

ABSTRACT

THE NEUROTICISM PERSONALITY TRAIT AND ITS RELATIONSHIP TO
MENOPAUSAL SYMPTOMS

By

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Virtually no research to date has investigated individual differences that might make women more or less susceptible to menopausal symptoms. This study hypothesized that high levels of the neuroticism personality trait render women more susceptible to severe menopausal symptoms. Neuroticism was assessed using the Eysenck Personality Questionnaire Brief Version (EPQ-BV), and menopausal symptoms were measured with the Menopausal Rating Scale (MRS). A total of 169 English speaking women ($M = 50.74$ years) were recruited through social media and flyers to complete an online survey. After controlling stressors, exercise, and income, a strong correlation between high neuroticism and more severe symptoms was found. This indicates that negative menopausal experiences can be predicted with individual difference measures. The utility of being able to predict difficult menopause experiences with individual difference measures in a clinical setting, as well as suggestions for future research of this type, are discussed.

THE NEUROTICISM PERSONALITY TRAIT AND ITS RELATIONSHIP TO
MENOPAUSAL SYMPTOMS

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CHAPTER 1

INTRODUCTION

Individual Differences and Menopausal Symptoms

Almost all women must undergo the physiological stage of menopause, and the experience can range from very positive to very negative. Some welcome this physiological change, as it can signal an exciting new phase in life and even a sense of freedom (Woods & Mitchell, 2005). For others, however, it can be a very deleterious, unwelcome experience (Woods & Mitchell, 2005). What determines these individual differences? This study investigated the possibility of predicting menopausal symptom severity by a woman's level of neuroticism, a personality trait in which individuals tend to exhibit emotional instability (Eysenck, 1985), negative affectivity (Watson & Clark, 1984), and psychological distress (Florian, Mikulincer, & Taubman, 1995). If such proves the case, the current findings have the potential to help health professionals treating menopausal women to target interventions more effectively.

Menopausal Symptoms

In general, healthy women can experience the symptoms of natural menopause between the ages of 42 to 58 years. It is during the late perimenopausal and early postmenopausal stages that many women tend to experience adverse symptoms (Soules et al., 2001).

The symptoms experienced during perimenopause and postmenopause can occur to varying degrees of frequency and severity and occur in different combinations. Some of the most common symptoms can include vasomotor symptoms (i.e., hot flashes), insomnia, depressed mood, and forgetfulness and other cognitive deficits (Birkhäuser, 2002; Halbreich et al., 1995; Landis & Moe, 2004; O'Connell, 2005; Weber, Mapstone, Staskiewicz, & Maki, 2012; Woods & Mitchell, 2005).

Of these, the most common complaint is vasomotor symptoms, or hot flashes (Nelesen, Krohn, & Dimsdale, 2004). A woman experiencing a hot flash usually begins to sweat profusely, her skin becomes flushed, and her heart rate suddenly drops followed quickly by a rise (Nelesen et al., 2004). Vasomotor symptoms can be particularly pronounced at night while the sufferer is attempting to sleep. In fact, vasomotor symptoms are often the cause of disrupted sleep and a common reason given for sleep loss in menopausal women (Landis & Moe, 2004). Some have, in fact, attributed mood changes, changing hormone levels, and changes in cognition to sleep disturbances (Ameratunga, Goldin, & Hickey, 2012; Landis & Moe, 2004).

Depressed mood symptoms are also widely reported, and may be the result of estrogen deficiency in menopausal women (Birkhäuser, 2002). As many as 19% to 29% of women report depressed mood during the menopausal transition (Woods & Mitchell, 2005). Kurpius, Nicpon, and Maresh (2001) found that a woman's mood correlates to menopausal symptomology. However, Woods and Mitchell (1997) found that having a stressful life is the most important factor in accounting for depressed mood in menopausal women.

Cognitive deficits are another common complaint among menopausal women, although some researchers dispute the idea that these are linked to menopause (Greendale et al., 2009; Woods & Mitchell, 2005). Menopausal women often refer to this phenomenon as “memory fog.” Weber et al. (2012) found that working memory and complex attention/vigilance were affected in perimenopausal women following a comprehensive neuropsychological battery of tests. However, verbal learning and verbal memory were not affected. Halbreich et al. (1995) tested postmenopausal women in driving simulation, reaction time, and some visuospatial tests and found a significant deterioration in cognitive functioning. Sherwin (2008) found that giving hormone replacement therapy to women who had their ovaries surgically removed helped them maintain their performance in verbal and abstract reasoning both before and after surgery, whereas those who took placebo did not do as well.

Along with the differing symptoms, there are also individual differences in the severity of these symptoms. Some women may go through this time of life with very little discomfort, while other women may find themselves very uncomfortable (Woods & Mitchell, 2005). One factor that may contribute to more extreme menopausal symptoms may be to have higher levels of the neurotic personality trait.

Neuroticism and Menopausal Symptoms

Some of the words used to describe neuroticism include emotional instability (Eysenck, 1985), negative affectivity (Watson & Clark, 1984), and psychological distress (Florian et al., 1995). Those high in neuroticism tend to have low resilience, affecting their ability to cope (Horner, 1996), and elevated negative reactions to stressors (Barlow,

Ellard, Sauer-Zavala, Bullis, & Carl, 2014). Watson and Clark's (1984) review concluded that individuals with high levels of the neuroticism trait are more likely to have a negative opinion of themselves and others, and are more likely to report distress, discomfort, and dissatisfaction. For the purposes of this study, high neuroticism was defined as the inclination to experience negative emotions (e.g., anxiety, distress, fear, sadness, anger, dissatisfaction, helplessness, irritability, and loneliness; Barlow et al., 2014).

A person high in neuroticism may find it difficult to change this personality characteristic. Personality traits found in the Five Factor Model, of which neuroticism is one, tend to be stable over time and may be considered inborn tendencies (50% or more of these traits have been attributed to genetic influences; Digman, 1990). One 6-year longitudinal study (Costa & McCrae, 1988) verified the stability of the neuroticism trait, finding high test-retest correlations for their Neuroticism scale. It was also found that study participants maintained their rankings on this and other traits over time, even when changes in raw scores were observed.

The neuroticism trait is associated with one's quality of life. For example, Neuroticism has been associated with the experience of physical illness. Persson and Sahlberg (2002) found that that neuroticism strongly influences self-rated symptoms and wellbeing in rheumatoid arthritis. Smith et al. (2008) found that spousal reports of negative affectivity and social behavior were able to predict coronary heart disease. Archer et al. (2009) found that women who rated high in neuroticism, as rated by knowledgeable informants, experienced an earlier age at onset of dementia as a result of

Alzheimer's disease. Clearly, there is a relationship between the experience of negative physical symptoms and neuroticism. Therefore, it is not unreasonable to assume there may be an association between the neuroticism personality trait and negative menopausal symptoms, as well.

Stress and Menopausal Symptoms

There is an important variable to consider in measuring the relationship between neuroticism and menopausal symptoms. Women in the age group associated with menopause often experience significant stressors during this phase in their lives (Woods & Mitchell, 1997). These might include caring for an elderly parent(s), children leaving home, caring for grandchildren, employment uncertainty, reduced financial income, death of significant others, divorce, widowhood, marital tension, declining health, and aging in a youth-oriented culture. Since stressors are common for women in the menopausal age group, it may be that they account for the negative menopausal symptoms experienced by women. In short, stress may be a confounding factor to consider in attempts to link neuroticism to menopausal symptoms. On a behavioral level, it is easy to confuse neuroticism with stress reactions because both are evidenced by emotional instability (Eysenck, 1985), negative affect, psychological distress (Watson & Clark, 1984), and lack of resilience (Horner, 1996); on a psychometric level, considerable evidence shows that scales of neuroticism and stress overlap (Bauld & Brown, 2009). Therefore, including an objective measure of stressors in studies would permit statistical disentanglement of stress from neuroticism. In fact, Horner (1996) had 173 men and women complete self-report measures of neuroticism, stressors, and illness, among other

constructs. High neuroticism was found to be associated with the number of stressors reported, yet it still emerged as an independent predictor of illness.

Exercise and Menopausal Symptoms

Another important variable to consider when measuring the effects of neuroticism on menopausal symptoms is exercise. Exercise has been linked to less severe menopausal symptoms, including vasomotor symptoms (Daley, Stokes-Lampard, & MacArthur, 2009), insomnia (Karacan, 2010), depressed mood (Elavsky & McAuley, 2005, 2007), and disruptions in cognitive functioning (Erickson et al., 2011). However there are conflicting reports as to which types of exercises (i.e., aerobic or weight-bearing) affect which types of menopausal symptoms (Daley et al., 2009; Karacan, 2010; Newton et al., 2014). Therefore, to more clearly determine the effects of high neuroticism on negative menopausal symptoms, it is important to control for exercise as well as stressors.

Present Study

Neuroticism is a stable personality characteristic, which health care professionals can easily assess with self-report measures (Digman, 1990). Neuroticism has been found to contribute to physical symptomology (Archer et al., 2009; Horner, 1996; Jeronimus, Riese, Sanderman, & Ormel, 2014; Persson & Sahlberg, 2002; Smith et al., 2008), and many women experience negative physical symptoms during late perimenopause and early postmenopause (Soules et al., 2001). Indeed, there are studies suggesting that neuroticism may worsen negative symptoms in other areas of physical well-being (Archer et al., 2009; Persson & Sahlberg, 2002; Smith et al., 2008).

However, women in this age group often find themselves facing new and numerous stressors, such as financial pressures and changing family dynamics (Woods & Mitchell, 1997). Therefore, to accurately determine how much of menopausal symptoms are attributable to neuroticism requires controlling levels of objective stress. Likewise, because of the ameliorative effects exercise has on menopausal symptoms (Daley et al., 2009; Elavsky & McAuley, 2005, 2007; Erickson et al., 2011; Karacan, 2010), it is also important to control exercise when examining the association between neuroticism and menopausal symptoms.

The proposed study hypothesized that high levels of neuroticism are associated with increased negative menopausal symptoms (e.g., hot flashes, insomnia, depressed mood, and cognitive deficits) above and beyond the levels of stressors and exercise.

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CHAPTER 2

METHODS

Participants

Qualifying participants were healthy, English speaking women from 30 to 61 years, who were experiencing changes in menstrual bleeding due to menopause. Women experiencing surgical menopause were excluded. Of the 294 who completed the study survey, 169 surveys were included in the analysis. Excluded surveys were those that were incomplete (120) or had out-of-range responses (5).

Measures

Screening Survey

All surveys were administered online. Following informed consent, participants first completed a screening survey. This survey asked if they were experiencing changes in menstrual bleeding due to the onset of menopause. Additionally, to determine if respondents are experiencing natural menopause, they were asked whether they are experiencing menopause due to surgery (see Appendix A). The survey was used to insure that participants met selection criteria and screened out those who did not.

Demographic Survey

Participants completed a demographics questionnaire, which inquired about sex, age, medications/drugs they were taking, ethnicity, household size, income level, and

education level (see Appendix B). Because medications and drugs may mask menopausal symptoms, there was a concern that these variables could possibly cloud the study results, so additional questions assessed drug use. This questionnaire was written for the present study, thus no reliability or validity information is available.

Neuroticism Questionnaire

The neuroticism trait was assessed with the neuroticism subscale of the Eysenck Personality Questionnaire Brief Version (EPQ-BV; Sato, 2005). The neuroticism subscale consists of 12 items, which use a 5-point response scale ranging from 1 (not at all) to 5 (extremely). Some of the questions include, “Does your mood often go up and down?” “Do you ever feel miserable for no reason?” and “Are you an irritable person?” Scores are calculated by totaling all items; higher scores indicate higher levels of neuroticism.

The NEO-PI is a commonly used measure of Big 5 personality traits, however, it has 181 items and separating the neuroticism trait from the other traits that the scale measures is not recommended (Costa & McCrae, 1992). Compared to other neuroticism psychometric scales, the EPQ-BV is shorter, presenting less respondent burden. In addition, the EPQ-BV has been found successful in studies measuring health outcomes. For example, the neuroticism sub-scale of the Eysenck Personality Inventory (EPI) was able to predict respondent mortality 21 years later (Shiple, Weiss, Der, Taylor, & Deary, 2007). In addition, this scale has been found to have good reliability ($\alpha = .90$, test-retest $\alpha = .92$; Sato, 2005). Validity was tested by comparing the EPQ-BV with the original Eysenck Personality Questionnaire-Revised (EPQR-S; Sato, 2005), and the neuroticism

sub-scales on each test were found to be highly correlated ($r = .88 - .89$). Internal reliability scores for the present study were also high ($\alpha = .93$).

Menopausal Symptoms Questionnaire

Participants completed the Menopause Rating Scale (MRS; Hauser, Huber, Keller, Lauritzen, & Schneider, 1994). The MRS is an 11-item scale that measures common symptoms and complaints of menopausal women. Sub-scales assess three dimensions: Psychological, somato-vegetative, and urogenital symptoms, with higher scores indicating more severe symptoms. MRS instructions direct respondents to indicate, “Which of the following symptoms apply to you at this time?” The psychological subscale has four items, such as “Depressive mood (feeling down, sad, on the verge of tears, lack of drive, mood swings).” The somato-vegetative subscale has four items such as “Hot flashes, sweating (episodes of sweating).” Finally, the urogenital subscale has three items such as “Dryness of vagina (sensation of dryness or burning in the vagina, difficulty with sexual intercourse).” The MRS also measures the subjective severity of symptoms using 5-point Likert scales ranging from 0 (none) to 4 (very severe). Summing the 11 item responses for each sub-scale gives sub-scale scores. Summing the subscale scores gives a total symptom severity score. Total scores for the MRS range from 0 (asymptomatic) to 44 (highest degree of complaints). Also, scores range from 0 (asymptomatic) to 16 (highest degree of complaints) for the psychological and somato-vegetative subscales and 0 (asymptomatic) to 12 (highest degree of complaints) for the urogenital subscale.

The MRS and the Kupperman Index are scales commonly used to assess menopausal symptoms. However, the Kupperman Index tends to be more sensitive to symptoms: Women tend to score higher on the Kupperman Index and slight symptoms may be detected where the MRS will not detect them (Heinemann et al., 2004). Therefore, to err on the conservative side of symptom detection, the MRS was chosen for this study. This scale has a high internal consistency with Cronbach's alphas ranging from $\alpha = .83$ to $.87$, and both consistency and test-retest stability were found to be good across different countries (Heinemann et al., 2004). The MRS internal reliability scores for the present study were comparable to these results ($\alpha = .87$). Validity indices across countries have been very good with high sub-scores to total-score correlations ($r = 0.7-0.9$). However, sub-scales have also been found to intercorrelate ($r = 0.5-0.7$), which suggests that the subscales may not be fully independent.

Stressors Questionnaire

To assess the number of current stressors, participants completed the Social Readjustment Rating Scale (SRRS; Holmes & Rahe, 1967). This measure provides a count of objective life events and hassles rather than an assessment of subjective, or perceived, stress. A 43-item checklist lists a variety of life events, such as "Death of a spouse," "Change in living conditions," and "Change in sleeping habits." Respondents indicate how many times, if at all, they experienced each stressor over the last year. For example, if a respondent experienced sleep disturbances every day over the past year due to hot flashes, it is possible for them to enter a number up to 365. Each item on the list is assigned a weighted value, and values are added to obtain a stress score. Therefore, a for

woman reporting sleep disturbances 365 times in a year this score would be multiplied by the prescribed weighted value (16). Scores of less than 150 are considered low, scores of 150 to 299 are considered moderate, and scores of 300 or more are high.

The benefit of this measure is that it provides the frequency of actual stressors. That is, it provides an indication of the type and severity of stressors individuals are experiencing. Moreover, its internal consistency reliability is fairly high with Cronbach's alphas ranging from $\alpha = .72$ to $.80$, and test-retest correlations ranged from $r = .87$ to $.90$ (one week) to $r = .64$ to $.74$ (6 months; Holmes & Rahe, 1967). This scale has been shown to correlate with illness symptoms, and those with high scores were 80% more likely to develop illness (Komaroff, Masuda, & Holme, 1968).

Exercise Questionnaire

The long version of the International Physical Activity Questionnaire (IPAQ; Craig et al., 2003) was used to measure the amount of physical activity in the previous week. The long version has 27 questions that tap four activity domains (work, transportation, domestic, and leisure) and differing activity levels (walking, moderate, vigorous, and sitting). An example of one question includes, "During the last 7 days, on how many days did you do vigorous physical activities like aerobics, running, fast bicycling, or fast swimming in your leisure time?" Respondents answer by indicating how many days, hours, and minutes they spent doing vigorous physical activities. Total activity levels (walking, moderate, vigorous) in each domain (i.e., work, transportation, domestic, and leisure) are computed by multiplying the metabolic equivalent of task (MET) minutes, by duration (minutes), by frequency (days). MET units are estimated

units of energy expenditure needed to perform various exercises. Vigorous physical activities are assigned larger MET units than moderate physical activities. For example, if a respondent has a job that requires a significant amount of physical activity, she may report getting 5 hours of vigorous physical activity on average per day over the past week. Scores are then calculated by transforming the hours to minutes. Then, scores are calculated by multiplying 8.0 MET (vigorous) minutes by 300 minutes by 7 days. Finally, the scores from each domain are summed for a total activity score (the sitting questions were developed as separate indicators and not as part of the summed physical activity score).

One of the advantages of this test is that it assesses respondents' activity levels in several arenas of their daily life, and not just going to a gym. Another advantage is that it differentiates levels of physical activity, which may be helpful in the debate as to the amount of exercise needed to be effective at helping ameliorate menopausal symptoms. Also, Cronbach's alphas for this questionnaire ranged from $\alpha = 0.56$ to 0.90 (Nakawatase et al., 2007). Cronbach's alpha for the present study also fell into midrange ($\alpha = .42$). It was found to have high test-retest reliability over one week (average $r = .80$), and criterion validity was demonstrated by a significant association between the measure and activity levels from motion detectors that were worn for one week (Craig et al., 2003).

The scales were presented to respondents in a fixed order: Menopausal symptoms, neuroticism, life events, and then exercise scales. The rationale was that after answering questions about one's stressors on the SRRS, respondents may have responded more negatively to questions on the EPQ-BV. Therefore, it was important to keep the

scales in the same order for each respondent with the EPQ-BV preceding the SRRS. Likewise, to avoid the influence of the psychological measures (e.g., EPQ-BV, SRRS, and IPAQ) on the reporting of menopausal symptoms, the MRS remained fixed in its position before these measures. The screening survey was also fixed in the first position to vet potential participants, and the demographics questionnaire stayed fixed at the last position to avoid priming effects (Steele & Aronson, 1995).

Procedure

Participants were recruited through social media, such as Facebook, Twitter, and Google+, and through flyers distributed at community locations such as grocery stores (see Appendix C for example of participant invitation to the study). Recruitment through social media involved inviting potential respondents to participate in a research study investigating women's health and menopause. When participants agreed, they were provided a link to an html webpage with more details about the study. The details provided on the html webpage were the same as those provided in the paper flyers. The paper flyers and online html webpage also provided useful links viewers could visit to get advice and support regarding menopausal symptoms (see Appendix D).

Interested respondents visited a link to the survey provided on both the flyer and the html webpage, which was located on Survey Monkey. First, they encountered an Informed Consent webpage (see Appendix E for informed consent), which indicated the sensitive nature of the questions to be asked on the survey, assured them of their option to skip questions or stop the survey at any time, and promised anonymity of response. Participants indicated their willingness to accept conditions of the informed consent by

clicking a button, allowing them to continue with the survey. No actual signatures were collected in the hopes that with anonymity, respondents would be more forthcoming and honest with the answers they provided. Second, after they agreed to the consent form, respondents were directed to answer questions that served to rule out any participants not eligible to participate (e.g., women who were not experiencing changes in menstrual bleeding due to menopause, women who had experienced surgical menopause). A negative answer to changes in menstrual bleeding or an affirmative answer to the surgical menopause ended the survey with a message thanking them for their time.

Participants who successfully passed through these two steps completed the menopausal symptoms, neuroticism, life events, exercise, and demographic scales, in that order. As an incentive, participants had the option to enter a drawing to win a \$100 Amazon gift card at the end of the survey, and then they were thanked for their time.

CHAPTER 3

RESULTS

Sample Characteristics

First, data were screened for data entry errors by examining descriptive statistics (see Tables 1 and 2). Out-of-bounds responses were found in five surveys (e.g., the number of hours reported doing exercise exceeded the number of hours in a day); these surveys were eliminated from analyses.

The average age of respondents was 50.74, with the youngest respondent being 30 years old and the oldest being 61 years old. The mean age of respondents in this study approximates the typical age in which women begin experiencing menopausal symptoms (i.e., 50 years; Ginsberg, 1991). As seen in Table 1, Caucasian (non-Hispanic) women were over-represented, comprising 86% of the sample. In addition, the majority of women also had a college education or more and middle-class income levels.

Scale Characteristics

The means and standard deviations for each of the study variables are shown in Table 2. Respondents' mean number of objective stressors was toward the top of possible scores, confirming the evidence that women tend to face added stressors during this phase of their lives (Woods & Mitchell, 1997). However standard deviations were large indicating a considerable range in the number of stressors reported.

TABLE 1. Participant Characteristics

Characteristic	<i>M</i>	<i>SD</i>	<i>n</i>	%
Age	50.88	5.11	168	
Number of people in household	2.79	1.29	169	
Race/Ethnicity				
Caucasian			144	87
Latino/Hispanic			6	4
African-American			4	2
Native American/Aleut			1	1
Other			11	7
Education Level				
Grammar School			1	<1
High School or Equivalent			19	11
Vocational/technical School (2 year)			15	9
Some College			50	30
Bachelor's Degree			56	34
Master's Degree			14	8
Doctoral Degree			3	1
Professional Degree (MD, JD, etc.)			2	1
Other			6	4
Annual Income(\$)			58	34
0 to 29,999			15	9
30,000 to 59,999			44	26
60,000 to 119,999			58	34
120,000 to 179,999			19	11
180,000+			13	8
Prefer not to answer	–		20	12

Note. Totals of percentages are not 100 for every characteristic because of rounding.

The IPAQ mean also fell in the high range with a large standard deviation. The large standard deviation is indicative of the large range of amounts of exercise reported, with women tending to report either large amounts of exercise or very little exercise. Physical activity scores on the IPAQ can vary greatly depending on the sample tested. For example, one could not expect physical activity scores for young, athletic women to be similar to scores for elderly women. Furthermore, there are no IPAQ scores with a

similar population in which to compare this study's sample. Therefore, it was not possible to determine whether physical activity scores were typical for this sample.

TABLE 2. Scale Characteristics

Measure	<i>M</i>	<i>SD</i>
SRRS	691.44	924.23
IPAQ–Total	6408.10	7791.29
IPAQ–Walking	1825.47	3355.91
IPAQ–Moderate	3331.51	4610.49
IPAQ–Vigorous	1251.12	2737.16
IPAQ–Work	2673.82	5386.42
IPAQ–Transport	591.40	1542.83
IPAQ–Domestic	2242.20	4044.29
IPAQ–Leisure	900.67	1636.79
EPQ-BV	27.82	9.86
MRS–Total	17.34	7.98
MRS–Psychological	6.67	3.85
MRS–Somato-Vegetative	6.66	2.90
MRS–Urogenital	4.01	2.55

Note. SRRS = Social Readjustment Rating Scale; IPAQ = International Physical Activity Questionnaire; EPQ-BV = Eysenck Personality Questionnaire Brief Version; MRS = Menopause Rating Scale.

All neuroticism and menopausal symptom scales reflected mean scores close to midrange of possible scores. However, standard deviations were large for both scales, signifying a considerable range in the number of symptoms reported.

Although stressors scores and physical activity means and standard deviations were somewhat high relative to possible scores, there was no evidence for basement or

ceiling effects on any of the measures. The study variables seemed to yield adequate variability with no compromise to correlational analysis.

Correlations were calculated to identify any relationship between demographics (e.g., education, income level) and both the predictor and dependent variables. This was done in order identify any demographics as potential confounds in the neuroticism-symptoms relationships. It was found that the respondents' income level indeed correlated with both menopausal symptoms and neuroticism (see Table 3).

TABLE 3. Zero-Order Correlations for Primary Study Variables

Measure	1	2	3	4	5	<i>M</i>	<i>SD</i>
1. Income	—						
2. Stressors	.03	—				636.09	874.62
3. Exercise	.06	.10	—			6000.30	7195.37
4. Neuroticism	-.27**	.19**	.04	—		29.24	10.17
5. Menopausal Symptoms	-.20*	.31**	.24**	.74**	—	18.35	7.92

* $p < .05$. ** $p < .01$.

Tests of Hypothesis

As indicated earlier, zero-order correlations calculated among all primary study variables showed a negative relationship between neuroticism and income level, in which higher neuroticism scores corresponded to lower income levels (see Table 3). Menopausal symptoms were found to have a negative relationship with income level, with more severe symptoms associated with lower income levels. Also found was a positive relationship between neuroticism and reported stressors, in which higher neuroticism scores corresponded to more stressors. Menopausal symptoms also showed a positive relationship with exercise, stressors and neuroticism. Because income was the

only demographic variable to correlate with both neuroticism and menopausal symptoms, it was considered a possible confound in the relationship between neuroticism and menopausal symptoms. Stressors and exercise would also be treated as possible confounds, as planned.

To test the hypothesis that high levels of neuroticism are associated with increased menopausal symptoms, hierarchical regression was used. To control for the possibly confounding effects of income level, stressors, and exercise, these variables were entered first into the equation (Step 1). In order to determine whether higher neuroticism could still predict menopausal symptoms after removing the influence of the potential confounds, it was entered next (Step 2). Results showed the overall regression equation, with all four predictors, to be statistically significant, $F(4, 164) = 65.61, p < .001$, adjusted $R^2 = .61$. Thus, approximately 61% of the variance in menopausal symptoms was explained by the four predictors in this model.

To assess the contributions of individual variables, the t statistic for each variable was examined according the step entered. In Step 1, income level was statistically significant, $t(165) = -3.12, p < .01$, as was the stressors score, $t(165) = 4.10, p < .001$, and the exercise score, $t(165) = 3.15, p < .01$. Together, these variables explained 19% of the variance in menopausal symptoms. In Step 2, the neuroticism score was also found to be statistically significant, $t(164) = 13.54, p < .001$. The hypothesis was clearly confirmed as evidenced by the fact that 43% of the remaining variance in menopausal symptoms was attributable to neuroticism. In short, women with higher levels of the

neuroticism personality trait reported more severe menopausal symptoms above and beyond the effects of income level, stressors, and exercise (see Figure 1).

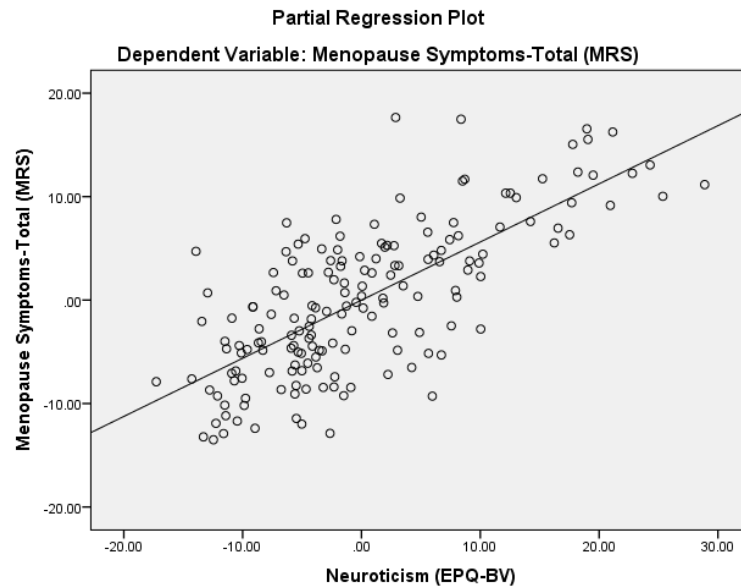


FIGURE 1. Regression plot depicting a significant positive relationship between menopausal symptoms and the neuroticism personality trait above and beyond income, stressors, and exercise. More severe levels of menopausal symptoms were related to higher levels of the neuroticism personality trait.

Secondary Analyses

A secondary area of interest was whether any particular stressors were related to menopausal symptoms. To determine whether there were any such relationships, zero-order correlations were calculated between individual stressors and menopausal symptoms (see Table 4). Although many of the relationships found between these stressors and symptoms were small, such relationships would be important starting points

for future research, and could help inform the assessment and treatment of women with severe menopausal symptoms.

TABLE 4. Zero-Order Correlations for MRS-Subscales and Stressors

Measure	MRS Psychological	MRS-Somato-Vegetative	MRS-Urogenital
Divorce	.12*	.01	.08
Marital Separation	.12*	-.00	.06
Marriage	.06	.03	.15*
Sex Difficulties	.16*	.19**	.32**
Death of Close Friend	.12*	.07	.07
Death of Family Member	.11	.08	.15*
Change Financial State	.14*	.09	.22**
Mortgage over \$100,000	.17*	.20*	.14
Personal Injury/Illness	.21**	.16*	.16*
Change in Sleeping Habits	.11	.18**	.25**
Change in Eating Habits	.14*	.18*	.20**
Retirement	.18*	.11	.11
Single Living Alone	.20**	.17*	-.04

* $p < .05$. ** $p < .01$.

Sex difficulties, a change in eating habits, and personal injury/illness were stressors found to correlate with all three symptom subscales (i.e., psychological, somato-vegetative, and urogenital). The home mortgage and living alone stressors were related to two subscales, the psychological and somato-vegetative subscales. Change in sleeping habits was also related to two subscales, the somato-vegetative and urogenital subscales. The change in financial status stressor was related to two symptom subscales, the psychological and urogenital. Divorce, marital separation, death of a close friend, and retirement were correlated to only the psychological subscale. Death of a close family member and marriage were correlated to only the urogenital subscale. Relationships between stressors and symptoms may have reverse causality. For example, some women

in pain may experience more arguments in their relationships and, therefore, face divorce or marital separation.

TABLE 5. Zero-Order Correlations for MRS-Subscales and Exercise

Measure	MRS Psychological	MRS-Somato-Vegetative	MRS-Urogenital
Total Exercise	.18*	.19*	.26**
Walking	.16*	.18*	.22**
Moderate	.12	.12	.13
Vigorous	.08	.11	.20**
Work Total	.20**	.21**	.29**
Walking	.19*	.17*	.28**
Moderate	.13	.20*	.21**
Vigorous	.17*	.16*	.22**
Transportation Total	.10	.14	.17*
Walking	.12	.17*	.20**
Cycling (Moderate)	-.08	-.10	-.09
Domestic Total	.07	.05	.06
Vigorous Outside Work	-.04	.02	.17*
Moderate Outside Work	.03	.08	.09
Moderate Inside Work	-.04	.04	.01
Leisure Total	-.15*	-.04	-.03
Walking	-.09	-.04	-.04
Moderate	.02	.02	.02
Vigorous	-.15*	-.05	-.03
Sitting Total per Week	.01	-.07	.02
Sitting Average per Day	.01	-.07	.02

* $p < .05$. ** $p < .01$.

Another area of secondary interest involved the relationship between types of menopausal symptoms (e.g., psychological, somato-vegetative, and urogenital) and the type of exercise, both in terms of exercise domains (work, transportation, domestic, or leisure) and intensity (easy, moderate, vigorous). Although, the IPAQ does not ask respondents to indicate specific types of exercise with regards to cardiovascular exercise

or strength training exercise, it does reflect how much exercise a women gets on average per week, even when they are getting this exercise in their everyday activities.

The benefit of knowing whether different types of exercise help or exacerbate menopausal symptoms may help resolve the debate regarding how much exercise, if any, helps alleviate menopausal symptoms. To determine whether there are any such relationships, zero-order correlations were calculated between the domains / intensity of exercise and menopausal symptoms (see Table 5). Some correlations, although small, were found.

There was only one significant correlation in which exercise had a beneficial effect on menopausal symptoms. Respondents who reported participating in more vigorous leisure time exercise also had lower psychological menopausal symptoms (see Figure 2). However, the more exercise respondents had at work, the more psychological symptoms they reported.

As evidenced in Table 6, it seems that exercise during work has the most impact on menopausal symptoms. Regrettably, the effects from exercise seem to affect symptoms in an undesirable manner. The more exercise participants had during work, the more psychological, somato-vegetative, and urogenital symptoms they reported experiencing. However, because directionality cannot be determined from correlational analysis, it is possible that, rather than exercise having a negative impact on symptoms, severe symptoms prevented women from doing as much exercise. For example, women experiencing the joint and muscular discomfort described in the Somato-vegetative symptom subscale, may find it difficult to participate in much exercise. There were no

significant relationships found between menopausal symptoms and the sedentary activity of sitting.

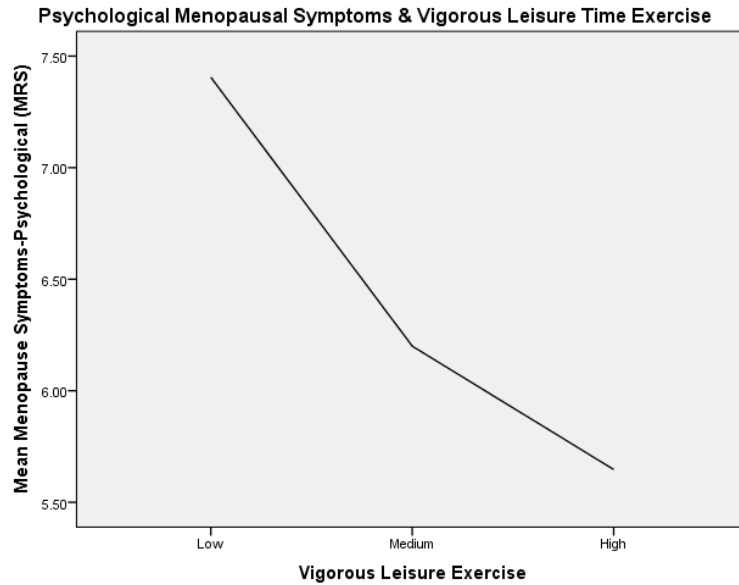


FIGURE 2. Line graph of relationship between the menopausal symptoms subscale for psychological symptoms and the vigorous level exercise domain for leisure. Respondents reported less severe psychological menopausal symptoms when participating in vigorous activity during leisure activities.

CHAPTER 4

DISCUSSION

Results supported the study's hypothesis: High levels of the neuroticism personality trait intensified menopausal symptoms. Moreover, this relationship remained even after possible confounding factors, such as income level, stressors, and exercise had been statistically controlled. The findings in this study add further support to past findings that negative health outcomes are associated with the neuroticism personality trait (Archer et al., 2009; Person & Sahlberg, 2002; Smith et al., 2008). Those high in neuroticism tend to have low resilience, affecting their ability to cope (Horner, 1996). Therefore, it is not surprising that their ability to cope with the symptoms of menopause may be compromised as reflected by reports of more intense menopausal symptoms.

As expected, women in this age group tended to report high numbers of life stressors (Woods & Mitchell, 1997). These life stressors seemed to have a significant impact on menopausal symptoms, in which women with more stressors reported experiencing more severe symptoms. Relationships were found between the types of stressors and types of menopausal symptoms.

Not surprisingly, two types of stressors affected all three menopausal domains (i.e., psychological, somato-vegetative, and urogenital): Eating habits and sex difficulties (Woods & Mitchell, 2005). However, it is possible that the stressors might well be the

result of menopause, and not the cause of menopausal symptoms. Women often experience weight gain during this stage of life due to hormonal changes (Davis et al., 2012), and changes in eating habits may well be a reflection of this phenomenon. Also, as hormones fluctuate during menopause, women tend to have difficulties with sex (Woods & Mitchell, 2005). Some of the urogenital symptoms measured in this study, include vaginal dryness and hormone fluctuation, which in fact contribute to difficulties in sexual activity and diminished sexual desire (Shin, & Shapiro, 2003).

Another stressor that was expected and found here was a change in sleeping habits (Woods & Mitchell, 2005). As with other stressors, a change in sleeping habits may well be a result of menopausal symptoms as hormones fluctuate. Women often experience hot flashes through the day and night, and when this occurs during sleep, sleep is often disturbed causing a change in sleeping habits (Ameratunga et al., 2012). An interesting finding, however, was the association between sleeping habits and urogenital symptoms. It may well be that the relationship lies simply in the inability to sleep due to the discomfort from urogenital symptoms. This is a phenomenon in need of further research, as this was a novel finding.

The relationship between exercise and menopausal symptoms revealed a somewhat opposite trend to what was expected. With the exception of the kind of exercise done during one's leisure time, physical activity (at work, at home, or in between) seemed to contribute to more extreme menopausal symptoms. It is possible that other kinds of exercise, like that performed at work, act more like stressors, and therefore, do not help the body in a therapeutic way. Although the correlation exists, however, it is

possible for the reverse to be true; women's severe menopausal symptoms could prevent them from participating in vigorous activities of these types.

If indeed, some forms of exercise exacerbate menopausal symptoms, this may have further health implications. Urogenital symptoms seem to be impacted the most from more, not less, physical activity and not in a desirable way. More research in this area is needed. It is possible that there is a physiological, rather than a psychological, explanation for this phenomenon.

The only exercise domain that showed improved menopausal symptoms for respondents was the leisure domain, which may be when individuals intentionally exercise for its health benefits. Since this may be the case, it is possible that those particular respondents, being health-minded, take other health measures to control menopausal symptoms, such as changing their diet. Additional research is needed to address these possible associations.

The present results do not settle the debate on the effects of exercise on menopausal symptoms. However, they do suggest that the type of exercise must be considered: It appears that recreational exercise may have an ameliorative affect, whereas other kinds of exercise may just provide further stressors for a women already experiencing more stress (Woods & Mitchell, 1997) and significant physical and psychological changes in their lives (Woods & Mitchell, 2005).

Possible Limitations

Even though the study's hypothesis was supported, there are potential shortcomings of the present study that must be taken into account. One limitation is in

terms of the sample's representativeness: First, respondents were self-selected and represented only those women with computer skills and computer access. In addition, the answers they provided on the internet survey may have been different if provided on a paper-and-pencil questionnaire. Furthermore, the majority of responses came from Caucasian, non-Hispanic women. Therefore, it is possible that present findings do not generalize to all ethnic groups. Future studies will need to be conducted to determine if members of other ethnic groups who are high in the neuroticism personality trait also experience more severe menopausal symptoms.

Another limitation is that there was no way to be sure that the survey was answered by the individuals for whom it was intended, or to verify that respondents actually fit the screening criteria. Moreover, respondents might have entered erroneous responses, owing to the fact that persons in this age group may not have been completely computer literate. However, after the data was screened for out-of-range responses, only five respondents were lost, indicating this might not have been a large problem. On the other hand, respondent fatigue and boredom appear to be greater concerns given that another 120 respondents were excluded due to incomplete surveys.

There were also potential limitations to the data analysis. For one, the questionnaires may have been intercorrelated for artifactual reasons, such as shared method variance. That is, there may have been "response bleeding," since respondents were answering several questionnaires at the same time. Future studies may consider having respondents answer each questionnaire on separate days to avoid this effect. Also, the presence of negative affectivity may have affected responses to both the

neuroticism and the symptoms measures, which were both negative in tone; this too would cause artifactual correlation. In future research, providing distracting activities, such as entertaining internet trivia games in between surveys, may curb this effect.

Finally, since analyses were correlational, the direction of causality remains undetermined. It may well be that the hormonal changes associated with menopause (Davis et al., 2012) caused participants to endorse more of the neuroticism items. Future studies might employ a longitudinal design, assessing neuroticism before the onset of menopause, to avoid this problem.

Implications

These findings could potentially help health care professionals identify women at risk for menopausal difficulties. That is, counselors and other psychological and medical practitioners could determine a woman's susceptibility to extreme menopausal symptoms by administering a simple personality questionnaire to patients. With all of the vagaries affecting menopause symptoms, having a measurable "vulnerability" variable such as neuroticism, can help target interventions to women most in need. However, this screening may not be appropriate for minority women, as they were underrepresented in this study. Therefore, it is unknown if the present findings apply to them.

The secondary results of this study may benefit health care providers and their patients, as well. Given the evidence that stressors may exacerbate symptoms, health care professionals may consider advising their patients in stress relieving remedies. Whether menopausal symptoms are worsened by stressors or stressors are a result of menopausal symptoms, taking measures to relieve stress may help provide some relief

from symptoms regardless of causal direction. Also, given the paradoxical results between exercise and symptoms, advising women to participate in more exercise may not be the best prescription.

APPENDICES

APPENDIX A
SCREENING QUESTIONNAIRE

Screening Questionnaire

Are you experiencing changes in menstrual bleeding due to the onset of menopause?

Yes No

Are you experiencing menopause as a result of surgery?

Yes No

*Those answering no to the first question or yes to the second question will be dismissed with the message, "Thank you for your time."

*Respondents answering yes to the first question and no to the second question will be routed to the main survey.

APPENDIX B
DEMOGRAPHIC QUESTIONNAIRE

Demographics

Sex: Male Female

Age:

Medications:

- Are you taking any hormone replacement therapy medications? Yes No
- If so, please indicate the name of the hormone replacement medication:
- Are you taking any prescription medication for menopausal symptoms? Yes No
- If so, please indicate the name of the prescription for menopausal symptoms:
- Are you taking any other prescription medications? Yes No
- If so, please indicate the name of the prescription medication:
- Are you taking any other drugs (street or over the counter)? Yes No
- If so, please indicate the name of any other drugs you are taking:

Ethnicity:

- African-American (non-Hispanic)
- Asian/Pacific Islanders
- Caucasian (non-Hispanic)
- Other:
- Latino or Hispanic
- Native American or Aleut
- Middle Eastern/Arabic

Household size:

Income level:

- Under \$10,000
- \$10,000 - \$19,999
- \$20,000 - \$29,999
- \$30,000 - \$39,999
- \$40,000 - \$49,999
- \$50,000 - \$74,999
- \$75,000 - \$99,999
- \$100,000 - \$150,000
- Over \$150,000
- Would rather not say

Education level:

- Grammar School
- High school or equivalent
- Vocational/technical school (2 year)
- Some college
- Bachelor's degree
- Master's degree
- Doctoral degree
- Professional degree (MD, JD, etc.)
- Other

(Optional) For a chance to win one of three \$100 Amazon Gift cards, please email MenopauseSurvey@gmail.com and provide your email address to enter the drawing (No other personal information needed).

APPENDIX C
PARTICIPANT RECRUITING FLYER



Menopause & Women's Health: Important Research for Today's Women



*For an Opportunity to Participate in
Important Research for Women's Health, Visit:*

<https://www.surveymonkey.com/s/menopause-womens-health>

Participant Qualifications:

- Survey is %100 anonymous. No identifying information is gathered from participants.
- Healthy, English speaking women.
- Ages 40 to 60 years.
- Women currently experiencing the onset of natural menopause.

Study Objective:

- Under the direction of Dr. Amirkhan, a professor at California State University, Long Beach (CSULB), Lora is conducting this study to explore menopausal symptoms and health in women. Your contributions will help us better understand menopausal symptoms and how they are related to individual personalities, stressors, and physical activities.

Survey Details:

- This survey takes approximately 30 to 45 minutes to complete.
- Some questions may be sensitive in nature.
- Respondents have the option to skip questions they do not feel comfortable answering.

Chance to Win \$100:

- While the survey is entirely anonymous, you will have the option at the end to enter a drawing for one of three \$100 Amazon Gift Certificates.
- Respondents must click through the entire survey to enter the drawing by submitting an email address.
- Your specific survey responses will not be associated with your email address, and your email address will be used only to notify the drawing winners.

About Lora Connor, Primary Investigator:

- Lora is currently a Graduate student from CSULB working under the direction of Dr. Amirkhan to complete this research project.
- This is part of her degree requirements for a Master's degree in Psychological Research at CSULB, and your help in completing this online survey is much appreciated.

Take the Menopause & Women's Health Survey:

<https://www.surveymonkey.com/s/menopause-womens-health>

Useful Links for More Information about Menopausal Symptoms:

- **WebMD:** www.webmd.com/menopause
- **34 Menopause Symptoms:** www.34-menopause-symptoms.com
- **NAMS:** www.menopause.org
- **NCCAM:** <http://nccam.nih.gov/health/menopause>

APPENDIX D
HELPFUL MENOPAUSE WEBSITE LINKS

WebMD

- WebMD: <http://www.webmd.com/menopause/default.htm>
 - This website provides provide credible information, supportive communities, and in-depth reference material about health subjects such as menopause.



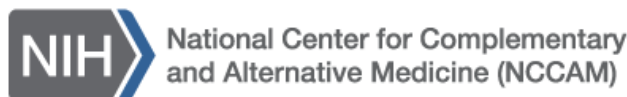
- 34 Menopause Symptoms: <http://www.34-menopause-symptoms.com/>
 - Gives advice on how to alleviate 34 menopausal symptoms through health, diet, and natural remedies. It also advises to seek professional help.



- MayoClinic: <http://www.mayoclinic.org/diseases-conditions/menopause/basics/symptoms/con-20019726>
 - Information, advice, and support from physicians, scientists and other medical experts.



- North American Menopause Society (NAMS): <http://www.menopause.org/for-women/expert-answers/faqs-body-changes-symptoms>
 - A non-profit organization, which has a multidisciplinary membership of experts from medicine, nursing, sociology, psychology, nutrition, anthropology, epidemiology, pharmacy, and education to provide information that is both accurate and unbiased.



- NIH: National Center for Complementary and Alternative Medicine (NCCAM): <http://nccam.nih.gov/health/menopause/menopausesymptoms>
 - The Federal Government's lead agency for scientific research on complementary and alternative medicine.
 - Their mission is define, through scientific research, the usefulness and safety of complementary and alternative medicine interventions.

APPENDIX E
CONSENT TO PARTICIPATE IN RESEARCH

Menopause and Women's Health

My name is Lora Connor. I am a graduate student in the Psychology Department at California State University, Long Beach. I am conducting a research study as part of the requirements of my degree in psychological research, under the direction of James Amirkhan, PhD.

You were selected as a possible participant in this study because you are a healthy, English speaking woman between the ages of 40 and 60 years of age who is experiencing symptoms of natural menopause.

PURPOSE OF THE STUDY

This study is being conducted to investigate women's health in which the primary areas of interest include: menopausal symptoms, individual personality, stressors, and physical activity.

PROCEDURES

If you decide to participate, you will click the next button located at the bottom of this electronic consent form and enter your responses to questions on the following online survey. Questions include topics concerning your menopausal symptoms, personality, stressors, and physical activity habits. The survey should last about 30 to 45 minutes.

POTENTIAL RISKS AND DISCOMFORTS

You may feel uncomfortable answering some of the questions, as some questions pertain to personal matters such as sexual problems, bladder problems, and vaginal dryness. You do not have to answer any questions that you do not wish to, and you may withdraw completely from the study at any time.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Your answers will help us better understand the experience of menopause, and may benefit women experiencing difficult menopausal.

PAYMENT FOR PARTICIPATION

For your participation, you will have the opportunity to enter a drawing for a \$100 Amazon gift card after clicking through all items on the survey. To enter the drawing, respondents must visit MenopauseSurvey@gmail.com to submit an email address. Only those clicking through the entire survey (respondents may skip any questions they do not

wish to answer) will have the opportunity to enter the drawing. Three gift cards will be awarded to 3 people. The aim of this study is to obtain responses from 300 people. The drawing will take place at the conclusion of the study during the summer of 2015.

ANONYMITY

Participation is anonymous. The results of the study may be published or presented at academic institutions, but participation is anonymous, which means that no one (not even the research team) will know the identity of participants taking this survey.

Any emails obtained in connection with this study will not be connected with any of your personal information and will be disclosed only with your permission or as required by law.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. Participation or non-participation will not affect you in any way. You may also refuse to answer any questions you don't want to answer and still remain in the study. You will be able to skip through any questions you do not wish to answer and click through to the end of the survey. The investigator may withdraw you from this research if circumstances arise which, in the opinion of the researcher, warrant doing so. Examples of disqualification for the study can include women experiencing menopause caused by unnatural means such as surgery or women who are not within the 40 to 60 years age group.

IDENTIFICATION OF INVESTIGATORS

We will be happy to answer any questions or concerns you have about the study. You may contact me at menopause.womens.health@gmail.com or my faculty advisor, Dr. Amirkhan, James.Amirkhan@csulb.edu or (562) 985-5351 if you have study related questions or problems.

RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact the Office of University Research, CSU Long Beach, 1250 Bellflower Blvd., Long Beach, CA 90840; Telephone: (562) 985-5314.

SIGNATURE OF RESEARCH PARTICIPANT

I understand the procedures and conditions of my participation described above. My questions have been answered to my satisfaction, and I agree to participate in this study. By clicking the “Next” button, I am electronically signing this form indicating an understanding of the information above. (By clicking to the survey you are indicating that you consent to participate.)

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