressor (social evaluative threat) using the Trier Social Stress Test (TSST) significantly differed among young Black women with low vs high internalized shame, adjusting for self-esteem and perceived stress. It was hypothesized that women with high internalized shame would show greater blood pressure reactivity to the TSST and less blood pressure recovery than women with low internalized shame. Differences in blood pressure responses to acute

stress may indicate SNS activity that varies by level of internalized shame among young Black women.

Methods

Participants

During August 2019 and January 2020, we recruited 32 Black women aged 18-22 years from a southern California University. Participants were recruited through announcements during Black student organization meetings, print and email flyer distributions on campus, and an undergraduate psychology participant pool. To be eligible for the study, women had to be aged ≥18 years and self-identify as an African American or Black woman. Women were excluded from the study if they had a previous diagnosis of mental illness (eg, clinical depression, bipolar disorder), diabetes, or cardiovascular disease. Participants were also excluded if they were currently pregnant, smoked (tobacco or marijuana) within the past 30 days, or were currently taking antidepressants.

Procedures

All study procedures were approved by the California State University's Institutional Review Board (IRB) and all procedures were followed in accordance with the ethical standards of the IRB. Women who were eligible and interested in the study participated in a two-hour laboratory stress reactivity protocol, the Trier Social Stress Test (TSST).[26] The TSST is a highly standardized protocol to induce stress and has been found to reliably induce changes in blood pressure in healthy young adults and ethnically diverse samples.[27] At the beginning of the stress reactivity protocol (during the initial 30-minute rest and acclimation period of the TSST), participants were provided with a tablet to complete an informed consent form and an electronic questionnaire via Qualtrics (assessing shame, self-esteem, and perceived stress). Participants were compensated with a $10 gift card at the conclusion of the electronic questionnaire.

Once completed, participants were seated and fitted with an automated blood pressure cuff where baseline systolic blood pressure (SBP) and diastolic blood pressure (DBP) were recorded at baseline (~5 min pre-TSST). Two SBP and DBP recordings were conducted two minutes apart in mm Hg for all blood pressure readings using an Omron Series 5 (BP7200; Matsusaka, Japan) automated oscillometric blood pressure monitor.

Participants were then led to a second room to perform public speaking (simulated job interview) and mental arithmetic (serial subtraction) tasks in front of two judges (ie, research assistants) who were videotaping their performance. These tasks lasted a total of 15 minutes. After participants exited the room, a second blood pressure reading was immediately taken. Throughout the 60-minute recovery period, four additional blood pressure readings were taken at 15, 30, 45, and 60 minutes after the TSST. Participants were debriefed on the stress reactivity protocol during the recovery period and were compensated for their time and effort after the study protocol with a $25 gift card.

Measures

Demographic Questionnaire

A demographic questionnaire measured age, ethnicity (eg, African American/ Black, African, Afro-Latino), and sexual orientation among the sample.

Internalized Shame Scale (ISS)

The ISS is a 30-item self-report questionnaire that comprises two scales to assess shame and self-esteem. Twenty four questions evaluated the extent to which shame becomes internalized and magnified as a consequence of long-term shame exposure.[28] These questions reflect feelings such as inferiority, insignificance, and inadequacy, to isolate an individual's specific feelings of shame. Examples of questions used on the ISS, include "I feel like I am never quite good enough" and "I feel somehow left out." Participants rated their level of agreement using a 5 point rating scale (1 = never to 5 = almost always). The use of the ISS has been limited among Black populations. The only other study to validate this scale within a Black population did not indicate an appropriate score for high shame in this population.[29] Therefore, tertile ranges were constructed to determine high and low shame groups according to the overall sample distribution of ISS scores. Similar to other studies examining psychosocial predictors of cardiovascular risk,[30] the high shame group represented the upper tertile (ISS scores ≥ 40), and the lower

two tertiles (ISS score ≤ 39) represented the low shame group. The ISS demonstrated very good reliability in the current study (α = .94).

Self-Esteem

Six questions on the ISS's self-esteem subscale were used to measure self-esteem in this study (1 = never to 5 = almost always). A score of 18 or higher on the self-esteem scale indicates greater self-esteem. Self-esteem questions included, "All in all, I am inclined to feel that I am a success" and "I take a positive attitude toward myself. The measure showed good reliability in the current sample (α=.82).

Perceived Stress Scale

The Perceived Stress Scale is a 14-question self-report scale to measure individual perceptions of the degree of stressfulness of a given daily life situation.[31] Participants were asked to rate the frequency of experiencing seven positively worded and seven negatively worded stress items over the past 4 weeks (0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, 4 = very often). Negatively worded stress items included questions such as "How often have you felt upset because of something that happened unexpectedly?" while positively worded questions included, for example, "How often have you felt confident about your ability to handle personal problems?" Positively worded stress questions were reverse coded such that lower scores indicated higher perceived stress. This scale demonstrated very good reliability in this study (α=.95).

Table 1. Demographic characteristics of study population, Black college women, by shame level (low vs high)

	Low shame, n=20	High shame, n=12
Age, M (SD)	19.75 (1.29)	19.10 (1.20)
Ethnicity		
Black/African American, n (%)	16 (80%)	9 (82%)
African, n (%)	2 (10%)	1 (9%)
Afro Latino, n (%)	1 (5%)	-
Biracial, n (%)	1 (5%)	1 (9%)
Sexual orientation		
Heterosexual, n (%)	18 (90%)	10 (91%)
Homosexual, n (%)	1 (5%)	-
Bisexual, n (%)	1 (5%)	1 (9%)
Study variables		
Shame, n (%)	24.47 (9.96)[b]	50.54 (8.46)[b]
PSS, n (%)	29.33 (4.66)[a]	33.63 (5.89)[a]
Self-Esteem, n (%)	20.23 (2.80)[b]	15.27 (2.69)[b]

Pearson's x^2 and independent samples *t tests* were conducted to test for between group differences among categorical and continuous variables, respectively.
a. P<.05.
b. P<.001.

Statistical Analysis

Pearson's chi-squared and independent samples t-tests were conducted for categorical and continuous variables, respectively, to test for between-group differences (low vs high shame) on participants' characteristics. Two separate repeated measures ANOVAs with Greenhouse-Geisser corrections for violations of sphericity were conducted to test for possible group by time effects for levels of shame (low shame vs high shame) on systolic and DBP over the six study time points (baseline, 1 min, 15 min, 30 min, 45 min, and 60 min post-TSST), adjusting for self-esteem and perceived stress. Tests were conducted using SPSS version 26 (IBM Corp, Armonk, NY, USA). The effect sizes for these group and time effects were presented as partial eta squared (η_p^2). The least-squares means method was used to compare group means for all significant effects. Casewise deletion of missing data was used in all analyses.

Results

Study Group Characteristics

Participants were approximately aged 19 years (SD= 1.28). Most women self-identified as Black or African American (81%), and heterosexual (91%). (Table 1). No differences were observed between women in the low and high shame groups on demographic characteristics. However, there were significant between group differences observed on shame and self-esteem. As expected, the higher shame group exhibited significantly higher mean internalized shame scores compared with the low shame group (M = 24.47, SD = 9.96 vs M = 50.54, SD = 8.46). The high shame group also exhibited lower self-esteem scores compared with the

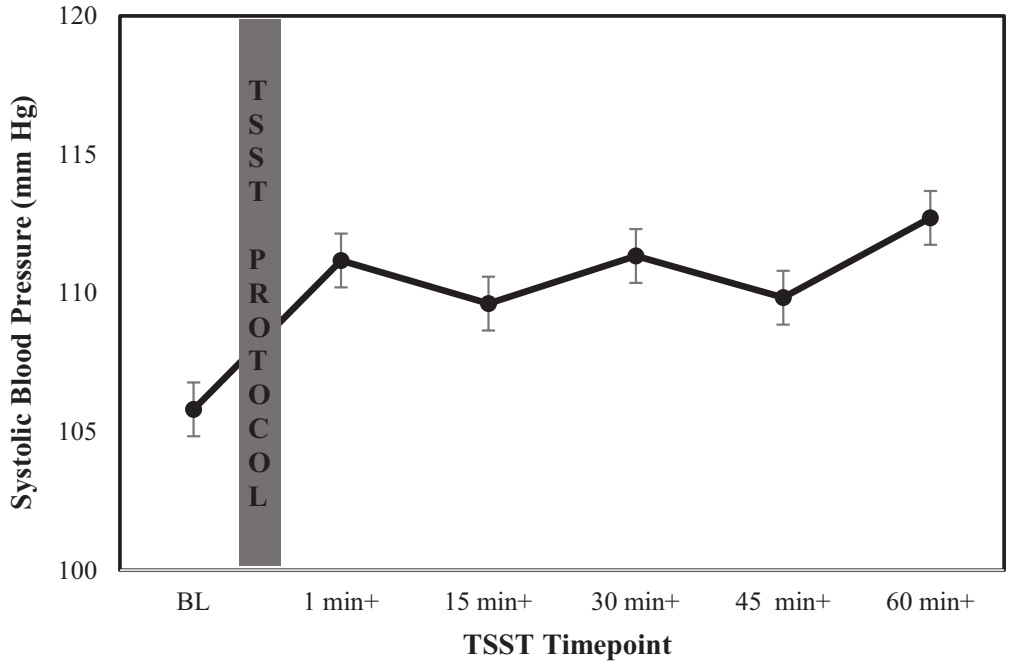

Figure 1. Changes in systolic blood pressure responses following a laboratory stressor

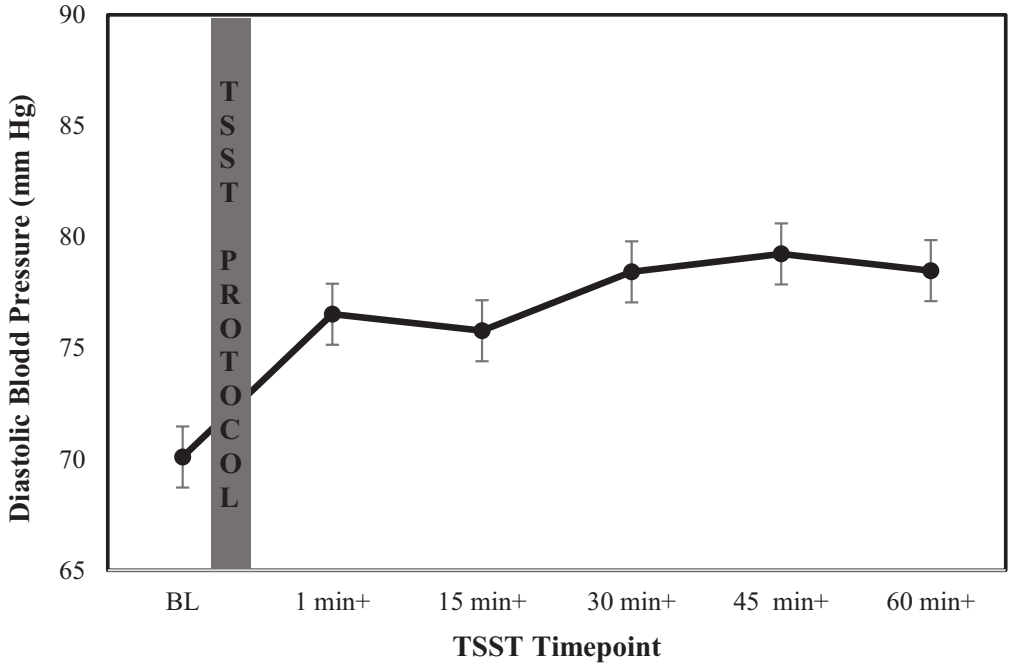

Figure 2. Changes in diastolic blood pressure responses following a laboratory stressor

low shame group (M = 20.23, SD = 2.80 vs M = 15.27; SD = 2.49).

Stress Reactivity

Response to TSST

The results of the repeated measures ANOVA (sphericity assumed) indicated that the TSST did not elicit a significant response on SBP during the recovery period [F(5, 26) = 1.117, P =.353, η_p^2 = .04]. The TSST (Greenhouse-Geisser Correction applied) did elicit a significant (P =.048) response for DBP (linear and cubic patterns), adjusting for self-esteem and perceived stress. For DBP, the greatest reactivity occurred from timepoint 1 (baseline, M = 70.99 mm Hg) to time point 5 (45 min post-TSST, M = 79.23 mm Hg). DBP recovery was only observed at time point 6 with a slight decrease in DPB [60 minutes post TSST, M = 78.49 mg Hg; F(5, 26) = 2.56, p =.048, η_p^2 = .09]. (Figures 1 and 2).

Systolic Blood Pressure

A repeated measures ANOVA (sphericity assumed) revealed that there was not a significant effect of shame on SBP responses to the TSST, adjusting for self-esteem and perceived stress (F[5, 26] = 1.063, P = .384, η_p^2 = .04). Therefore, compared with participants with lower levels of shame, participants with higher levels of shame did not significantly differ in SBP responses to the TSST (Figure 3).

Diastolic Blood Pressure

A repeated measures ANOVA with a Greenhouse-Geisser correction revealed that there was a significant effect of shame on DBP responses to the TSST (linear and cubic patterns), adjusting for self-esteem and perceived stress (F[5, 26] = 3.156, P = .020, η_p^2 = .11). Specifically, DBP for women in the low shame group peaked immediately following the TSST (1 min post-TSST; M = 81.2 mm Hg, SE = 2.1), relative to baseline (M = 72.2 mm Hg, SE = 2.5), and remained relatively stable throughout the 60-minute post-TSST recovery period. In contrast, DBP for women in the high shame group did not peak until 45 min post-TSST (M

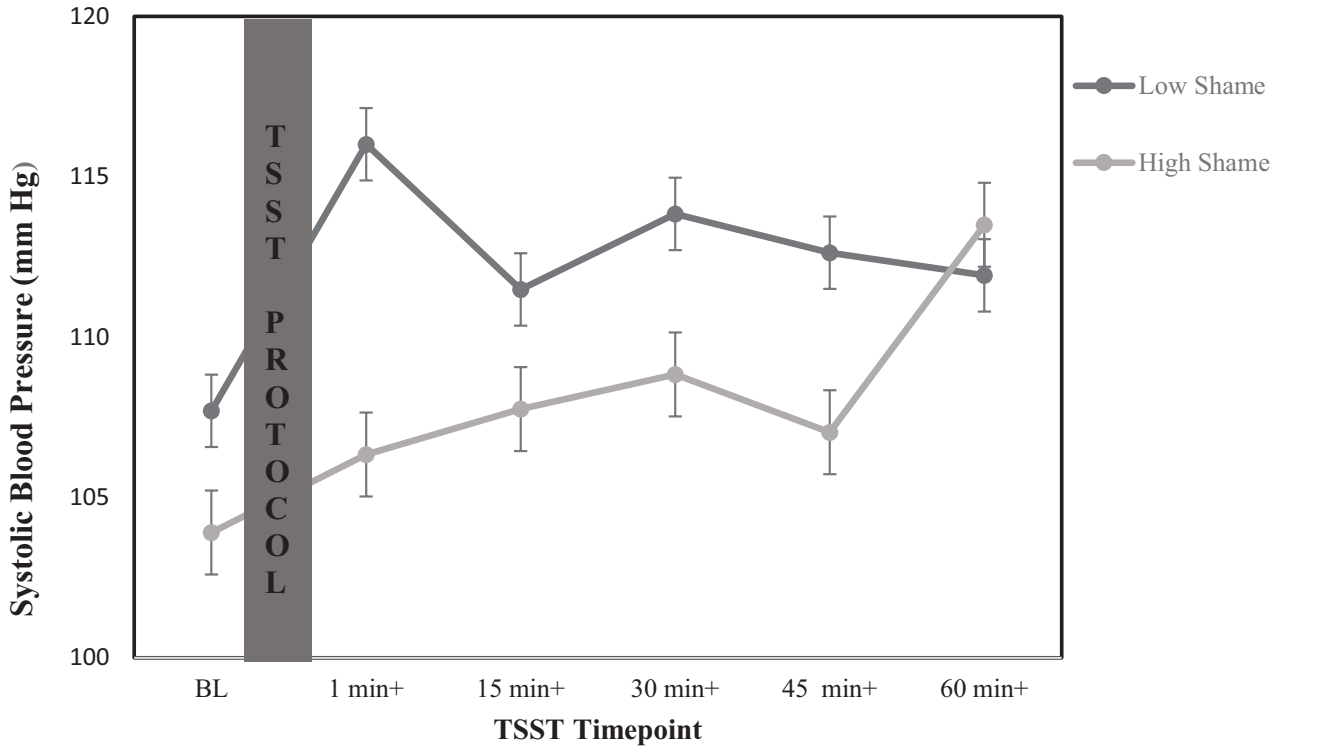

Figure 3. Changes in systolic blood pressure following a laboratory stressor by shame level

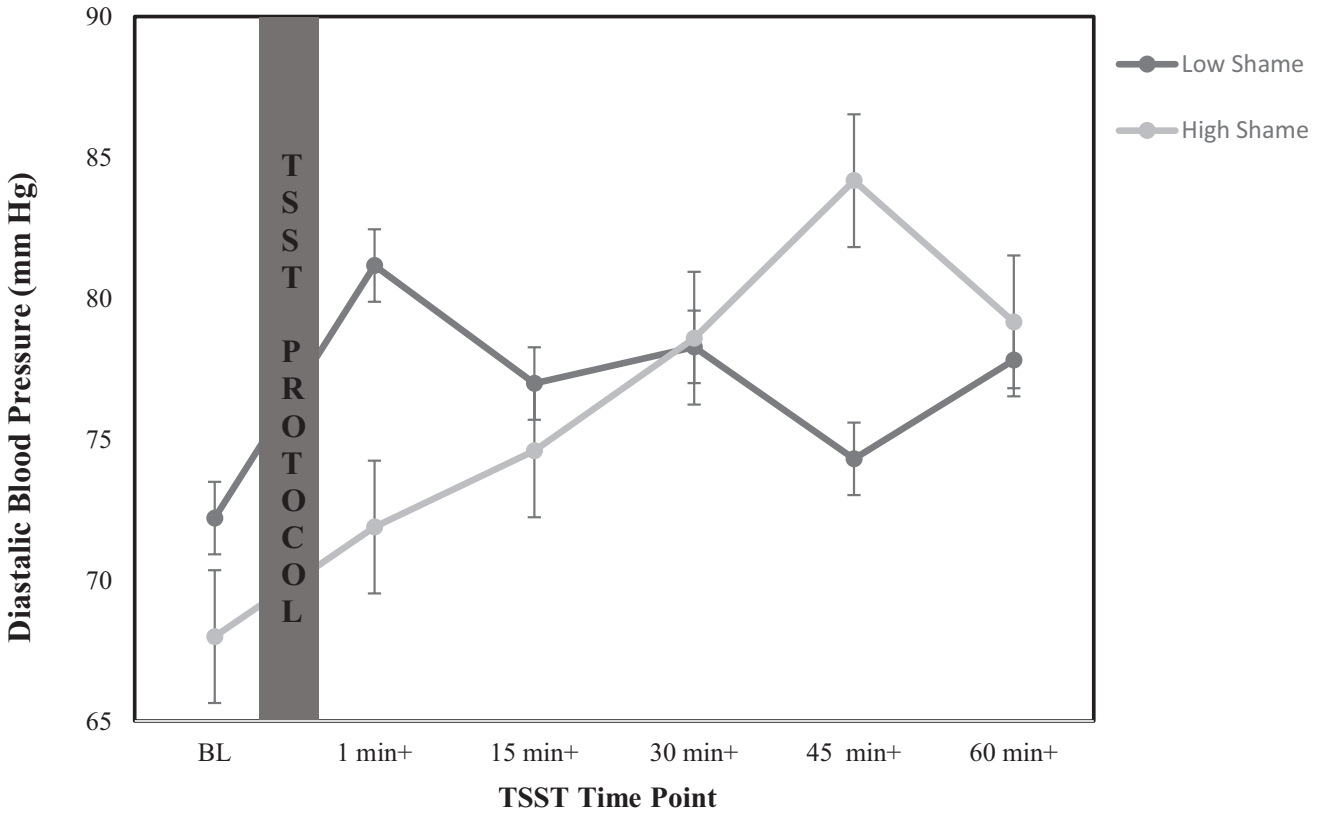

Figure 4. Changes in diastolic blood pressure following a laboratory stressor by shame level

=84.2 mm Hg, SE = 3.9), relative to baseline (M =68.0 mm Hg, SE = 3.7), and then slightly decreased at 60 min post-TSST (Figure 4).

Discussion

To our current knowledge, this study is one of the first to examine associations between shame and blood pressure patterns (reactivity and recovery) in a sample of young Black women. There were several significant findings to note. In the only other study to examine shame and blood pressure patterns, Gruenwald and colleagues (2004)[32] examined differences in shame and blood pressure reactivity and recovery among a sample (male and female) with the majority Asians and Caucasians aged approximately 18 years. The authors reported that participants in a social evaluative condition exhibited significantly greater shame, SBP, and DBP reactivity than participants in a non-evaluative condition. Conversely, the social evaluative condition was not associated with differences in SBP or DBP during a 30-minute recovery period. This suggests participants' SBP and DPB recovered to baseline values within 30 minutes following a laboratory stressor.

Our findings are distinguished from this work in several ways. Our sample, consisting of Black women aged approximately 19 years, assessed differences in blood pressure patterns among women who reported high vs low internalized shame. We found no significant differences in exposure to a social evaluative threat (TSST) on SBP reactivity or recovery. However, a significant interaction effect of time and shame was observed for DBP reactivity. Among the high shame group, DBP peaked at 45 minutes after the exposure to TSST compared with women in the low shame group where DBP peaked immediately after stress exposure. This suggests women in the high shame group may demonstrate prolonged DBP reactivity to social stress. Moreover, a small reduction

in DBP was observed after a one-hour recovery period that may be indicative of poor DBP recovery among women with higher shame.

The association between shame and DBP was not surprising given the study sample comprised young Black women. Existing studies suggest the early cardiovascular dysfunction is most apparent in DBP rather than SBP among young adults while older adults are more likely to observe dysfunction in both SBP and DBP.[33,34] In addition, negative affect has been shown to predict higher ambulatory DBP in younger vs older samples.[35] The current study suggests shame, as a negative affect, may be associated with prolonged SNS activity responses to stress, increasing the risk of hypertension in young Black women.[6,7,36]

This study …contributes to the existing literature elucidating the potential social cognitive processes contributing to hypertension risk among young Black women.

Limitations

The study findings should be interpreted considering several limitations. First, the sample comprised young Black women on a college campus. This limits the generalizability of the study findings to Black women outside of this context. This study also included a relatively small sample size (N=32) that warrants further exploration of shame and stress reactivity in larger samples. Finally, this study only examined internalized shame, a consequence of long-term shame exposure, but should be differentiated from external shame. Whereas internalized shame originates from the individual,[28] external shame originates from the social environment. Thus, further exploration of exposure to external shame and other emotional responses is necessary to understand the nature of shame risk on cardiovascular reactivity.

Conclusion and Implications

Despite these limitations, this study is novel and contributes to the existing literature elucidating the potential social cognitive processes contributing to hypertension risk among young Black women. Black women who experience shame may develop schemas (mental structures of networks of linked thought, feelings, and attitudes) that can heighten shame appraisal and perceptions of shame.[13] Frequent and intense experiences of shame may contribute to prolonged SNS activity which may contribute to overall hypertension risk. This study did not include variables that measure experiences often reported by Black women (eg, discrimination and/or exclusion) that could also impact shame experiences. It is possible that including these experiences in future studies may demonstrate greater stress reactivity among Black women. This warrants further research within larger samples that are powered to examine associations between shame, SNS, and blood pressure while accounting for the possible effects of other psychosocial factors (eg, discrimination, exclusion, religiosity, emotion regulation). Notwithstanding, this study promotes further exploration of the social cognitive processes that link shame experiences to SNS activity and subsequent hypertension risk among young Black women.

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Conflict of Interest

No conflicts of interest to report.

Author Contributions

Research concept and design: Johnson, Urizar; Acquisition of data: Johnson, Urizar; Data analysis and interpretation: Johnson, Urizar; Manuscript draft: Johnson, Urizar; Statistical expertise: Johnson; Acquisition of funding: Johnson; Administrative: Johnson, Urizar

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