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# Does rumination mediate the relationship between everyday discrimination and blood pressure?

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DOES RUMINATION MEDIATE THE RELATIONSHIP BETWEEN EVERYDAY  
DISCRIMINATION AND BLOOD PRESSURE?

BY

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B.A., Wellesley College, 2001  
M.A., Northwestern University, 2006

A Dissertation  
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University of Louisville  
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A Dissertation Approved on

September 22, 2017

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## DEDICATION

This dissertation is dedicated to my parents

Jerry Fischer & Jane Larson Ross

who gave me a world full of opportunities

and to my husband and children

Eric, Will, Evie, & Lucy Roane

who make ordinary life feel extraordinary.

## ABSTRACT

### DOES RUMINATION MEDIATE THE RELATIONSHIP BETWEEN EVERYDAY DISCRIMINATION AND BLOOD PRESSURE?

Sarah Roane

September 22, 2017

Social stressors, such as perceived discrimination, account for some health disparities by triggering a series of physiological responses (Selye, 1955) which may be prolonged by perseverative cognition such as rumination (Brosschot et al., 2005). In the current study, I investigated whether everyday discrimination is positively associated with both brooding or reflection rumination in Black/African American (AA) individuals, as well as whether brooding or reflection rumination mediate the potential associations between everyday discrimination and blood pressure. Data were collected from a community college sample and analyses were conducted using the whole sample ( $N = 286$ ; 57.3% female; 51.6% White and 29.8% Black/AA; mean age = 24.5,  $SD = 8.4$ ) along with subsamples of Black/AA participants ( $N = 76$ ; 64.7% female; mean age = 27.4,  $SD = 11.2$ ) and White participants ( $N = 147$ ; 50.3% female; mean age = 23.2,  $SD = 6.4$ ). I used Hayes' (2013) PROCESS command tool for SPSS to run OLS regression procedures to calculate direct, indirect, and total effects. Everyday discrimination was associated with brooding ( $p \leq .05$ ), but not with reflection rumination within the Black/AA subsample ( $p > .05$ ). Both brooding and reflection rumination were associated with everyday discrimination in the White subsample ( $p \leq .01$ ) and the overall sample ( $p \leq .01$ ). Neither SBP nor DBP was associated with brooding or

reflection rumination in overall sample or any subsamples ( $p > .05$ ). The unexpected results may be related to the correlational study design and the unique nature of my sample.

Limitations of this study include: possible issues with internal validity, cross-sectional design, inadequate power, and lack of ambulatory blood pressure monitoring. In spite of the limitations, this study contributes to the relatively small body of literature investigating discrimination, rumination, and cardiovascular outcomes and offers direction for future researchers.

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## INTRODUCTION

Widespread health disparities exist in the U.S. and are persistent over time, with racial/ethnic minorities suffering earlier disease onset, faster progression, greater severity, and higher mortality (Williams & Mohammed, 2013). The long-standing disparities include cardiovascular disease (CVD) and its risk factors, such as hypertension (Hertz, Unger, Cornell, & Saunders, 2005). Hypertension is a leading cause of cardiovascular disease, stroke, and chronic kidney disease (Centers for Disease Control and Prevention, 2016) and can be defined as elevated systolic blood pressure (SBP), diastolic blood pressure (DBP), or both. The incidence of hypertension is significantly higher among individuals without a four-year college degree, individuals who are considered middle income or below, individuals with disabilities, and Black/African American adults (Gillespie & Hurvitz, 2013).

Historically, health disparities were believed to be genetic or biological or the result of cultural behaviors and values (Williams & Mohammed, 2013). However, a growing body of research supports hypotheses that social stressors, such as perceived discrimination, account for some health disparities (e.g., Brondolo, Brady ver Halen, Pencille, Beatty, & Contrada, 2009; White et al., 2011). In fact, perceived discrimination has been positively associated with negative health indicators such as coronary artery calcification (Lewis et al., 2006), increased C-reactive protein (Lewis, Aiello, Leurgans, Kelly, & Barnes, 2010), and elevated blood pressure (Lewis et al., 2009). A better understanding of the association

between discrimination and physical health may be key to comprehending and addressing health disparities.

### **Perceived Everyday Discrimination and Health Disparities**

Perceived discrimination is action or inaction that results from negative perception or judgment of members of a group (Pascoe & Smart Richman, 2009; Williams, Spencer, & Jackson, 1999). Perceived discrimination encompasses both major discriminatory events and everyday discrimination. The concept of everyday discrimination is rooted in Philomena Essed's (1991) landmark work on race. Essed used in-depth interviews from more than 2,000 Black women to compare contemporary racism in the United States and the Netherlands. She addressed what were then neglected aspects of racism, including: racism in everyday situations, covert expressions of racism, knowledge of racism and how that knowledge is acquired. Essed found that discrimination was a structured part of daily life and included recurring indignities and irritations in commonplace situations. Some examples of the subtle and unconscious forms of discrimination that are considered everyday discrimination include: being mistaken for someone who serves others (such as a maid) or being overlooked or ignored while waiting in line (Banks et al., 2006). Everyday discrimination is widely considered to be the most impactful discrimination experienced in the United States (e.g., Essed, 1991; Harrell, 2000; Tougas et al., 2004).

Perceived discrimination, including everyday discrimination, has harmful health effects across mental and physical health, including depression, anxiety, obesity, high blood pressure, and breast cancer (e.g., Pascoe & Smart Richman, 2009; Williams, Neighbors, & Jackson, 2003; Williams & Mohammed, 2009). In a sample of Asian, Black/African American, and Latino/a adults, Brondolo et al. (2011) found that lifetime perceived

discrimination accounted for 7% of the variance in participants' self-reported health across racial/ethnic subgroups. Specific to hypertension, researchers have found that perceived discrimination affects nocturnal blood pressure recovery (e.g., Brondolo et al., 2008; Gregoski et al., 2013) and is associated with higher systolic and diastolic blood pressure throughout the day (e.g., Steffen, McNeilly, Anderson, & Sherwood, 2003; Smart Richman, Pek, Pascoe, & Bauer, 2010).

Pascoe and Smart Richman (2009) conducted a meta-analysis on the effect of a range of forms of discrimination on multiple health outcomes. They found that increased levels of perceived discrimination are related to multiple indicators of poor physical health ( $r = -.13$ ), including SBP and DBP. For moderate and low socioeconomic status (SES) individuals, perceived discrimination is common and results in similar levels of stress and emotional responses regardless of the how the perceived discrimination is attributed (Williams et al., 2012). Nevertheless, social stressors, including perceived discrimination, cluster together and more frequently co-occur in disadvantaged and racial/ethnic minority populations (Sterntal, Slopen, & Williams, 2011). Williams and Mohammed (2013) have argued the importance of further study to determine the specific elements of perceived discrimination that are pathogenic for particular groups and under what conditions that pathogenesis develops.

### **Stress Theory**

There are several proposed pathways linking discrimination and health and most researchers hypothesize that multiple pathways are involved (Clark, Anderson, Clark, & Williams, 1999; Pascoe & Smart Richman, 2009; Williams & Mohammed, 2013). One commonly cited hypothesis is stress theory (Selye, 1955), which suggests social stressors trigger a series of physiological responses such as increased heart rate, elevated blood

pressure, and increased cortisol secretions. Over time, the amplified physiological responses can cause downstream consequences (e.g., Clark, et al., 1999; Landrine, Klonoff, Corral, Fernandez, & Roesch, 2006).

Within the umbrella of stress theory, there are multiple hypotheses about how social stressors effect physiological responses. For example, repeated exposure to discrimination may result in the body becoming more physically reactive to stressful social situations (Guyll, Matthews, & Bromberger, 2001). Other researchers have suggested that frequent, everyday discrimination can turn into a chronic stressor that, over time, diminishes protective resources while increasing vulnerability to physical illness (Gee, Spencer, Chen, & Takeuchi, 2007). Another hypothesis is that everyday discrimination may contribute to allostatic load, a dysregulation of interrelated physiological systems caused by chronic stress that, if prolonged, leads to physical deterioration (e.g., Logan & Barksdale, 2008). Understanding how stress in general and discrimination in particular impacts physical responses has significant implications.

### **Prolonged Activation as a Missing Element of Stress Theory**

While stress theory is widely accepted, it does not specify how the physiological activation is prolonged, which is what ultimately leads to the pathogenic state and results in organic disease (Brosschot, Pieper, & Thayer, 2005; Linden, Earle, Gerin, & Christenfeld, 1997; Ursin & Eriksen, 2004). Brosschot et al. (2005) suggested that the missing element in stress theory is a cognitive mechanism underlying prolonged activation. They proposed that perseverative cognition, a construct that includes worry, rumination, and anticipatory stress, serves as a mediator or pathway for the prolonged physiological activation that follows social stressors and leads to physical health concerns.

Numerous studies demonstrate that forms of perseverative cognition serve as a means by which psychosocial stress may produce sustained activation of one or more physiological systems, including the cardiovascular system (e.g., Brosschot, Gerin, & Thayer, 2006; Brosschot, Van Dijk, & Thayer, 2007; Brosschot, Verkuil, & Thayer, 2010; Pieper & Brosschot, 2005; Verkuil, Brosschot, Meerman, & Thayer, 2012). In a recent systematic review of perseverative cognition and somatic health, Ottaviani et al. (2016) found that experimental studies demonstrated significant associations between perseverative cognition and higher DBP ( $g = .45$ ) and SBP ( $g = .51$ ), while they also found stronger causal relationships between perseverative cognition and DBP but not SBP in experimental studies with higher portion of racial/ethnic minorities (>35%).

### **Rumination as a Mechanism Prolonging Physiological Activation**

Perseverative cognition takes multiple forms. Worry is a perseverative cognition related to fear of future events, while rumination is a perseverative cognitive response to past distress (Miranda, Polanco-Roman, Tsypes, & Valderrama, 2013; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Research on rumination and DBP and SBP provides support for an association. A meta-analysis examining rumination and cardiovascular reactivity found that rumination had large effects on DBP ( $d = 1.213 - 1.420$ ) and SBP ( $d = 1.057 - 1.371$ ; Busch, Pössel, & Valentine, 2017). Increased rumination has also been associated with elevated blood pressure during recovery periods following an anger or negative emotion recall task (Gerin, Davidson, Christenfeld, Goyal, & Schwartz, 2006; Key, Campbell, Bacon, & Gerin, 2008; Routledge, McFetridge-Durdle, Macdonald, Breau, & Campbell, 2015) and slower blood pressure recovery after emotional or stressful tasks (Ayduk & Kross, 2008; Glynn, Christenfeld, & Gerin, 2002; Radstaak, Geurts, Brosschot, Cillessen, & Kompier, 2011).

Gerin et al. (2012) proposed a model where rumination results in autonomic activation similar to the original response to an acute stressor, which they suggest explains repeated physiological activation and results in accumulated risk for hypertension.

### **Rumination Subtypes**

Rumination is associated with difficulty finding solutions to problems, mental inflexibility, and decreased optimism about the future (Davis & Nolen-Hoeksema, 2000; Lyubomirsky & Nolen-Hoeksema, 1995). Researchers have identified subtypes within rumination, including brooding and reflection (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Brooding rumination can be explained as dwelling on one's dysphoric mood (Miranda & Nolen-Hoeksema, 2007). Reflection rumination can be considered intentional, inward efforts to alleviate depressive symptoms through problem resolution (Tanner, Voon, Hasking, & Martin, 2013).

Research indicates that brooding is a maladaptive form of rumination since it is both cross-sectionally and predictively associated with depressive symptoms, suicidal ideation, and passive coping (Burwell & Shirk, 2007; Miranda & Nolen-Hoeksema, 2007; O'Connor & Noyce, 2008). Research on reflection rumination has yielded mixed results. Reflection rumination is associated with major depression in individuals which are low in active coping, but not in individuals that are high in active coping (Marroquín, Fontes, Scilletta, & Miranda, 2010) and it is positively associated with active coping (Treynor et al., 2003). Yet, reflection rumination is also predictive of suicidal ideation (Miranda & Nolen-Hoeksema, 2007) and associated with suicidal ideation in those with past suicide attempts (Surrence, Miranda, Marroquín, & Chan, 2009). Finally, some researchers found no concurrent association between reflection and depressive symptoms (Schoofs, Hermans, & Raes, 2010) and

reflection rumination has not been predictive of later depressive symptoms (Burwell & Shirk, 2007; Schoofs et al., 2010). Given the findings around brooding and reflection rumination, it is reasonable that both would be associated with everyday discrimination, while only brooding rumination would prolong the related effects in most individuals.

### **Rumination and Discrimination**

A positive association has been established between brooding rumination and perceived discrimination (Borders & Liang, 2011; Hatzenbuehler, 2009). More specifically, a positive association between brooding rumination and perceived discrimination was found in racial/ethnic minorities, but not White individuals (Miranda et al., 2013). Miranda and colleagues posited that perceived discrimination might have greater relevance to racial/ethnic minorities, which in turn might increase brooding rumination. This hypothesis fits with the meta-analysis results that demonstrate stronger causal relationships between perseverative cognition and DBP in samples with a greater percentage of racial/ethnic minorities (Ottaviani et al., 2016). Thus, research findings demonstrate positive associations between rumination, including brooding rumination, and negative blood pressure indicators as well as a positive association between brooding rumination and perceived discrimination in racial/ethnic minorities.

### **Current Study**

The current study investigated associations between everyday discrimination, brooding and reflection rumination, and blood pressure in a community college population. Based on current research (Borders & Liang, 2011; Brondolo et al., 2008; Brosschot et al., 2006; Brosschot et al., 2007; Brosschot et al., 2010; Busch et al., 2016; Gerin et al., 2012; Gregoski et al., 2013; Hatzenbuehler, 2009; Miranda et al., 2013; Pascoe & Smart Richman,



2009; Pieper & Brosschot, 2005; Smart Richman et al., 2010; Steffen et al., 2003; Verkuil et al., 2012; White et al., 2011), I developed three hypotheses. First, I hypothesized that everyday discrimination is positively associated with both brooding rumination and reflection rumination in racial/ethnic minority individuals. Second, I hypothesized that brooding rumination, but not reflection rumination, is positively associated with SBP and DBP. Third, I hypothesized that brooding, but not reflection rumination, mediates the association between everyday discrimination and SBP and DBP in racial/ethnic minority individuals.

## METHODS

### Participants

Data were collected from a sample of 286 community college students in an urban, medium-sized area in the eastern part of the United States. The sample was 57.3% female with ages ranging from 18 to 62 ( $M = 24.49$ ,  $SD = 8.39$ ). Just over half (51.6%) of the sample self-identified as White, and the remaining sample identified as 29.8% Black/African American, 9.8% Hispanic or Latino/a, 3.9% Mixed Race, 2.5% Asian or Asian American, 2.1% Other, and 0.4% Native American. Self-reported income ranged from: below \$10,000 annually (15.8%); between \$10,000-\$19,999 annually (10.3%); between \$20,000-\$29,999 annually (19.8%); between \$30,000-\$39,999 annually (9.5%); between \$40,000-\$49,999 annually (8.4%); between \$50,000-\$64,999 annually (8.4%); between \$65,000-\$79,999 annually (6.2%); between \$80,000-\$99,999 (7.7%); greater than \$100,000 annually (10.6%); and the remaining (3.3%) reported their income as other.

### Measures

**Demographics.** Participants completed a demographics questionnaire that requested self-report data about their date of birth, biological sex, height, weight, past and current smoking status, current alcohol use, family history of high blood pressure, heart disease and stroke, SES, and self-reported race/ethnicity. This information was collected to control for potential confounding variables and was based on literature related to elevated SBP and DBP (Brondolo et al., 2008; Gillespie & Hurvitz, 2013; Guyll et al., 2001; Lewis et al., 2009;

Smart Richman et al., 2010; Steffan et al., 2002; White et al., 2011).

**Blood Pressure.** Researchers were trained in standardized blood pressure measurement procedures. Blood pressure was measured using an Omron BP710N based on oscillometry. Researchers took blood pressure measurements while participants were filling out the surveys. During the blood pressure measurement, participants sat with their backs supported and legs uncrossed and their elbow and forearm resting on the table with the palm of their hand turned upward. The cuff was applied to participants' upper arm, about one inch above the arm crease. Researchers adjusted the cuff size after measuring participants' arm circumference and started the Omron BP710N after participants were seated for two minutes with the cuff on their arm. Measurements were taken automatically three times at 1-min intervals and the mean of the readings was used in this study. These blood pressure measurement procedures are similar to those typically used in health psychology research (e.g., Everson, Kaplan, Goldberg, & Salonen, 2000; Hildrum, Mykletun, Holmen, & Dahl, 2008).

**Ruminative Response Subscale (RRS).** The Ruminative Response Subscale (RRS; Nolen-Hoeksema & Morrow, 1991) is one of four subscales of the Response Style Questionnaire (RSQ; Nolen-Hoeksema, 1991). The RRS originally contained 22 items that measured the frequency of participants' thoughts and behaviors in response to depressed mood. Treynor et al. (2003) suggested removing the 12 items of the scale that overlapped with symptoms of depression, leaving 10 items that assess the brooding and reflection subtypes of rumination. A similar division has been suggested by other factor analyses conducted on the RRS (e.g., Fresco, Frankel, Mennin, Turk, & Heimberg, 2002). As a result, brooding and reflection rumination were each measured by five RRS items. Participants

designated the frequency on a scale from 1 (almost never) to 4 (almost always) with which they generally think or do certain things (e.g., “why do I have problems that other people don’t have?” or “analyze recent events to try to understand why you are depressed”) when they are feeling dysphoric. In the initial factor analysis that identified the two subscales, the coefficient alpha was .77 for brooding and .72 for reflection (Treyner et al., 2003). Treyner and colleagues (2003) acknowledged this internal consistency as relatively low, however they noted that each coefficient alpha measures only five items and if the subscales had additional items their internal consistency would improve. Subsequent studies have found internal consistency reliabilities ranging from .76 - .80 for brooding and .69-.72 for reflection (Armey et al., 2009; Marroquín et al., 2010; Miranda et al., 2013). In this study, the overall sample had a Cronbach’s alpha of .81 for brooding and .76 for reflection. Within the sample, Black/AA participants’ Cronbach’s alpha was .82 for brooding and .80 for reflection and White participants’ Cronbach’s alpha was .81 for brooding and .75 for reflection.

**The Everyday Discrimination Scale (EDS).** The EDS (Williams, Yu, Jackson, & Anderson, 1997) is a widely used 9-item measure developed to assess aspects of discrimination that occur regularly but might generally be considered relatively minor (Williams & Mohammed, 2009). The EDS has been used with a range of diverse samples and is considered to have good utility (Kim, Sellbom, & Ford, 2014). Participants were asked how frequently they experience unfair treatment in their daily life. Responses were based on a 6-point Likert-type scale, with responses ranging from 1 (almost everyday) to 6 (never). Higher scores reflected greater perceived discrimination. Examples of items on the EDS include “You are treated with less respect than other people are” and “People act as if they think you are dishonest”. Clark, Coleman, and Novak (2004) conducted a validation study

and reported a Cronbach's alpha of .87. More recently, researchers examined the reliability of the EDS in a racial/ethnic minority sample and found a Cronbach's alpha of .88 (Kim et al., 2014). In the overall sample for this study, Cronbach's alpha was .88. Within the sample, Black/African American participants' Cronbach's alpha was .87 and White participants' Cronbach's alpha was .88.

## **Procedures**

We received approval from both the University's Institutional Review Board and Jefferson County Community and Technical College's (JCTC) Institutional Review Board. The lead researcher presented the study to the Department Chair for the Psychology Department at JCTC. With the department chair's approval, we contacted instructors teaching Psychology 110 across JCTC's six campuses via email to introduce them to the study and invite them to open their classes for their students to participate. Psychology 110 is a general education requirement for students at the community college, meaning that any student who is seeking their Associate of Art or Associate of Science degree is required to take the course. Six of 21 (30%) contacted instructors teaching sections of Psychology 110 agreed to participate in the study. We collected data from 15 of 48 (31.2%) Psychology 110 classes taught in the academic year 2015/16.<sup>1</sup>

We administered assessments during class periods that were selected by participating instructors to fit within their planned curriculum. Class periods were one hour and 15 minutes long and the introduction and administration of the surveys took the entire class period. During the class where we administered the measures, the instructors introduced the

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<sup>1</sup> I also calculated all analyses with only the Fall data (50% response rate, we visited 12 out of 24 offered Fall Psychology 110 classes) and the results were the same, indicating that the response rate did not affect the outcome.

research team to their classes and we read a script to provide general information about the study. Instructors left the room after the initial introduction and students who preferred not to participate were then able to leave without being penalized since their instructors did not know which students participated. A total of three students left without completing surveys. We obtained informed consent and gave participating students the surveys, which were randomized within packets to reduce order effects. The surveys included in this study were part of a larger packet of surveys that was administered. Members of the research team then took blood pressure measurements from participating students. At the end of the class period, students had an opportunity to ask any questions and were given the research team's contact information in case they had further questions or needed additional debriefing.

## **Data Analysis**

**Data Cleaning and Missing Data Procedures.** Prior to conducting analyses I cleaned the data, first removing cases where the participants filled out the surveys carelessly. Carelessness was determined by failure to complete more than 50% of all survey items or by filling in the same answer throughout the surveys. I removed five total participants with careless responses, leaving me with 319 participants in my analysis. Next, I examined missing data and determined that on all questionnaires together 685 of 78,400 data points were missing (# of items across all participants) which represents 0.87% missingness. I was unable to discern a clear pattern among missing items, which suggests the data to be missing at random (MAR). Missing data is not considered a concern when a small percentage of data are MAR from a large data set (Tabachnik & Fidell, 2007; Parent, 2013).

Given the small percentage of missing data, I selected Available Item Analysis (AIA) as a robust approach (Parent, 2013) to address missing data. AIA is a method of addressing

missing data by computing the mean for each scale using data from all available items. Parent (2013) presented both actual and simulated data suggesting AIA is an effective method for item-level missing data and produces equivalent performance to multiple imputation (MI) with sufficient sample size and scale reliability. Further, AIA results only in bias when missing data is severe (50%; Schlomer, Bauman, & Card, 2010). Thus, following Parent (2013), I selected 75% as my level of tolerance for missing data, meaning participants needed to complete at least 75% of the items in each questionnaire and needed to have all three blood pressure measures. If participants did not meet the tolerance level for any of the measures, they were excluded from analyses. Based on this criterion, I excluded 33 participants (17 missed the criterion for the questionnaires, 15 missed the blood pressure criterion, 1 missed the criterion for both) from the sample of 319 (10.3%), bringing the final sample size to 286. Excluding 10.3% of cases is typical and within acceptable the range for missing data (Peng, Harwell, Liou, & Ehman, 2006; Schlomer et al., 2010).

After completing AIA, I examined outliers which I defined as any data point three or more standard deviations (SDs) from the mean (Osborne, 2013). Based on this criterion, I trimmed 19 out of 3,731 data points (# of scale scores across all participants) or 0.51% as outliers.

**Testing Assumptions.** After addressing missing data and cleaning the data, I tested the assumptions of Ordinary Least Squares (OLS) regression. First, I informally assessed linearity by examining scatterplots of all variables. Next, to check for normal distribution, I plotted histograms, calculated skew and kurtosis, and applied the Kolmogorov-Smirnov and Shapiro-Wilkes tests. Some of the Kolmogorov-Smirnov tests and Shapiro-Wilkes tests were significant. However, this is common in large data sets (Osborne, 2013). Further, the

visual inspection of the scatterplots and histograms revealed normal distribution and no skew or kurtosis values were at or above an absolute value of one which support the conclusion that the data meets normal distribution (Osborne, 2013). Finally, I checked for homoscedasticity by examining a plot of the residuals versus the predicted values.

**Covariates.** As reported earlier, I controlled for relevant covariates that were determined by a thorough literature review. These included: age (Guyll et al., 2001; Lewis et al., 2009; Smart Richman et al., 2010; Steffen et al., 2003; White et al., 2011), biological sex (Smart Richman et al., 2010; Steffen et al., 2003), BMI (Guyll et al., 2001; Lewis et al., 2009; Smart Richman et al., 2010; Steffen et al., 2003; White et al., 2011), family history of high blood pressure, heart disease and stroke (Guyll et al., 2001; Lewis et al., 2009), self-reported race/ethnicity (Lewis et al., 2009; Smart Richman et al., 2010; White et al., 2011), smoking status (Lewis et al., 2009; White et al., 2011), and SES (Smart Richman et al., 2010; Steffen et al., 2003; White et al., 2011) in all analyses.

**Testing for Mediation via Direct, Indirect, and Total Effects.** To check for mediation effects, I used Hayes' (2013) PROCESS command tool for SPSS to calculate estimated direct, indirect, and total effects of perceived discrimination and brooding and reflection rumination on DBP and SBP. Miranda et al. (2013) found a positive association between brooding rumination and perceived discrimination in racial/ethnic minorities, but not White individuals. As a result, I calculated six analyses in total: SBP and DBP for the whole sample (see Figures 1 and 2), only White participants (see Figures 3 and 4), and only Black/African American participants (see Figures 5 and 6). No other racial/ethnic minority participant group was large enough for analysis. PROCESS commands were created by Hayes (2013) and use OLS regression procedures to calculate direct, indirect, and total



effects. PROCESS creates a bias-corrected bootstrap interval (BCBI) based on an empirically derived representation of the sampling distribution of the indirect effect (Preacher & Hayes, 2008). When the BCBI does not include zero, the indirect effect is statistically significant.

## RESULTS

In this study, the only racial/ethnic minority participant sample with sufficient size to detect a medium effect was the Black/African American participant sample. For this reason, for the rest of the results and discussion I will specify that I am referring to the Black/African American sample, including when discussing my hypotheses. Correlations, means, and standard deviations for the Black/African American participants and White participants can be found in Table 1 and for the overall participant sample in Table 2.

Within the Black/AA participant sample there was a significant correlation between everyday discrimination and gender while brooding rumination correlated with: reflection rumination, BMI, gender, a family history of hypertension, and a family history of heart disease. For White participants everyday discrimination correlated with brooding rumination, reflection rumination, and a family history of stroke; brooding rumination correlated with reflection rumination, age, and gender; and reflection rumination was correlated with age. For the whole sample, everyday discrimination was correlated with brooding and reflection rumination and smoking, while brooding rumination was correlated with reflection rumination, gender, and smoking status; and reflection rumination correlated with gender, smoking status, and SBP.

With regards to the OLS regression analyses, my first hypothesis was that everyday discrimination is positively associated with both brooding rumination and reflection rumination in racial/ethnic minority individuals. This hypothesis was partially supported for

Black/African American participants, as everyday discrimination was associated with brooding, but not with reflection rumination (Figure 1). Both brooding and reflection rumination were associated with everyday discrimination in the White subsample (Figure 2) and the overall sample (Figure 3).

Next, I hypothesized that brooding, but not reflection rumination would have a positive association with SBP and DBP independent of race/ethnicity of the participants. However, neither SBP nor DBP was associated with brooding rumination in any of the subsamples (Figures 1 & 2) or the overall sample (Figure 3). My final hypothesis was that brooding, but not reflection rumination, would mediate the association between everyday discrimination and SBP and DBP in Black/African American participants but not in White participants. In contrast to this hypothesis, there were no direct or indirect effects on SBP or DBP in the Black/African American participant sample (Table 4), the White participant sample (Table 5), or the overall sample (Table 6).

## DISCUSSION

This study examined potential associations between everyday discrimination, brooding and reflection rumination, and blood pressure in a community college sample. I developed three hypotheses based on the existing literature (Borders & Liang, 2011; Brondolo et al., 2008; Brosschot et al., 2006; Brosschot et al., 2007; Brosschot et al., 2010; Busch et al., 2016; Gerin et al., 2012; Gregoski et al., 2013; Hatzenbuehler, 2009; Miranda et al., 2013; Pascoe & Smart Richman, 2009; Pieper & Brosschot, 2005; Smart Richman et al., 2010; Steffen et al., 2003; Verkuil et al., 2012; White et al., 2011). First, I hypothesized that everyday discrimination is positively associated with both brooding rumination and reflection rumination in racial/ethnic minority individuals. The OLS regression partially confirmed this hypothesis for Black/African American participants, as I found a positive association between everyday discrimination and brooding rumination but no association between everyday discrimination and reflection rumination. However, the bivariate correlations showed no correlation between everyday discrimination and brooding rumination and a significant correlation between everyday discrimination and reflection rumination. The results of the OLS regressions and the correlations suggest that, when controlling for confounding variables (including BMI, age, gender, race/ethnicity, income, smoking status, and family history of heart disease, hypertension, or stroke), changes in everyday discrimination impact brooding rumination, but without control variables there was no association. Whereas changes in everyday discrimination did not impact reflection rumination when controlling for the confounding variables listed above, while in the

correlation analysis with no control variables there was a significant association. Additionally, there was a unidirectional relationship, but not a bidirectional association between everyday discrimination and brooding rumination and the reverse was true for everyday discrimination and reflection rumination, which had a bidirectional association with no unidirectional impact. The complexity of the associations between everyday discrimination and rumination suggests the need for further study.

My hypothesis was based on findings around reflection rumination and depression (Burwell & Shirk, 2007; Marroquín et al., 2010; Miranda & Nolen-Hoeksema, 2007; Schoofs et al., 2010; Surrence et al., 2009), however in the only previous study that I am aware of that investigated brooding and reflection rumination and discrimination, Miranda et al. (2013) found that reflection was not associated with perceived discrimination for either racial/ethnic minorities or White individuals. My results also differed from the previous study for White participants and the overall sample, where I found a positive association between both brooding rumination and reflection rumination and everyday discrimination. The previous study found no association of brooding rumination and perceived discrimination in White individuals (Miranda et al., 2013).

There are notable differences between my study and Miranda et al.'s (2013) study. Miranda et al. (2013) measured perceived discrimination using the Schedule of Racist Events (SRE; Landrine & Klonoff, 1996) which measures the perceived frequency and *stress* associated with perceptions of discrimination whereas I used the EDS which only measures the perceived frequency perceived discrimination. This difference is significant for a number of reasons, including the foundation of this study which is stress theory and the established relationship between stress and brooding rumination (e.g., Quinn & Joormann, 2015; Woody,

Burkhouse, Birk, & Gibb, 2015) as well as stress and blood pressure (e.g., Bekkouche, Holmes, Whittaker, & Krantz, 2011). Additionally, while I examined zero-order correlations, Miranda and colleagues calculated bivariate correlations between perceived discrimination and brooding, while adjusting for reflection and ethnic identity; and correlations between perceived discrimination and reflection, adjusting for brooding and ethnic identity.

It is possible that the substantial differences between my study and Miranda et al.'s (2013) study explain the differences in the studies' results. In my study, both reflection and brooding rumination were associated with everyday discrimination for White participants while only brooding rumination was associated with everyday discrimination for Black/African American participants. Findings indicate that reflective rumination affects racial and ethnic groups differently (Chang et al., 2010; Cheref, Lane, Polanco-Roman, Gadol, & Miranda, 2015). A limitation of the current study is the number of participants who identified as racial/ethnic minorities. While almost half of the participants identify as racial/ethnic minorities, only 84 participants identified as Black/African American, a number which just satisfied the requirements to detect a medium effect size. Other racial/ethnic groups were too small and would have allowed me to detect only large effect sizes. Thus, I was limited in what analyses I could run and I was unable to look at any differences that might exist for other racial/ethnic minorities. Given the evidence that rumination has differential effects on different racial and ethnic groups (Chang et al., 2010; Cheref et al., 2015; Miranda et al., 2013) this significantly limited the generalizability of my findings. A future study should focus their efforts on recruiting sufficient representation of any racial/ethnic minority group that they wish to include in their analyses.

In my second and third hypotheses, I proposed that brooding, but not reflection rumination, is positively associated with SBP and DBP and that brooding, but not reflection rumination, mediates the association between everyday discrimination and SBP and DBP in racial/ethnic minority individuals. These hypotheses were not supported; brooding rumination was not associated with SBP or DBP in any of the three examined samples (including the Black/African American, White, and overall samples), thus there was no mediation. In summary, contrary to my expectations neither everyday discrimination nor rumination is significantly associated with blood pressure in the present study. This raises the question if there might be issues related to blood pressure or the overall study design, particularly since two recent meta-analyses (Busch et al., 2016; Ottaviani et al., 2016) found significant associations between perseverative cognition, including rumination, and higher SBP and DBP.

Differences between my study and the meta-analyses may explain the different findings. My study had a correlational design and looked at trait brooding and reflection rumination, while the meta-analyses included experimental studies that induced state rumination/perseverative cognitions. In studies where rumination is induced, researchers measure the immediate physiological effects of state rumination. As previous research demonstrated, induced state rumination is associated with blood pressure reactivity (e.g., Gerin et al., 2006; Glynn et al., 2002; Routledge et al., 2015) and slower blood pressure recovery (e.g., Ayduk & Kross, 2008; Key et al., 2008; Radstaak et al., 2011). Results around trait rumination are mixed with some studies finding trait rumination to be associated with blood pressure reactivity (Gerin et al., 2006; Routledge et al., 2005) and diminished DBP dipping (Johnson, Key, Routledge, Gerin, & Campbell, 2014), while other researchers have

found no association between trait rumination and blood pressure reactivity or recovery after performing experimental tasks (Key et al., 2008; Woody, Smolak, Rabideau, Figueroa, & Zoccola, 2015). In spite of the mixed data related to trait rumination and blood pressure, I expect both state and trait rumination to elevate blood pressure and slow blood pressure recovery. However, I anticipate that the magnitude of the effects would be larger when measuring induced state rumination, which fits with the findings that larger effect sizes were associated with using stressful tasks to induce perseverative cognition (Ottaviani et al., 2016). Although the effects of trait rumination may be smaller than induced state rumination, they are still impactful according to the hypothesis of prolonged activation's role in stress theory (Brosschot et al., 2005), which suggests the ongoing physiological consequences of trait perseverative cognition result in disease state development. Thus, even less substantial elevations of blood pressure or blunting of blood pressure recovery accrue to detrimental effect in trait ruminators. As a result, it may be more difficult to measure the effects of trait rumination since the effect size will be small, something my study did not have the power to detect.

Additionally, in their meta-analyses, Ottaviani et al. (2016) found that effects were larger in studies: with samples composed of fewer White individuals and fewer women, that had longer assessment, that had a within-subject design, and controlled for the effects of potential confounders. Unfortunately, while I attempted to control for potential confounders, none of the other factors associated with larger effect sizes were present in my study. For example, just over half of my sample identified as White and more than 57% identified as female.



Internal and external validities also vary between my study and the experimental studies included in the meta-analyses. Experimental studies have high internal validity due to the manipulation of one or more independent variables and the random assignment of participants; this allows experimenters to make inferences about causality (Heppner, Wampold, & Kivlighan, 2007). Nevertheless, since experiments are controlled, the reactions of participants may not accurately reflect their behaviors in a non-experimental environment and the generalizability may be limited (Wilson, Aronson, & Carlsmith, 2010). In comparison to experimental studies, my study was a correlational design, looking at a sample taken directly from the population of interest within a real-life setting but without manipulation of variables or randomization. In correlational studies, external validity is high due to direct sampling from the population of interest. On the other hand, the internal validity in correlational studies is low since variables are studied as they naturally occur, meaning no variables are manipulated and the environment is uncontrolled (Heppner et al., 2007). The threats to internal validity in my study made it difficult to accurately measure the relationships between everyday discrimination, brooding and reflection rumination, and blood pressure. Thus, the experimental studies included in the meta-analyses may better represent the true relationships between rumination/perseverative cognition and blood pressure, though my study did have the benefit of sampling directly from the population I was interested and being carried out at a place in the environment of interest. Nevertheless, a study without sufficient internal validity offers only limited value.

In summary, the overall design and conditions of my study were substantially different from the experimental research that makes up much of the literature it was grounded on. I measured trait rumination “in the field” with the intention of looking for cumulative

effect on blood pressure, while referencing literature primarily made up of experimental studies that induced rumination and measured acute physiological responses. Given the difficulty of detecting small effects, future researchers should take care to design a study that has sufficient power and be aware that the effects that do exist may be larger in studies with a longer assessment and samples that include fewer White individuals and fewer women. Future researchers should also balance the need for both internal validity and external validity, particularly replication of experimental results in the field, by using a longitudinal correlational design that carefully controls as many confounding variables as possible within the limitations of correlational research.

### **Limitations and Future Directions**

Beyond the differences between my study and the studies included in the meta-analyses, it is possible that limitations in my study significantly affected the findings, particularly related to blood pressure. One limitation is the cross-sectional design—stress theory suggests that over time protective resources are diminished which then increases vulnerability to physical illness (Gee et al., 2007). Similarly, theories related to allostatic load focus on pathology and chronic illness such as hypertension as the long-term result of allostasis (Logan & Barksdale, 2008). In this study, we asked participants about their *current* everyday discrimination experiences not allowing for a long-term effect to take place. A more effective design might be a longitudinal study that follows up at regular intervals over the course of several years to more accurately and thoroughly assess the possible relationships between everyday discrimination, trait rumination, and long-term consequences such as elevated blood pressure.

Another limitation is the single timepoint blood pressure measurement. Using ambulatory blood pressure (ABP) is more closely associated with cardiovascular morbidity and mortality than blood pressure measured at a single timepoint (Brondolo et al., 2008) and it measures individual responses to daily experiences, including everyday discrimination (Smart Richman et al., 2010). ABP would also capture blood pressure recovery, which has been associated with rumination after emotional or stressful tasks (e.g., Radstaak et al., 2011). Impaired cardiovascular recovery, including delayed blood pressure recovery is associated with negative cardiovascular outcomes such as hypertension and increased mortality (Panaite, Salomon, Jin, & Rottenberg, 2015). Finally, using ABP monitoring would allow the measurement of nocturnal BP, which is closely related to cardiovascular morbidity and has been associated with psychosocial stressors (Brondolo et al., 2008) and trait rumination (Johnson et al., 2014). Thus a future study using ABP monitoring would be able to measure blood pressure elevation and recovery and nocturnal blood pressure, providing a more complete representation of blood pressure and physiological consequences.

I have identified numerous directions for correlational research investigating potential associations between everyday discrimination, rumination, and blood pressure, but there are also unexplored avenues in experimental studies. While numerous researchers have experimentally manipulated rumination, the experimental manipulation of experiences of discrimination may be an important avenue to explore. One example of experimental manipulation of experiences of discrimination is Cyberball. Cyberball is an online program where participants are made to believe they are playing a ball-tossing game with two or three other individuals, when in fact researchers control the “other players,” frequency of inclusion, course and speed of the game, player information, and iconic representation.

Cyberball can be used as a measure of discrimination (Williams & Jarvis, 2006) and has been used to examine the casual effects of discrimination, in particular racial discrimination (Stock, Peterson, Molloy, & Lambert, 2017). A meta-analysis demonstrated Cyberball's effects on psychological outcomes (Hartgerink et al. 2015). Researchers can use Cyberball to manipulate experiences of discrimination which would then allow them to measure immediate physiological responses to this experience and to evaluate whether there are differential effects in high trait ruminators vs. low trait ruminators.

One should be careful when translating the results of this study into clinical practice due to the need for further research to determine the differential effects of everyday discrimination on individuals of different races and ethnicities. Nevertheless, the results do suggest that the association of everyday discrimination with brooding rumination applies to individuals with a range of racial and ethnic identities. Clinicians can assess their clients' experiences with everyday discrimination in order to determine the impact everyday discrimination may be having in that individual's life. When clients are experiencing high levels of everyday discrimination, clinicians can implement interventions such as a mindfulness-based stress reduction (MBSR) program (Kabat-Zinn, 1982), which are associated with a decrease in rumination (Hawley et al., 2014; Ramel, Goldin, Carmona, & McQuaid, 2004; Villa & Hilt, 2014).

Although I did not find what I expected in this study, the results add to the small body of literature regarding discrimination, rumination, and cardiovascular outcomes. Much of the current consensus is based on experimental studies, though one study (Ottaviani, Shapiro, & Fitzgerald, 2011) did find that the effects of induced rumination on BP continued in the 24 hours following the experiment, which indicates that rumination's role in pathogenesis exists

outside the experiment. Taking into consideration the challenges and limitations of the current study will help future studies hone in on ways to better investigate the associations between everyday discrimination, trait rumination, and blood pressure.

Table 1

*Means, Standard Deviations, and Zero-Order Correlations for Everyday Discrimination (EDS), Brooding Rumination (RSQb), Reflection Rumination (RSQr), and all covariates for Black/African American participants*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. EDS	–	.21	.13	-.18	.12	.26*	-.09	-.09	.03	.02	.14	.03	-.09
2. RSQb		–	.62**	.09	.30**	.24*	.02	-.13	-.22*	.29**	-.09	-.04	.08
3. RSQr			–	.02	.03	.11	-.07	-.15	-.18	-.17	-.01	-.09	-.01
4. Age				–	.33**	.20	-.16	-.18	-.17	-.11	-.25*	.39**	.52**
5. BMI					–	.14	-.08	.03	-.14	-.10	-.21	.44**	.52**
6. Gender						–	-.00	-.06	-.20	-.10	-.18	.33**	.07
7. Income							–	.13	-.04	.01	.01	-.07	-.12
8. Smoke								–	.05	-.06	.07	.03	-.08
9. Hyper									–	.23*	.30**	-.02	-.13
10. Heart										–	.36**	.09	.01
11. Stroke											–	-.01	-.20
12. SBP												–	.71**

13. DBP

<i>M</i>	2.33	2.21	2.28	27.41	29.11	1.65	6.26	3.24	17.38	22.31	18.71	118.23	75.42
<i>SD</i>	.95	.73	.80	11.19	8.55	.48	10.94	1.16	36.46	39.99	37.39	15.62	12.07

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*Note.* N= 76. EDS = Everyday Discrimination Scale; RSQb = Response Style Questionnaire Ruminative Response Brooding Subscale; RSQr = Response Style Questionnaire Ruminative Response Reflection Subscale; Age = participants' self-identified age in years; BMI = body mass index; Gender = participants' self-identified gender; Income = participants' self-identified income categories; Race = participants' self-identified race/ethnicity categories; Smoke = participants' self-identification of smoking category; Hyper = family history of hypertension with yes or no categories; Heart = family history of heart disease with yes or no categories; Stroke = family history of stroke with yes or no categories; SBP = average of three measurements of systolic blood pressure; DBP = average of three measurements of diastolic blood pressure.

\*\*  $p \leq .01$ , \*  $p \leq .05$

Table 2

*Means, Standard Deviations, and Zero-Order Correlations for Everyday Discrimination (EDS), Brooding Rumination (RSQb), Reflection Rumination (RSQr), and all covariates for White participants*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. EDS	–	.25**	.23**	-.08	.11	-.01	.11	-.08	-.05	.01	.16*	.03	.01
2. RSQb		–	.51**	-.21*	.03	.18*	-.01	-.10	.02	.00	.14	-.11	-.09
3. RSQr			–	-.18*	-.05	.11	.06	-.09	.08	.08	.09	-.14	-.14
4. Age				–	.18*	-.01	-.13	-.13	-.04	-.01	-.21*	.14	.24**
5. BMI					–	.02	.12	.02	-.11	.00	.03	.34**	.41**
6. Gender						–	-.03	-.09	-.21*	-.18*	.01	-.50**	-.09
7. Income							–	.04	.04	-.01	.01	-.04	.02
8. Smoke								–	-.05	-.05	.11	.04	-.01
9. Hyper									–	.43**	.25**	.01	-.02
10. Heart										–	.35**	.14	.15
11. Stroke											–	.01	-.04
12. SBP												–	.63**



13. DBP

<i>M</i>	2.58	2.34	2.31	23.22	24.82	1.50	9.19	3.25	21.22	25.04	23.46	115.78	74.01
<i>SD</i>	.92	.74	.71	6.44	5.06	.50	15.79	1.14	39.52	41.68	40.79	16.09	8.80

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*Note.* N= 147. EDS = Everyday Discrimination Scale; RSQb = Response Style Questionnaire Ruminative Response Brooding Subscale; RSQr = Response Style Questionnaire Ruminative Response Reflection Subscale; Age = participants' self-identified age in years; BMI = body mass index; Gender = participants' self-identified gender; Income = participants' self-identified income categories; Race = participants' self-identified race/ethnicity categories; Smoke = participants' self-identification of smoking category; Hyper = family history of hypertension with yes or no categories; Heart = family history of heart disease with yes or no categories; Stroke = family history of stroke with yes or no categories; SBP = average of three measurements of systolic blood pressure; DBP = average of three measurements of diastolic blood pressure.

\*\*  $p \leq .01$ , \*  $p \leq .05$

Table 3

*Means, Standard Deviations, and Zero-Order Correlations for Everyday Discrimination (EDS), Brooding Rumination (RSQb), Reflection Rumination (RSQr), and all covariates for all participants*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. EDS	–	.30*	.24*	-.15	.10	-.09	.06	.04	-.15*	-.02	.01	.11	.04	–
2. RSQb		–	.57*	-.09	.10	.20**	.00	.05	-.13*	-.02	-.09	.06	-.09	–
3. RSQr			–	-.09	-.01	.12*	.02	.04	-.14*	-.04	-.05	.04	-.12*	–
4. Age				–	.31*	.09	-.13*	-.20*	-.11	-.12*	-.08	-.22*	.26**	–
5. BMI					–	.11	.01	-.26*	.00	-.13*	-.04	-.07	.37**	–
6. Gender						–	-.04	-.12*	-.05	-.20*	-.12*	-.05	-.43**	–
7. Income							–	.05	.05	.02	.00	.03	-.03	–
8. Race								–	.04	.05	.02	.10	-.02	–
9. Smoke									–	.01	-.06	.10	-.01	–
10. Hyper										–	.38*	.30*	.02	–
11. Heart											–	.39*	.11	–
12. Stroke												–	.02	–

13. SBP

14. DBP

<i>M</i>	2.45	2.32	2.32	24.49	25.92	1.57	7.64	3.39	3.31	21.10	23.23	21.68	115.13	73
<i>SD</i>	.94	.73	.74	8.39	6.52	.50	12.94	1.26	1.10	39.36	40.44	39.49	15.55	10

*Note.* N= 286. EDS = Everyday Discrimination Scale; RSQb = Response Style Questionnaire Ruminative Response Brooding Subscale; RSQr = Response Style Questionnaire Ruminative Response Reflection Subscale; Age = participants' self-identified age in years; BMI = body mass index; Gender = participants' self-identified gender; Income = participants' self-identified income categories; Race = participants' self-identified race/ethnicity categories; Smoke = participants' self-identification of smoking category; Hyper = family history of hypertension with yes or no categories; Heart = family history of heart disease with yes or no categories; Stroke = family history of stroke with yes or no categories; SBP = average of three measurements of systolic blood pressure; DBP = average of three measurements of diastolic blood pressure.

\*\*  $p \leq .01$ , \*  $p \leq .05$

Table 4

*Total, Direct, and Indirect Effects and their Confidence Intervals testing for Multiple Mediations for Black/African American participants*

	Effects	Standard Errors	Lower 95% CI	Upper 95% CI
<b>Total effect</b>				
EDS – SBP	-.92	1.48	-3.88	2.04
EDS – DBP	-1.04	1.24	-3.52	1.43
<b>Direct effect</b>				
EDS – SBP	-.64	1.53	-3.77	2.41
EDS – DBP	-.97	1.29	-3.55	1.61
<b>Indirect effects from EDS to SBP by</b>				
RSQb	-.02	.57	-1.44	.95
RSQr	-.26	.53	-2.13	.29
<b>Indirect effects from EDS to DBP by</b>				
RSQb	.07	.39	-.65	1.02
RSQr	-.14	.36	-1.47	.25

*Note.* N= 76. Data for the indirect effects are bootstrapped (5000 samples). EDS = Everyday Discrimination Scale; RSQb = Ruminative Response Subscale Brooding; RSQr = Ruminative Response Subscale Reflection.

Table 5

*Total, Direct, and Indirect Effects and their Confidence Intervals testing for Multiple Mediations for White participants*

	Effects	Standard Errors	Lower 95% CI	Upper 95% CI
<b>Total effect</b>				
EDS – SBP	.10	1.27	-2.42	2.62
EDS – DBP	-.08	.78	-1.63	1.46
<b>Direct effect</b>				
EDS – SBP	.29	1.33	-2.34	2.92
EDS – DBP	.13	.81	-1.48	1.74
<b>Indirect effects from EDS to SBP by</b>				
RSQb	.08	.35	-.70	.74
RSQr	-.27	.37	-1.24	.27
<b>Indirect effects from EDS to DBP by</b>				
RSQb	-.01	.23	-.52	.42
RSQr	.20	.23	-.82	.13

*Note.* N= 147. Data for the indirect effects are bootstrapped (5000 samples). EDS = Everyday Discrimination Scale; RSQb = Ruminative Response Subscale Brooding; RSQr = Ruminative Response Subscale Reflection.

Table 6

*Total, Direct, and Indirect Effects and their Confidence Intervals testing for Multiple*

*Mediations for all participants*

	Effects	Standard Errors	Lower 95% CI	Upper 95% CI
<b>Total effect</b>				
EDS – SBP	.07	.85	-1.61	1.74
EDS – DBP	-.25	.59	-1.42	.91
<b>Direct effect</b>				
EDS – SBP	.16	.88	-1.58	1.90
EDS – DBP	-.29	.62	-1.50	.92
<b>Indirect effects from EDS to SBP by</b>				
RSQb	.18	.27	-.35	.74
RSQr	-.27	.26	-.92	.11
<b>Indirect effects from EDS to DBP by</b>				
RSQb	.20	.19	-.12	.63
RSQr	-.17	.16	-.59	.08

*Note.* N= 286. Data for the indirect effects are bootstrapped (5000 samples). EDS = Everyday Discrimination Scale; RSQb = Ruminative Response Subscale Brooding; RSQr = Ruminative Response Subscale Reflection.

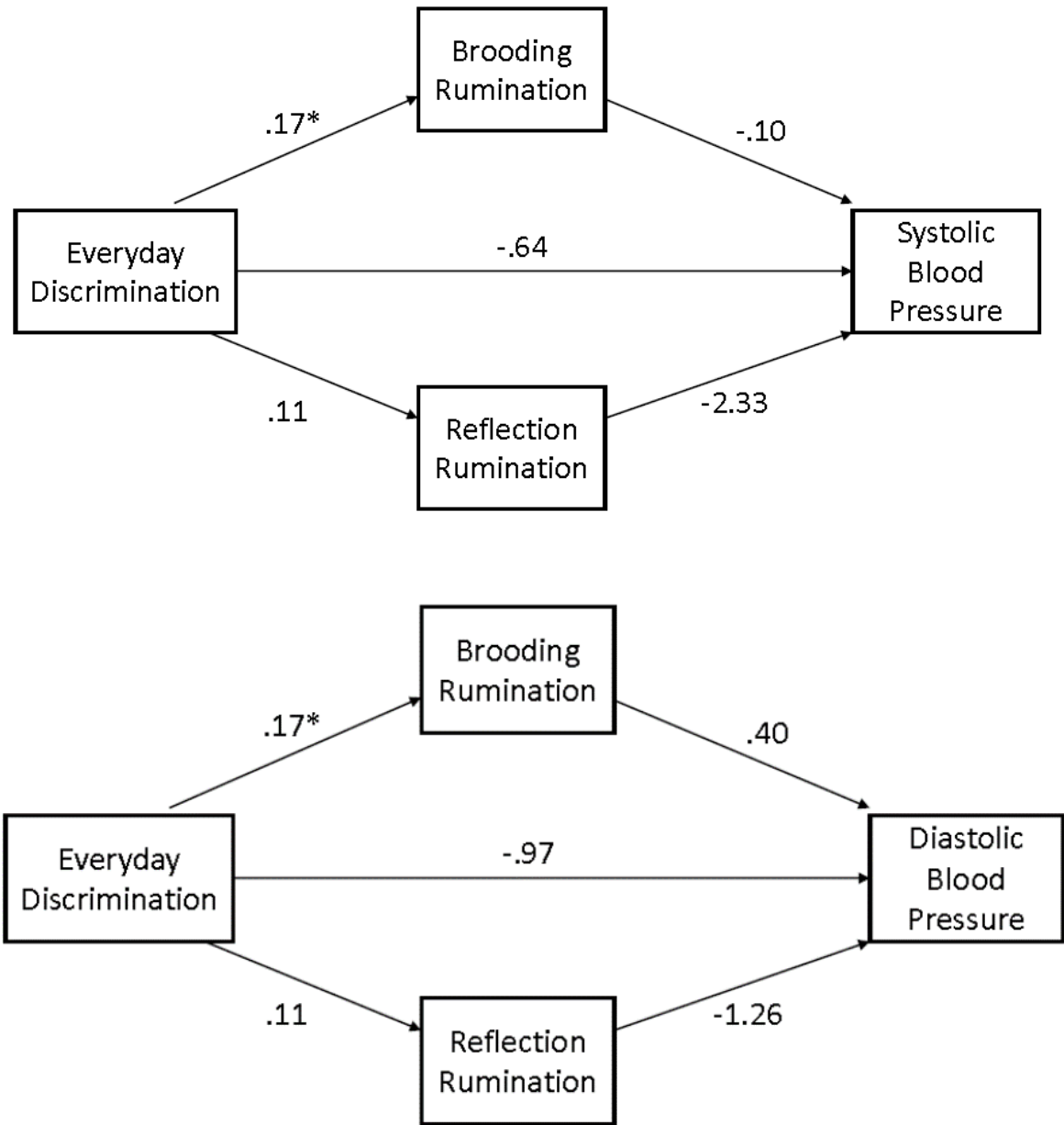


Figure 1. Multiple Mediation Model for Black/African American Participants. N = 76. \*  $p \leq .05$

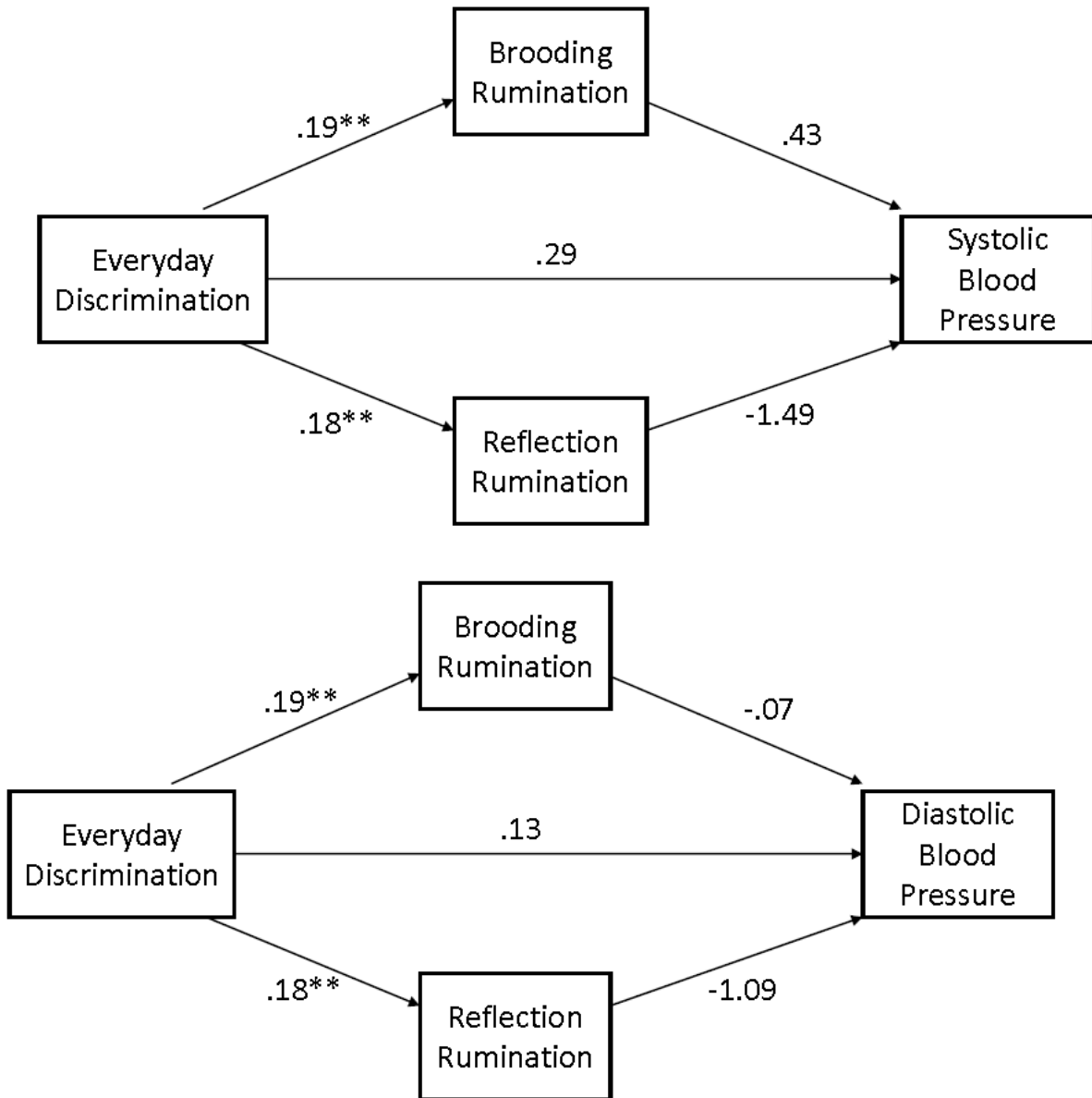


Figure 2. Multiple Mediation Model for White Participants. N = 147. \*\* $p \leq .01$



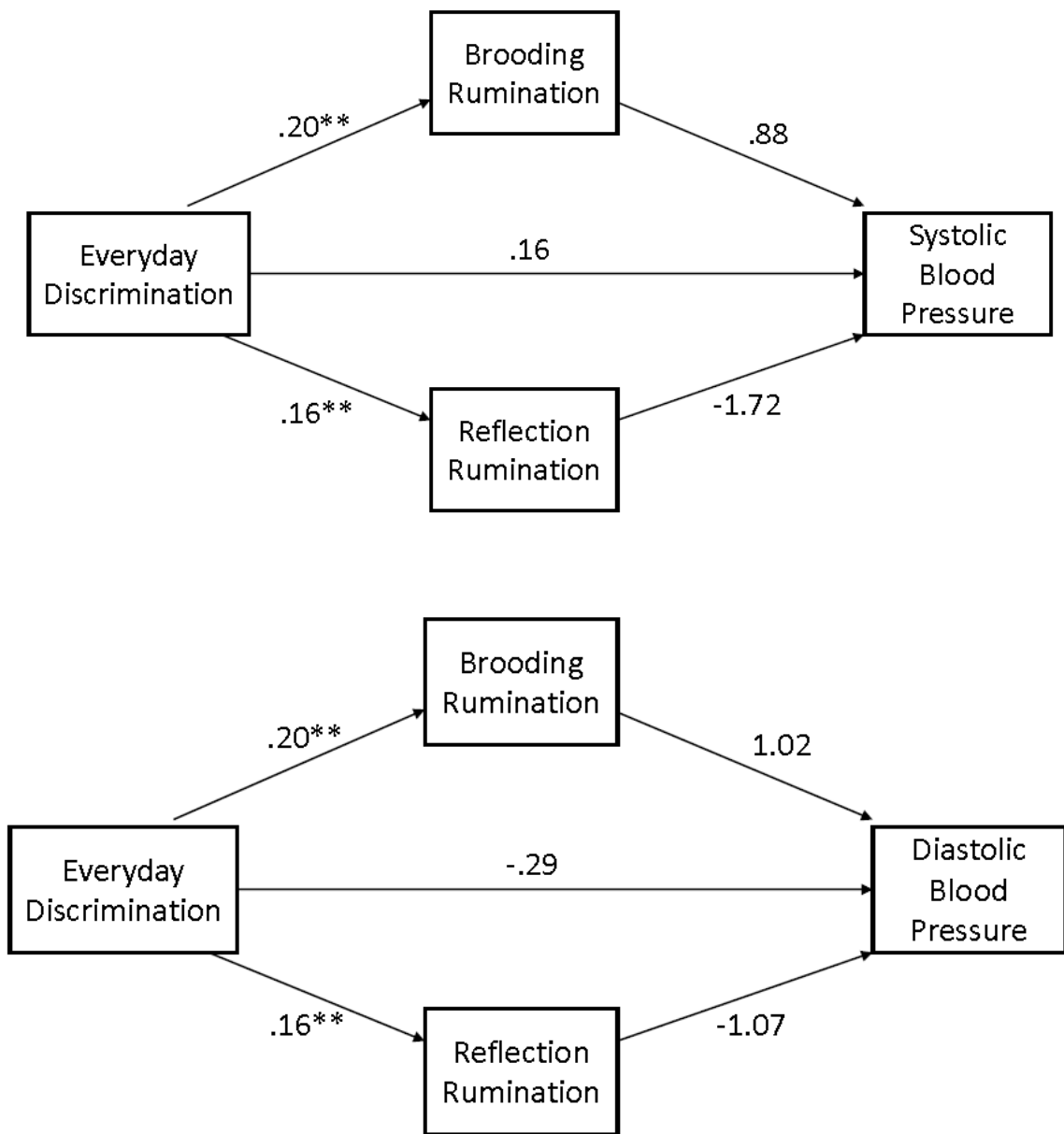


Figure 3. Multiple Mediation Model for all Participants. N = 286. \*\*  $p \leq .01$

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## CURRICULUM VITAE

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### EDUCATION

- Ph.D.** University of Louisville, Louisville, Kentucky  
Counseling Psychology (APA-Accredited), Expected August 2018  
Dissertation Title: *Rumination as mediator of the everyday discrimination-hypertension association.*
- M.A.** Northwestern University, Evanston, Illinois  
Counseling Psychology, June, 2006
- B.A.** Wellesley College, Wellesley, Massachusetts  
Religion, May, 2001
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### PROFESSIONAL LICENSURE

#### State of Nebraska

Mental Health Practitioner, 2012-current (license #4162)

Professional Counselor, 2012-current (license #2044)

#### State of Illinois

Clinical Professional Counselor, 2009-current (license #180007106)

Professional Counselor, 2006-2009 (license #178004679)

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### AWARDS AND HONORS

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|---------------|--|
| June 2016     | Comprehensive Examination Pass, with Honors in Orals and Theories      |
| May 2016      | Travel Award, Student Travel Award, American Psychological Association |
| April 2016    | Travel Grant, Graduate Student Council, University of Louisville       |
| November 2015 | Research Grant, Graduate Student Council, University of Louisville     |
| May 2015      | Travel Grant, Graduate Student Council, University of Louisville       |
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### TEACHING EXPERIENCE

**University of Louisville, Louisville, KY, Instructor, Supervisor: Dr. Kate Snyder**

August 2016 to May 2017; August 2014 to May 2015, EDTP 107 Human Development & Learning

Content of course introduces undergraduate students in education to the basic principles of human development and learning.

**University of Nebraska at Omaha, Omaha, NE, Instructor, Supervisor: Dr. Paul Barnes**

August 2011 to December 2011, COUN 8610 Introduction to Marital, Couple, & Family Therapy,

Content of course introduced graduate students in counseling to basic theories and techniques related to the practice of marital, couple, and family counseling.

February 2013 to April 2013, COUN 4310/8316 Counseling Techniques II

Content of course introduced undergraduate and graduate students in counseling to basic knowledge of skill techniques related to the practice of marital, couple, and family counseling.

May 2013 to July 2013, COUN 8030 Counseling Practices

Content of course assisted graduate students in counseling with the development of counseling microskills.

**Northwestern University, Evanston, IL, Instructor, Supervisor: Dr. Lee Blum**

August 2008 to May 2009, CPSY 481 Supervised Practicum in Counseling

Content of course facilitated master's level counseling students' development of clinical skills and professional behaviors.

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**CLINICAL EXPERIENCE**

**Atlanta VA Medical Center, Decatur, GA, Pre-doctoral Intern**

August 2017 to August 2018, Training Directors: Drs. Andrea Michels and Evelyn Lemoine

Currently completing 6-month major rotation with the General Mental Health service, engaging in a range of evidence-based psychotherapy modalities with individual veterans and groups. Caseload includes veterans with a range of presenting concerns, including psychotic spectrum disorders, mood disorders, and post-traumatic stress disorder. Also completing a 6-month minor rotation on the Consult-Liaison service, interviewing inpatients on the medical unit who have been referred for mental health evaluation and providing recommendations to the medical team. Reasons for referral include: substance abuse, behavior problems, suicidality, psychosis, delirium, dementia, and competency concerns. During the second half of the year, I will complete a major rotation in Geropsychology and a minor rotation in Health Psychology, focused on treating chronic pain.

**Robley Rex VA Medical Center, Louisville, KY, Practicum Student**

August 2016 to May 2017, Supervisor: Dr. Patricia Weiter

Health Promotion & Disease Prevention practicum student in the Ambulatory Care service. Engaged in evidence based practice, including motivational interviewing, to help veterans and their physicians improve outcomes in weight management, smoking cessation, and chronic disease self-management. Provided consultation and education to healthcare professionals, conducted treatment outcome research, and participated in

institutional committee meetings with the primary goal of engaging veterans in their own health.

**Kleinman Psychology, Louisville, KY, Practicum Student**

August 2015 to May 2017, Supervisor: Dr. Brighid Kleinman.

Conducted intakes and provided individual therapy utilizing evidence based approaches at a practice specializing in working with transgender and gender nonconforming individuals. Administered, scored, and interpreted assessments evaluating clients' mental health functioning for the purposes of medical treatment related to gender dysphoria and provided documentation to medical providers.

**University of Louisville Cardinal Success Program, Louisville, KY, Graduate Assistant**

July 2015 to July 2016, Supervisor: Dr. Eugene Foster

Assisted in the development and opening of two community-based treatment clinics located in a low-income neighborhood. Facilitated the integration of tele-psychiatry, social work, and nursing services and acted as coordinator for the integrated services. Responsible for organizing community outreach and coordinating program development. Supervised two clinical mental health master's students in their clinical work. Facilitated bi-weekly trainings and engaged in weekly presentations, trainings and treatment team meetings. Administered, scored, and interpreted assessments evaluating clients' mental health functioning, substance use, and academic and intellectual functioning and provided integrated reports. Responsible for collecting and analyzing data for program evaluation as well as the formal write-up.

**Louisville OCD Clinic, Louisville, KY, Practicum Student**

January 2015 to August 2015, Supervisor: Dr. Monnica Williams

Conducted structured intakes and provided individual therapy to clients presenting with OCD and Anxiety disorders, utilizing empirically supported treatments and integrating feedback measures into the treatment process. Administered, scored, and interpreted assessments evaluating clients' mental health functioning and provided integrated reports. Co-facilitated therapy groups designed for Sexual Orientation OCD and Pedophilia OCD.

**Family Enrichment, Omaha, NE, Licensed Mental Health Practitioner**

November 2012 to July 2014

Provided individual, couples, and family therapy at a group practice using evidence based approaches. Participated in individual and group consultations, regular trainings, and marketing efforts. Primary referral source was the Department of Family Medicine at the University of Nebraska Medical Center.

**Private Practice, Chicago, IL, Licensed Clinical Professional Counselor**

October 2009 to July 2011

Provided individual and couples therapy at a solo practice using evidence based approaches. Participated in individual and group consultations, attended and presented trainings, and developed a website and other marketing and outreach efforts. Managed all insurance panel credentialing and correspondence, billing, marketing, and office logistics.

**Urban Balance, Chicago, IL, Licensed Professional Counselor and Office Manager**

August 2007 to October 2010, Supervisor: Joyce Marter, LCPC

Provided individual and couples therapy using evidence based approaches, ran critical incident stress debriefing and employee assistance program services, and led invited trainings for client organizations as part of a multi-office group practice. Responsible for opening and managing a new branch of the practice, including: identifying a location, hiring staff therapists, furnishing and maintaining an office space, and engaging in community outreach.

**Bensinger DuPont & Associates, Chicago, IL, Licensed Professional Counselor**

August 2006 to March 2008, Supervisor: Terry Strickland, LCPC

Provided intakes, assessments, referral and crisis services using evidence based approaches, both in-person and telephone-based, for a national employee assistance program. Primary referral sources were companies mandating employees for treatment after failed drug screens or workplace incidents. Answered the problem gambling helplines for multiple states and provided Motivational Interviewing-based telephone interventions.

**Awakening Center, Chicago, IL, Advanced Practicum Student**

June 2005 to May 2006, Supervisor: Amy Grabowski, LCPC

Provided individual and couples therapy using evidence based approaches at a center specializing in eating disorders, led weekly eating disorder psychotherapy group, and conducted outreach and trainings on behalf of the center.

**Kenneth Young Center, Elk Grove Village, IL, Practicum Student**

September 2004 to June 2005, Supervisor: Linda Springer, LCPC

Provided weekly counseling for adults at community mental health agency, assisted with and conducted intakes for the adult team at the CMHC, and actively participated in weekly group and individual supervision.

**Thresholds North, Chicago, IL, Pre-Practicum Student**

September 2003 to June 2004, Supervisor: Marge Bolin, LCPC

Provided case management at psychosocial rehabilitation center specializing in vocational assessment and placement. Conducted vocational portion of intake, led vocational assessment and training groups, and co-led weekly skills training group.

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**PROFESSIONAL SERVICE**

**Society for Counseling Psychology (Division 17) Development Committee**

Selected to be the Student Representative on SCP's fundraising and development committee, October 2016-October 2017

**Kentucky Psychological Association Continuing Education Committee**

Student Representative for KPA's continuing education committee, March 2016-June 2017

**Society for Health Psychology (Division 38) Campus Representative**

Student Representative for the University of Louisville, August 2015-August 2016

**American Psychological Association of Graduate Students (APAGS) Ambassador**

Ambassador for the APA Conference, August 2015

**University of Louisville**

Student Interviewer for Counseling Psychology Doctoral Program, January 2015

### **Ad hoc Reviewer for Journals**

Journal of Health Psychology (invited reviewer)

Psychology, Health, & Medicine (invited reviewer)

Psychology of Religion and Spirituality (student co-reviewer)

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### **PUBLICATIONS**

**Roane, S.J.**, Pössel, P., Mitchell, A. M., & Eaton, W.W. (2017). Associations of depression status and hopelessness with blood pressure: A 24-year follow-up study. *Psychology, Health & Medicine*, 1-11.

### **Manuscripts in Preparation or Under Review**

Pössel, P. & **Roane, S.J.** (under review). Do changes in the frontal brain activity mediate the effects of prevention programs on depressive symptoms in adolescents? A pilot study.

Pössel, P. & **Roane, S.J.** (in progress). Integrating the Hopelessness Model and the Response Style Theory in an Adolescent Sample.

Harbison, B., Pössel, P. & **Roane, S.J.** (in progress). Trait rumination and low subjective social status: A diathesis-stress model for the development of depression and cardiovascular disease symptoms

**Roane, S.J.**, Pössel, P., & Mitchell, A. M. (in progress). Impact of caregiver age and duration of caregiving on cancer caregivers' depressive symptoms.

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### **CONFERENCE PRESENTATIONS**

**Roane, S.J.**, Pössel, P., & Mitchell, A. M. (2016, August). Depression in Family Caregivers of Cancer Patients. Poster presented at the American Psychological Association Conference. Denver, CO.

Barr, S.M. & **Roane, S.J.** (2016, June). Effectively Addressing Comorbid Issues in Affirmative Therapy with Trans Clients. Workshop presented to over 100 behavioral health professionals at the Philadelphia Trans Health Conference. Philadelphia, PA.

**Roane, S.J.**, Pössel, P., Mitchell, A. M., & Eaton, W.W. (2015, November). Hypertension's Association with Cognitive Risk Factors for Depression. Poster presented at the Association for Cognitive and Behavioral Therapies Convention. Chicago, IL.

**Roane, S.J.**, Pössel, P., Mitchell, A. M., & Eaton, W.W. (2015, August). The relationships among hopelessness, depressive symptoms, and blood pressure. Poster presented at the American Psychological Association Conference. Toronto, Canada.

Smith, R. J., Nicholson, B. C., & **Roane, S.J.** (2015, August). Hardiness, social support, and parenting stress in adolescent mothers. Poster presented at the annual convention of the American Psychological Association, Toronto, Canada.

**Roane, S.J.**, Pössel, P., Mitchell, A. M., & Eaton, W.W. (2015, March). Depressive symptoms as a mediator of the relationship between hopelessness and blood pressure. Poster presented at the Great Lakes Regional Counseling Psychology Conference. Muncie, IN.

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## INVITED PRESENTATIONS

Eleazor, J. & **Roane, S.J.** (2016, July). Affirmative Treatment for Transgender Service Members in Military Mental Health. Workshop presented to Army behavioral health providers. Ft. Knox, KY.

**Roane, S.J.** & Murray-Golay, A. (January 2010). Seasonal Affective Disorder. Training presented to the Ravenswood Therapists Association.

**Roane, S.J.** (2009, November). Managing Conflict. Training presented to the Funeral Director Services Association of Greater Chicago.

**Roane, S.J.** & Eaton, J. (2009, October) College Student Mental Health. Training presented to the faculty in the Dance Department at Columbia College.

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## RESEARCH EXPERIENCE

### **University of Louisville, Louisville, KY, Graduate Researcher, Mind-Body Research Team**

July 2014 to current, Supervisor: Dr. Patrick Pössel

Developed and collaborated on research projects examining risk factors of hopelessness, depression, and their relationship with physical health. Coordinated projects including: investigating interactions between caregiver (family and professional) cognitive coping strategies and cortisol levels; examining possible connections between perceived discrimination, cognitive processing style, and blood pressure; analyzing epidemiological data. Conducted analyses using quantitative approaches (e.g., structural equation modeling). Discussed findings and implications through manuscript writing and publishing under peer review and presentations at national and regional conferences.

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## NON-CLINICAL EXPERIENCE

### **Prospect Park Alliance, Brooklyn, NY, Development Assistant**

July 2002 to April 2003

Responsible for tracking all donations, correspondence with individual donors, membership premium dispensation. Assisted in planning annual gala as well as seasonal tours and member events. Coordinated tree adoption program.

### **Goldman Sachs, New York, NY, Financial Analyst**

July 2001 to July 2002

Monitored broker-dealers' fixed income accounts and acted as a liaison with these firms. Compiled monthly exposure report, assisted with funds reconciliation, maintained department web page, participated in analyst training program.

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## PROFESSIONAL MEMBERSHIPS

American Psychological Association (APA)  
Society of Counseling Psychology (Division 17)  
Health Psychology (Division 38)  
Psychology of Women (Division 35)

Georgia Psychological Association (GPA)

Kentucky Psychological Association (KPA)

Association for Behavioral and Cognitive Therapies (ABCT)

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