

THE EFFECT OF QUALITY OF LIFE ON CARDIOMETABOLIC
RISK FACTORS IN POSTMENOPAUSAL WOMEN

By

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ABSTRACT

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Background: The emergence of cardiometabolic (CMD) indicators for Metabolic Syndrome (MetS) coincides with the decline in estrogen production during menopause and substantially increases development of cardiovascular disease (CVD) in women. Quality of life (QOL) encompasses physical, material, and social well-being. Research reveals a correlation between low QOL scores and CMD disease. Menopause significantly increases CMD risk, and may also lower QOL scores. **Objective:** To investigate the relationship between QOL and CMD risk in postmenopausal women. **Method:** Cisgender, postmenopausal women (age > 45 years) were recruited through emails to complete the online survey. Data collection included demographics, physical characteristics and activity level, sexual health, medical history, current conditions, and QOL satisfaction level. **Results:** MetS indicators were present, symptoms of menopause were prevalent, and QOL satisfaction was low. **Discussion:** QOL satisfaction is impacted by the physiological changes of menopause and MetS conditions. Lifestyle modifications during perimenopause are needed to improve health and reduce the risk of CMD disease. **Keywords:** menopause, post-menopausal, quality of life, cardiometabolic indicators, metabolic syndrome, covid-19

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INTRODUCTION

A major health hazard is growing in our modern world that is not a communicable disease, rather a consequence of the Western lifestyle's influence. Metabolic syndrome (MetS) has become a global epidemic, resulting from increased consumption of high calorie, low fiber, processed and ultra-processed foods, compounded by a decrease in physical activity and more sedentary leisure time activities. The cluster of risk factors known as MetS is characterized by the co-occurrence of at least three of the five following criteria: elevated waistline circumference; elevated blood pressure; elevated triglycerides; elevated fasting blood glucose level; and decreased level of HDL-C. The combination of these conditions substantially increases the risk for development of Type 2 diabetes and cardiovascular disease (CVD) (Saklayen, 2018). Chronological aging is an additional factor as the risk for stroke doubles with every decade after the age of 55 (CDC, 2017). In 2017, 12.2% of adults in the United States had Type 2 diabetes and 34% had MetS (Saklayen, 2018). The economic impact of MetS is evidenced by the high usage of medical care associated with the individual components of MetS, i.e., a 40% increase in medical care costs after the incidence of diabetes, amounting to trillions worldwide (Nichols & Moler, 2011). In a longitudinal, 9-year study by Janssen et al. (2010), menopause-related testosterone levels were implicated as a hormonal change associated with three of the five components of MetS due to the accumulation of intraabdominal fat that contains more androgen receptors. The research suggests that a decrease in estrogen levels, which promote gluteo-femoral fat accumulation, leads to the

androgen-dominated hormonal milieu that increases a woman's risk for MetS. Before the age of 45, CVD is rare among women but after the age of 65, cardiometabolic risk factors accelerate until they surpass those in men, demonstrating that menopause increases the risk of CVD independent of normal aging (Ebtekar et al, 2018). The emergence of MetS indicators during menopausal transition coincides with the decline in estrogen production and may explain the higher rate of CVD in postmenopausal women (Carr, 2003). Due to the hormonal changes of menopause, CVD is the primary cause of mortality for women in the United States, responsible for about 1 in every 5 deaths in 2017 (CDC, 2020).

The gradual process leading to menopause begins around age 45 when fertility declines as the ovaries get smaller and produce less of the hormones (estrogen and progesterone) that control the menstrual cycle (Pinkerton & Stovall, 2010). Perimenopause begins about three to five years before menopause and is characterized by irregular menstrual cycles, vasomotor symptoms, and psychological reactions (Larroy et al., 2020). Menopause is reached when a woman has no menstrual cycle for twelve months without any other cause, (e.g., illness, medication), and post menopause is the final stage, one year since the last menstrual cycle until end of life. The direct effect of estrogen deficiency on body fat distribution (central obesity), insulin action, and stiffening of the arterial wall increase the chance for a menopausal woman to develop MetS by 60% (Carr, 2003). Identification and treatment of these indicators for MetS at an early stage provides the opportunity to prevent or postpone diabetes and CVD by making changes to daily lifestyle. Modifications to physical activity and diet may reduce future

health care needs and improve overall well-being and quality of life (QOL) during menopause.

The significance of QOL as a public health concern was established by the World Health Organization (WHO) in 1949; health is not just an absence of disease, it is a state of complete physical, mental, and social well-being determined by: personal habits, social engagement, education/income, and living environment, (WHO, 2019). A healthy living environment is associated with a lower incidence of diabetes and hypertension while adverse living conditions increase the production of cortisol and the risk for CVD, (Diez Roux et al., 2016). Transitioning into menopause has been found to have a consistently negative impact on QOL, health outcomes, and increased health risks. However, research surrounding this topic fails to address several important variables associated with a woman's physiological aging process such as changes in sexual activity, alterations in sleep patterns, increased caregiving responsibilities, and severity of chronic medical conditions that occur during menopause (Hess et al., 2012). The current life expectancy of women in the United States is 81.1 years (CDC, 2020). Accordingly, it can be said that women who live 81 years spend a significant part of their life in post-menopausal status. Menopause and MetS are both associated with an unsatisfactory QOL in several studies linking social factors to health. By considering all domains that impact postmenopausal health, we can better understand how to assist this population to enhance QOL and improve health outcomes.

Research demonstrates a correlation between low QOL scores and increased risk for cardiometabolic diseases. Additionally, menopause has been correlated with lower

QOL scores as well as increased risk for cardiometabolic diseases. The direct connection between these three conditions has yet to be examined. Therefore, the purpose of this study is to investigate the relationship between QOL and cardiometabolic risk indicators in postmenopausal women. The objective of this study is to assess the impact of menopause on QOL and the associated risk factors of cardiometabolic disease, specifically metabolic syndrome in postmenopausal women. Hypothesis: Postmenopausal women that express a greater burden in life (stress, financial struggle, social isolation, etc.) will show greater signs of negative cardiometabolic health outcomes.

REVIEW OF LITERATURE

The following review of literature will cover cardiometabolic risk factors, physiological changes during menopause, the increased health risks during menopausal transition and the impact of menopause on QOL.

Cardiometabolic Risk Factors and Metabolic Syndrome

Metabolic syndrome is a cluster of cardiometabolic risk factors that substantially increase the development of cardiovascular disease (CVD). A diagnosis of MetS occurs when any three of the five following criteria are present: (1) elevated waist circumference (≥ 35 inches for women; ≥ 40 inches for males); (2) elevated triglycerides (≥ 150 mg per 100 ml); (3) elevated blood pressure ($\geq 130/\geq 85$ mm Hg); (4) elevated fasting glucose (≥ 110 mg per 100 ml); and (5) decreased HDL-C (< 50 mg per 100 ml for women; < 40 mg per 100 ml for men) (Vetter et al., 2011). A combination of these disorders increases the risk for development of CVD greater than the presence of any one condition alone (Gurka et al., 2016). All of the defining risk factors in MetS are associated with increased annual medical costs, and expenses are magnified by each component resulting in higher future medical costs (Nichols & Moler, 2011). Researchers at the University of Washington School of Medicine found that the cost for healthcare in the United States was \$2.7 trillion dollars in 2016, and 27% of that cost was attributed to modifiable risk factors associated with cardiometabolic disease, such as obesity and smoking. The expense of treating obesity was \$238.5 billion, hypertension treatment expense was \$179.9 billion, and the cost for treatment of high fasting plasma glucose was \$171.9 billion (Dieleman et

al., 2020). Healthcare spending continues to increase and 18% of the United States economy is currently directed towards healthcare expenses. Unmanaged risk factors are not only costly but may result in the prevalence of associated co-morbidities if left untreated (Dieleman et al., 2020). The five conditions that contribute to the risk for development of MetS are linked, and abdominal obesity's contribution is significant as it leads to increased insulin resistance, the common denominator for the risk of MetS development (Paley & Johnson, 2018). Figure 1 illustrates the link between components.

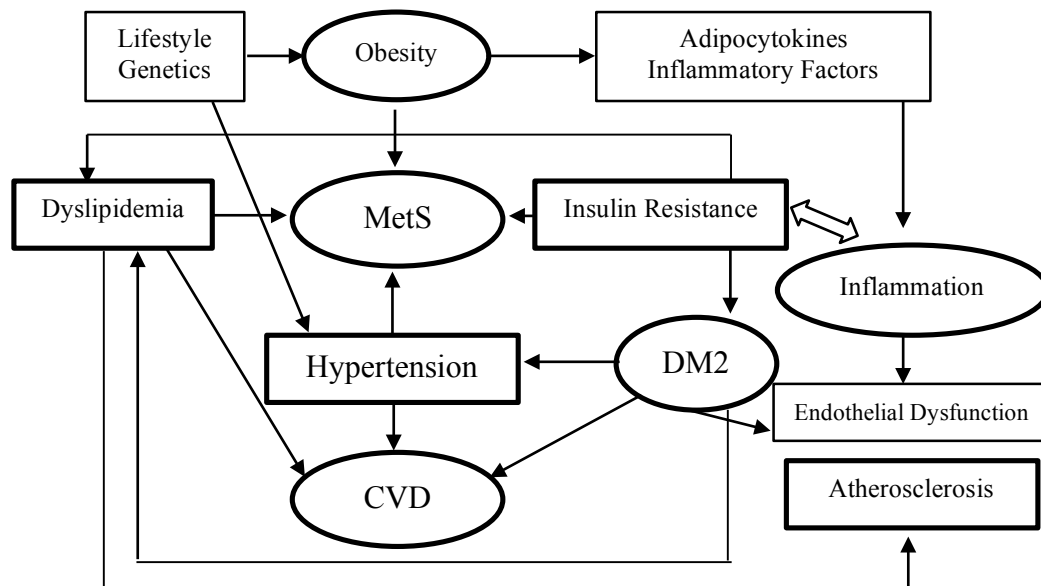


Figure 1. Relationship between MetS components and cardiometabolic indicators

Fat deposits increase with age as a result of the changing hormonal environment, more sedentary leisure time activities, high calorie eating habits, changes in lean mass, and lack of physical activity. It is estimated that adults spend eight to ten hours per day engaged in sedentary behaviors that involve sitting, (e.g., using a computer, smartphone apps, television viewing, time spent in vehicles) due to societal trends that move toward

urbanization, mechanization and technological advancements (Vincent et al., 2017). The body's preference for fat storage shifts from the periphery, i.e., face, arms, and legs, to the central abdominal region, especially the viscera. The role of visceral obesity in the development of insulin resistance and MetS has been associated with a higher risk for diabetes, and central adiposity is the most predominantly used diagnostic criteria for MetS (Paley & Johnson, 2018). Adipocytes are metabolically active, secreting over a dozen hormones affecting appetite, satiety, and energy metabolism of the body (Saklayen, 2018). Excessive visceral fat deposits are associated with the development of adipose cells that are enlarged, dysfunctional, and secrete pro-inflammatory biomarkers including prostaglandins, C-reactive protein (CRP), and cytokines. A high body fat percentage contributes to the dysfunction by signaling the release of inflammatory mediators from adipose tissue that increase the circulation of free fatty acids requiring greater insulin secretion for control of glucose metabolism. The resulting hyperinsulinemia desensitizes insulin-sensitive tissues, which predisposes individuals to type II diabetes (Paley & Johnson, 2018). Increased visceral fat accumulation and insulin resistance are two of the most important pathophysiological components of MetS and are associated with increased future healthcare needs and expenses (Stefanska et al., 2015).

Menopause

The clinical diagnosis for menopause is 12 consecutive months of amenorrhea after a woman's final menstrual period, signifying the end of her reproductive stage. The human ovary contains a finite number of non-growing follicles established in utero that decline with age. This decline of ovarian function results in a reduction of estrogen

secretion with a shift towards androgen dominance, culminating in menopause around age 50 (Wallace & Kelsey, 2010). Menopause is not a single climacteric event, it is a transition between the reproductive phase and the non-reproductive phase that may span over a decade depending on the individual (Soules et al., 2001). The identification of phases was established by The Stages of Reproductive Aging Workshop (STRAW), and is based on the characteristics of the menstrual cycle, supportive criteria (endocrine biomarkers and antral follicle count (AFC)), and descriptive characteristics (e.g., vasomotor symptoms). This criteria divides a woman's life into three phases; reproductive, menopause transition, and post menopause (Stefanska et al., 2015). The first signs of impending menopause begin in the later years of the reproductive phase, also referred to as perimenopause. This phase is characterized by variable lengths of the menstrual cycle with a shorter duration of the follicular stage and increased anovulatory cycles. The perimenopause phase varies in length for each woman with menstrual irregularities that may span four to six years before the final menses (Carr, 2003). During the perimenopausal phase, the diminishing activity of the ovaries is a catalyst for changes in hormone levels that result in physiological symptoms affecting the physical, vasomotor, psychosocial, and sexual domains (Pinkerton & Stovall, 2010). The severity and duration of physiological symptoms are unique for each woman and may impact their personal and social performance leading to multiple serious issues in life and her sense of purpose (Taebi et al., 2018). The end of perimenopause occurs after 12 months have passed since the final menstrual period, and the phase of menopause begins. Post

menopause has an early phase that lasts from five to eight years since the onset of menopause and a late phase that continues until the time of death (Stefanska et al., 2015).

Physiological changes

During the transition through menopause, decreasing ovarian activity is associated with physiological symptoms such as headache, sleep disorder, mood swings, concentration deficits, hot flashes, anxiety, and vaginal dryness. The intensity, duration and impact of these symptoms are as unique as the individual experiencing them. Additionally, negative health outcomes such as osteoporosis are also linked to lower levels of estrogen and connected to the activity of estrogen receptors in bone (Pinkerton & Stovall, 2010). Please refer to Table 1 for a detailed list of menopausal symptoms from the Menopause-Specific QOL (MENQOL) Questionnaire, Women's Health Society, Toronto, Canada.

Table 1. Physiological symptoms of menopause categorized by domain

Vasomotor	Psychological	Physical	Sexual
Hot Flushes	Dissatisfaction with life	Flatulence or gas pain	Changes in desire for sex
Night Sweats	Feeling anxious, nervous	Muscle or joint aches	Vaginal dryness
Sweating	Poor Memory	Feeling tired, worn out	Pain with intercourse
	Accomplishing less	Difficulty sleeping	Avoiding intimacy
	Feeling depressed, down	Ache in back, neck, head	
	Impatience with others	Decreased physical strength	
	Willing to be alone	Decrease in stamina	
		Feeling a lack of energy	
		Skin dryness	
		Changes in skin tone, spots	
		Increased facial hair	
		Weight gain	
		Bloated feeling	
		Low backache	
		Frequent urination	
		Involuntary urination	

The most common reason that women seek medical treatment during menopause is hot flashes. It is not life threatening, but an unpleasant and painful experience triggered by a reduction in estrogen levels. The hot flash begins with a sudden redness of skin on the face, neck and chest with elevations in core body temperature, followed by perspiration and feeling weak or dizzy (Bani et al., 2013). The reduction in estrogen production increases the activity and stimulation of serotonin receptors (5-HT_{2A}) in the hypothalamus where the temperature regulation center triggers autonomic responses of increased body temperature and extreme sweating, ending with shivering as the body cools. Hot flashes usually last about one to five minutes, with lingering effects that can decrease the quality of physical, emotional and social life (Bani et al., 2013). Additionally, hot flashes affect sleep quality and higher rates of somatic, psychological, and menopausal symptoms are seen in women with frequent vasomotor disturbances (M.-J. Kim et al., 2018). Studies also show a higher rate of sleep disturbance during the perimenopausal and postmenopausal phases, compared to the reproductive phase, and that poor sleep quality increases the severity of physiological symptoms and risk for negative health outcomes (M.-J. Kim et al., 2018).

Both menopause and normal aging contribute to a loss of muscle tone throughout the body and is significant in regard to the pelvic floor which holds the uterus and bladder in place above the vagina. Bladder control problems may develop with a weakened pelvic floor and cause urinary leakage when sneezing or coughing. In severe cases, the lack of muscle tone in the pelvic floor tissue allows the uterus, bladder, and bowel wall to sag into the vagina or protrude outside of the vagina. This urogenital condition has

repercussions beyond incontinence that may impact a woman's personal life, social performance, sense of well-being and may lead to future negative health outcomes (Taebi et al., 2018).

Declining levels of estrogen related to natural menopause have an effect on sexual interest, responsiveness and frequency in 50% of postmenopausal women (Pinkerton & Stovall, 2010). Vaginal epithelium becomes thinner and more fragile due to decreases in blood flow, resulting in decreased collagen and elastic fibers. The physical discomfort due to vaginal dryness and pain with intercourse increases over the menopausal transition and contributes to sexual dysfunction. A recent study by Arnot & Mace (2019) found that sexual frequency is associated with the timing of menopause. If a woman is sexually inactive, then pregnancy is impossible and there is no continued investment in the energy required for ovulation. In their study, women who had sex monthly began menopause at a later age. Women who are sexually active throughout menopause sustain their vaginal health due to increased blood flow with sexual arousal, continued mechanical distention, and possible seminal fluid benefits (Pinkerton & Stovall, 2010).

During the reproductive phase, estrogen promotes the accumulation of gluteo-femoral fat, but the decline of estrogen with menopause is associated with an increase in abdominal fat due to the dominance of androgens. This shift to central fat patterning contributes to 400% more visceral fat in women between the third and seventh decades of life, and is associated with insulin resistance, hyperinsulinemia, and dyslipidemia (Hunter et al., 2010). The prevalence of weight gain in middle-aged women is increasing worldwide; in 2018, two thirds of middle-aged women were overweight and one-third of

them were obese. A combination of declining estrogen levels, environmental factors, lifestyle and reduced physical activity contribute to weight gain during the menopausal transition (Ebtekar et al., 2018). This is illustrated by Figure 2.

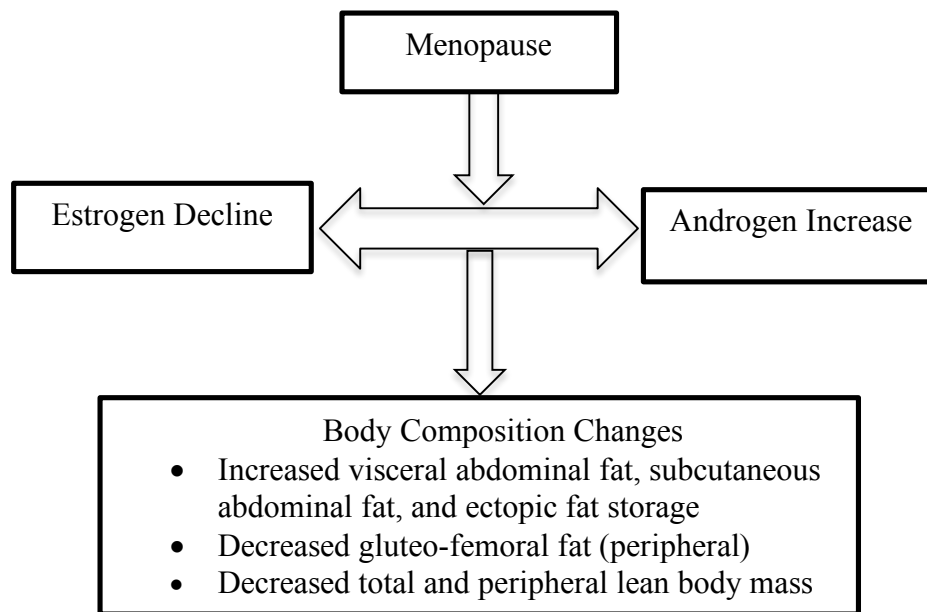


Figure 2. The effect of hormonal changes in body composition with menopause

Dyslipidemia results from a combination of abdominal obesity, increased insulin resistance, free fatty acid levels, and decreased adiponectin. These conditions contribute through an increased secretion of particles containing apolipoprotein B. This leads to hypertriglyceridemia and increased hepatic lipase activity resulting in a predominance of small dense LDL particles and a reduction in large antiatherogenic HDL particles. Metabolic changes in lipid profiles and elevated triglycerides after menopause increase a woman's risk for development of CVD and diabetes (Pinkerton & Stovall, 2010). During perimenopause, lipid metabolism shifts toward a more atherogenic lipid profile similar to MetS and may be related to the increase of visceral fat that emerges during the transition

to menopause. However, further research is needed to understand what mechanisms are underlying the menopausal changes that result in dyslipidemia (Carr, 2003).

Menopause and MetS

According to results from the Study of Women's Health Across the Nation (SWAN), menopause begins to increase the incidence of MetS six years before the final menstrual period and continues to progress for another six years after menopause (Janssen et al., 2008). The prevalence of MetS after menopause is estimated to be 31% to 55% globally, and three times higher among women in their postmenopausal phase compared to women who were in their premenopausal phase (Stefanska et al., 2015). Due to the increasing androgenicity of the hormonal environment during the transition, menopause has been associated with insulin resistance, dyslipidemia, and diabetes (Janssen et al., 2008). Menopause and the change in hormones are also associated with a tendency for intraabdominal fat storage, a reduction in lean body mass, a lower resting metabolic rate and less physical activity energy expenditure (Carr, 2003). Reduced physical activity in combination with high calorie eating habits results in the reduction of exercise capacity and contributes to a vicious cycle of muscle loss, inactivity, low motivation and weight gain (Paley & Johnson, 2018).

Hypertension affects 25% of adult women worldwide with a higher prevalence in women after the age of 60 (Pinto, 2007). The decline in estrogen concentration is the mechanism potentially responsible for the increase in blood pressure, and is compounded by chronological age and a proinflammatory state (Stefanska et al., 2015). Lower

estrogen levels affect the elasticity of arterial walls and contribute to the development of hypertension during the menopause transition (Stefanska et al., 2015).

The risk for dyslipidemia is linked to both aging and menopausal status through different mechanisms related to abdominal obesity and insulin resistance. Additionally, the hormonal change in the adipose tissue metabolism due to menopause exacerbates these conditions leading to a higher risk for development of MetS in women (Stefanska et al., 2015). The occurrence of MetS in postmenopausal women increases from 20% in the fifth decade of life to 30% over the next ten years due to physiological changes and lifestyle factors. It is important to consider that the life expectancy for women has increased by 24 years since 1920, when the average age of death was only 57 (CDC, 2020). Women are living longer now and will spend about one third of their lives in the postmenopausal phase. Changes to lifestyle and modifiable health risks are needed for the prevention of cardiometabolic disorders and improved quality of life during a woman's transition through menopause (Ebtekar et al., 2018).

Quality of Life

Health is not just an absence of disease, it is a state of complete physical, mental, and social well-being determined by our: personal habits, social engagement, education/income, and living environment. This holistic state of being is known as quality of life (QOL), the standard for a person's health, comfort, and happiness. The estimation of a sense of well-being can be assessed by the measurement of QOL (Larroy et al., 2020). There are six broad domains of QOL established by the World Health

Organization in 1949, (WHO); physical health, psychological health, level of independence, social relations, environment, and personal spiritual beliefs. Each of the six domains contains four facets, producing a questionnaire with a total of 100 items that are rated on a five-point scale, then combined into one total score (*WHOQOL-100.Pdf*, n.d.). This instrument is useful in clinical practice as a form of assessment to gather valuable information in order for a practitioner to make informed choices for their patient and improves the patient's perception of their healthcare. Research and policymaking utilize the QOL survey for insights into the nature of a disease by assessing the impact on a patient's well-being, and the effectiveness of different interventions (Burckhardt & Anderson, 2003). Figure 2 illustrates the relationship between the domains of QOL.



Figure 3. Domains of quality of life

Menopause and quality of life

The decline of ovarian hormone production is associated with physiological changes that may affect up to 80% of women during the menopause transition and significantly affects her perception of QOL and individual purpose as a woman (Hess et al., 2012). There is an expectation to remain youthful and attractive in certain cultures while menopause signals aging and loss of attractiveness thus affecting the identity of women (Larroy et al., 2020). Additionally, women who experience severe menopausal symptoms are impacted in their personal and social functioning, resulting in a diminished QOL and diminished sense of well-being (Taebi et al., 2018). Research by Kim & Cho, (2020) documented that socioeconomic and social support contribute to the increased risk of cardiometabolic disease in middle-aged women. They reported that women who are more socioeconomically vulnerable have reduced accessibility to health care services and are more prone to neglect their health due to work and family demands.

The role of women and family caregiving is an essential part of long-term healthcare, with 66% of informal care providers being female. Caregivers are less likely to have their own health needs met, have one or more chronic health conditions, along with negative psychological and physical health outcomes associated with caregiving, i.e., depression. The economic impact of caregiving responsibilities by women, individually amounts to \$142,693 in lost wages and \$131,351 in lost Social Security benefits as a result of early departure from the labor force, thereby affecting their standard of living and QOL (Navaie-Waliser et al., 2002). In addition, Lidfeldt et al., (2003) reported the importance of identifying non-biological risks that are linked to

MetS, including low education and social isolation, but there is a lack of research concerning women and menopause.

A longitudinal study of women's health (STRIDE) conducted by the University of Pittsburgh in 2011, demonstrated that the decrement in QOL associated with menopause is most evident in overall physical health, frequency of pain, energy, and fatigue. The emotional impact of menopause transition is more pronounced in the late perimenopausal phase and early postmenopausal phases compared to late post menopause, indicating that women are able to function in most aspects of life in spite of the physical discomfort of symptoms (Hess et al., 2012). Evidence revealed by this review of literature demonstrates the link between menopause and the cardiometabolic risk factors that lead to the development of MetS. A woman's risk for developing the MetS components of obesity, insulin resistance, and hypertension is exacerbated by the physiological changes that accompany menopause, and both MetS and menopause have been associated with an unsatisfactory QOL that leads to negative health outcomes (Vetter et al., 2011).

The value of a scale for QOL is demonstrated by Vetter et al. (2011), who found that MetS in itself is not associated with decreased QOL, but other factors such as obesity, depression and greater disease burden may significantly influence QOL. Along these lines, menopause was found to have a consistently negative impact on health related QOL, irrespective of the symptoms. However, research surrounding it failed to address several important variables associated with aging such as changes in sexual activity, alterations in sleep patterns, increased caregiving responsibilities, and severity of chronic medical conditions (Hess et al., 2012).

The reliability of the survey as an instrument to measure QOL domains that are conceptually distinct from other health status or causal indicators has been established by previous research (Burckhardt & Anderson, 2003). The objective of this study is to investigate the relationship between cardiometabolic health, the physiological changes of menopause, and their impact on the domains of QOL.

METHODS

Population and Sampling Procedures

The inclusion requirements for this study were cisgender women (age > 45 years) with more than twelve months since the date of last menstruation (postmenopausal). Additionally, all participants had internet access, and the ability to read and respond to the confidential online survey in English. Participants were recruited through emails to select women's groups with instructions and a link to the survey powered by Qualtrics.com through Humboldt State University. Additionally, the researcher created new social media pages on Facebook and Instagram specific to this study, and posted a flyer with instructions and a link to the survey on Qualtrics.com. The survey was administered by the participant in their own environment without a time constraint, and responses were recorded on the Qualtrics.com secure website. Participants were excluded if they did not complete the survey. Sampling was performed between December 2020 and March 2021. The Institutional Review Board of Humboldt State University (HSU) granted approval for this research in 2020 (IRB registration #17-004).

Research Design

A non-experimental design with quantitative data was analyzed for correlation between QOL and cardiometabolic health indicators in the postmenopausal phase. Additionally, a multiple linear regression was performed to determine the relationship between QOL scores and cardiometabolic risk indicators from the health history

questionnaire using a statistical significance set at $p < .05$. There is no intervention or control group. All participants were included in one group for this study.

Collection and Tabulation of Data

The statistical software G*Power 3.1 9.4 (Faul et al., 2009) was used to determine the intended sample size of 64 postmenopausal women with a power of 0.80. There was a total of 137 responses, which exceeded the required sample size. The primary measure is the correlation between QOL and current health conditions; there are no secondary measures. The QOL score was measured with 20 questions that assess the socioeconomic factors identified as determinants of health: personal habits, social engagement, education/income and living environment. The survey uses an 11-point response scale ranging from extremely dissatisfied (0) to extremely satisfied (10), resulting in a total score of 0 to 220 achieved by the sum of the responses. Please see Table 2 for representative questions from each domain. Questions were compiled from the following surveys: Perceived Quality of Life (Patrick et al., 1988), North American Menopause Society (questionnaireNAMS.pdf, 1989 [MENQOL]), and Stanford Sleep Study (stanfordhealthcare.org, 2020). These surveys have been proven to be reliable and valid. Additional data collection included health history and the presence of metabolic syndrome indicators, physical activity, sexual health, caregiving responsibilities, and lifestyle. Given the timing of the survey, we included questions about changes due to the impact of sheltering in place and social distancing measures instituted in March 2020. The list of survey questions was shared with the researcher's graduate committee for

content, and construct validity to ensure they are valid instruments. The selected questions for the QOL survey were reviewed and edited according to the committee's suggestions, and they were combined into this study's QOL survey using Qualtrics software (Qualtrics, Provo, UT). Representative questions are listed in Table 2.

Table 2. Representative Questions from each domain of QOL survey

QOL Subdomains	Representative Question
Living Environment	"Are you responsible for the care of someone else? Partner? Parent? Child? Sibling? Grandchild?"
Social Engagement	"How dissatisfied or satisfied are you with how often you see or talk to your family and friends?"
Personal Habits	"How dissatisfied or satisfied are you with how well you care for yourself, for example, bathing, shopping, or preparing meals?"
Income/Education	"In the past 12 months, how often were you unable to pay the mortgage or rent on time?"

Analysis

The independent/predictor variables are five MetS risk indicators and the dependent/outcome variable is the QOL total score, all classified as interval/ratio. IBM SPSS Statistics 27 was used with a multiple linear regression model to analyze the relationship between MetS indicators and QOL scores, with an alpha level set at $p < .05$, and results are expressed as percentages, mean, and standard deviation. Data was assessed for normality and no outliers were found. The assumption of independent errors was not violated (Durbin-Watson = 2.146), VIF (< 10) and Tolerance (> 0.2) values showed that multicollinearity was not problematic. The assumption of homoscedasticity was not violated, shown by the normal ZRESID and ZPRED scatterplots.

RESULTS

There was a total of 137 responses, of which 107 met the inclusion requirements and completed the survey. The mean age of participants was 63 years, (± 8.7), ranging from 54 to 72, and the mean years in postmenopause was 13.89, (± 9.9). Women (46%) rated their overall health as good, 32% rated their overall health as average, 11% said they had excellent overall health, and 11% said they had poor overall health. The majority of participants (62%) had higher secondary and university education, and 38% had some college. Almost half (45%) were retired, 23% were employed part-time, 21% were employed full-time, and 10% had a disability. Socioeconomic data showed that 58% had an annual income above \$50,000, and 42% reported annual income less than \$49,000, please see Table 3.

Table 3. Sociodemographic characteristics of participants

Sociodemographic	<i>N</i>	%
Marital Status		
Married	58	54
Living with Partner	7	6
Divorced	24	22
Separated	3	3
Widowed	3	3
Never Married	12	11
Ethnicity		
White	97	91
Black or African American	4	4
American Indian or Alaska Native	6	6
Japanese	1	.9
Guamanian or Chamorro	1	.9
Mexican, Mexican-American, Chicana	3	3
Puerto Rican	1	.9
Other Hispanic or Latino	8	7
Other	3	2.8
Employment		

Sociodemographic	<i>N</i>	%
Working 35 or more hours per week	23	21
Working 34 or less hours per week	25	23
Unemployed or laid off	3	3
Retired	48	45
Disabled	10	9
Education		
High school graduate	3	3
Some college	28	26
2-year degree	10	9
4-year degree	32	30
Professional degree	27	25
Doctorate	7	6
Annual Income		
Less than \$5000	6	6
\$5000 to \$11,999	6	6
\$12,000 to \$15,999	1	1
\$16,000 to \$24,999	6	6
\$25,000 to \$34,999	11	10
\$35,000 to \$49,000	15	14
\$50,000 to \$74,000	18	17
\$75,000 to 99,000	11	10
\$100,000 or greater	33	31

Note: Participants were on average 63.17 years old ($SD = 8.71$). Some participants checked multiple ethnicities. Some were retired and working part-time.

The health history conditions were self-reported, and showed that a large number of participants ($n = 43$) had waistlines above 35 inches ($M = 43.85$), blood pressure above 120/80mmHg ($n = 37$), elevated fasting glucose ($n = 7$), elevated triglycerides ($n = 14$), low levels of high-density lipoprotein cholesterol ($n = 6$), and diabetes ($n = 15$). Table 4 shows the percentage of participants with the presence of metabolic syndrome indicators.

Table 4. Participants with indicators for MetS

Self-reported conditions	<i>N</i>	With conditions	%
Waistline > 35 in.	96	43	45
Hypertension > 120/80	103	37	36
Fasting Glucose >100mg/dL	31	7	22
TG > 150mg/dL	39	14	36
HDL-C < 50mg/dL	47	6	13
Type 1 Diabetes	31	1	3
Type 2 Diabetes	31	14	45

Note: *N* = the number of participants who reported their conditions (out of 107).

Almost half (47%) of women said they were still experiencing menopausal symptoms, with sleep disruption (26%), and hot flashes (24%) the most common, see Table 5. Treatment for menopausal symptoms included hormone replacement therapy (15%), nonhormonal/herbal (9%), and cannabis (15%). Half (50%) of participants said they had a positive view about menopause, 18% had a negative view, and 32% were neutral. The amount of time before falling asleep ($M = 26.77$) ranged from eight to 45 minutes, typical amount of sleep was less than eight hours ($M = 6.91$), and the number of awakenings per night ($M = 3.52$, $SD = 5.91$) ranged from zero to nine.

Table 5. Participants experiencing menopausal symptoms

Symptom	<i>N</i>	%
Hot Flashes	37	24
Sleep Disturbance	41	26
Mood Changes	23	15
Night Sweats	25	16
Chills	6	4
Cognitive Issues (i.e., brain fog)	24	15

Note: Menopausal symptoms were reported by 49% of participants, $N = 52$.

The responses about sexual health in Table 6 revealed that 43% of participants were sexually active, 72% experienced orgasms, 61% reported a loss of interest in sex, and 29% had concerns about their sex life.

Table 6. Sexual health and activity

Sexual Health	Yes	No	Prefer not to answer
Currently Sexually Active	46	53	8
Pain with intercourse	27	56	17
Monogamous relationship	72	33	2
Concerns about sex life	31	70	6
Loss of interest in sexual activity	69	33	5
Loss of arousal	56	45	6
Loss of response, weaker or absent orgasm	50	46	11
Experiencing orgasm	77	22	8
Self-stimulated	47		
With a partner	13		
Both, self-stimulated and with partner	29		
No orgasm		18	

Note: $N = 107$ responses.

Lifestyle choices showed that 50% of participants consumed alcohol, ranging from two days per week (22%), to daily (16%), and 8% smoked more than six cigarettes per day. Regular physical activity (exercising three to five times per week for 30 to 60 minutes each time) was reported by 71% of participants. See Table 7 for complete details.

Table 7. Physical activity, intensity, and duration

Activity	<i>N</i>	%
Level of intensity		
Low, (light yard/housework, slow walking)	16	21
Medium, (brisk walking, hiking, vacuuming)	54	71
High (jogging, running, treading water)	6	8
Duration of activity		
5 to 25 minutes	13	17
30 to 55 minutes	39	51
60 minutes and above	24	32
Frequency		
1 to 2 days per week	6	8
3 days per week	21	28
4 days per week	14	18
5 days per week	18	24
6 days per week	7	9
7 days per week	10	13

Note: *N* = 76, participants who reported regular physical activity

The indicators for MetS were analyzed as potential predictors of the QOL score ($M = 128.615$), however the model summary did not show any significant associations between MetS indicators and QOL score, ($F = 1.457$) and ($p = 0.313$). Correlations showed a negative weak relationship between QOL satisfaction scores and waistline circumference (-0.315), blood pressure (-0.197), HDL-C (-0.238), and fasting glucose (-0.222). There was a negative moderate relationship between QOL scores and triglycerides (-0.604). Significant positive correlations were found between QOL and triglycerides ($p = 0.014$), waistline circumference and triglycerides ($p = 0.005$), waistline and HDL-C ($p = 0.002$), and triglycerides and HDL-C ($p = 0.009$). Generally speaking, there is a relationship between the presence of indicators for MetS and QOL scores in postmenopausal women, and the alternative hypothesis is supported.

Table 8. Regressions of associations between QOL scores and MetS risk indicators

MetS Risk Indicators	Beta*	t	p-value
Triglycerides (>150mg/dL)	-.735	-1.913	.097
Fasting Glucose (>100mg/dL)	-.271	-.886	.405
Blood Pressure (>120/80mmHg)	-.186	-.609	.561
Waistline (>35 inches)	.114	.241	.816
HDL-C (<50mg/dL)	-.022	-.047	.964

Note: $R^2 = 0.510$. Dependent variable is the QOL score. *Standardized Beta Coefficients

Impacts of COVID-19

Responses to questions about the impact of social distancing and sheltering in place due to the COVID-19 pandemic showed less satisfaction with QOL, an increase in stressors, (i.e., income, health, isolation), changes to lifestyle, (i.e., less exercise, increased alcohol), and more mental health issues (see Table 9).

Table 9. Impacts of COVID-19 restrictions

Changes	More			Less		No Change		Yes		No	
	%	%	%	%	%	%	%	%	%	%	%
QOL satisfaction	7	66	25								
Exercise frequency	18	37	44								
Mental health issues	30	0	70								
Stressors	73	4	23								
Sexual health change	6	15	79								
Time to fall asleep	21	4	75								
Hours in bed	13	9	78								
Hours of sleep	13	18	69								
Early awakening/tired	19	2	79	36	64						
Irregular sleep pattern	23	4	73	59	41						
Alcohol consumption	15	1	35	51	49						
Overall health change	7	26	67	31	69						
Weight fluctuation				62	38						
Caregiving change				8	92						
Household changes				3	97						
Housing situation				6	94						
Income change				27	73						
Occupation change				10	90						
Employment change				22	78						

DISCUSSION

In this study, we endeavored to investigate the relationship between satisfaction with QOL and cardiometabolic risk factors during the postmenopausal phase. The model summary did not show a significant association between MetS indicators and the QOL satisfaction score, but there were significant positive correlations found between the MetS indicators themselves, and between triglycerides and QOL. This could be interpreted as women being able to find satisfaction with life in spite of the negative physical outcomes related to MetS and menopause. These findings are consistent with those of Vetter, et al (2011), who suggested that MetS in itself is not associated with unsatisfactory QOL, but that other factors that may be involved.

Quality of Life Scores

The mean score of each QOL question, ranging from zero to ten, relates to the domains of personal, social, income, and living environment. In the personal domain of QOL satisfaction, participants rated their overall health, amount of walking, and independence with a mean score of six, just above neutral. The mean score for purpose in life, self-care, and food intake was eight. Participants' scores showed that they are a little satisfied with their personal lifestyle. Sexual satisfaction was also just above neutral, with a mean score of six. This is consistent with questions about sexual health and the percentage (53%) of women who are not sexually active, and expressed a loss of interest (65%) in sexual activities.

Social engagement scores were higher for questions about being understood, and the amount of respect from others, both had a mean of nine or moderately satisfied. Satisfaction with community involvement, help from and to family/friends had a mean score of seven, a little satisfied. Seeing family and friends had a mean score of six, which may be one of the effects of pandemic restrictions in place since March 2020.

There was a higher level of satisfaction ($M = 8$) with the way income met their needs, and in regards to employment status ($M = 8$). This shows that participants were moderately satisfied with their income and employment.

Sleep satisfaction score ($M = 6$) was low, and corresponds to the presence of menopausal symptoms. Participants reported sleep disturbance (26%) and hot flashes (24%) as the most disruptive to their sleep quality. They also slept less than eight hours ($M = 6.91$) per night. Lack of sleep has been associated with increased menopausal symptoms, obesity, mood problems, hypertension, and CVD risk, (Kim, et al, 2016).

Living environment responses revealed that adult children (7%), moved back home due to loss of employment, and college residency pandemic restrictions. Some participants (11%) had increased caregiving responsibilities, both in their own home, and with a parent or sibling in an assisted living community. There were reports of home maintenance issues, including pests/insects (14%), mold (14%), repairs needed (17%), and problems with neighbors (6%). There were issues with their partner/spouse (7%); a constant 24/7 presence, controlling behavior, and lack of support about menopause.

We asked what the major stressors were in their life, and allowed short answer responses. The biggest source of stress (33%) was isolation, due to lack of contact with

friends, family, and grandchildren while sheltering in place during the COVID-19 pandemic. Other stressors reported were finances (24%), uncertain job security (11%), declining health (19%), disability (8%), and pain (6%). Women also said lack of exercise options (6%), and weight gain (6%) contributed to their stress level, along with anxiety (9%) about COVID-19 exposure. Depression (7%), and death in the family (6%) were also listed as stressors. Menopausal symptoms (3%), contributed to stress about identity due to hot flashes, and its effect on cosmetics.

Responses show that each domain of QOL was impacted, as well as overall physical, mental and social well-being. Satisfaction levels ranged from a little unsatisfied to somewhat satisfied in all 20 questions, including “how happy are you?” ($M = 7.4$). Additional models are needed to determine the relationship between QOL scores and sociodemographic data.

CONCLUSION

Lifestyle modifications during the perimenopausal stage are necessary in order to mitigate the physiological changes that increase CMD risk in the transition to menopause. A program that includes aerobic exercise, strength training, mind-body therapies and education about menopause is necessary to lower negative health outcomes, and reduce the economic impact of associated healthcare costs in this population. Physical activities provide some relief for vasomotor symptoms, sleep disruption, and mental issues (Taebi et al., 2018). Strength training is needed to prevent muscle loss, pelvic floor atrophy, osteoporosis, and a slower metabolism (Carr, 2003). Mind-body therapies such as yoga and tai chi, have beneficial effects on mood, sleep, and reduce the risk for CMD (Innes, et al, 2008). The majority of respondents (55%) said that they rarely have someone to talk to about post-menopausal changes, and expressed interest in a program for support (27%) during post-menopause, to improve their health (31%), and to improve their QOL (34%). They would like the program to include physical activity (34%), mindful movement (33%), dialogue (13%), and either virtual (32%), or in person (26%), when it is possible. Being informed about what to expect during the transition to menopause gives a woman the opportunity to modify her lifestyle for better health and QOL during postmenopause.

There were limitations to this research due to COVID-19 restrictions. Participants self-reported their health history, current conditions, and physical characteristics. Not all of the participants knew their blood pressure, lipid levels, or fasting glucose. The original design of this study included laboratory blood analysis, and measurements of blood

pressure, waistline circumference, height and weight taken in person. Results may have been more significant if there had been complete data across the participants. Future research is needed to examine the relationships between QOL scores, socio-demographic characteristics, and attitude about menopause for a more comprehensive analysis.

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APPENDIX

Quality of Life PM

Start of Block: Informed Consent

Informed Consent *Quality of Life Post Menopause*

Informed Consent Form: Principal Investigator

HSU Graduate Student

Chavela Riotutar, Kinesiology Master's student, Humboldt State University

HSU Graduate Advisor

Dr. Taylor Bloedon, PhD, RDN, CSSD, Department of Kinesiology and Recreation Administration **WHAT IS THE PURPOSE OF THIS STUDY?**

You are being invited to take part in a research study to assess the impact of Quality of Life (QOL) on cardiometabolic health. The results will be used for a master's thesis and will be published in a scientific journal. Menopause and its physiological changes exacerbate a woman's risk for developing obesity, insulin resistance, and hypertension, which are three of the five components of Metabolic Syndrome (MetS). Both MetS and menopause have been associated with an unsatisfactory QOL that leads to negative health outcomes. Identification and treatment of these indicators for MetS at an early stage gives the opportunity to prevent or postpone diabetes and cardiovascular disease by making changes to daily lifestyle.

WHAT WILL OCCUR DURING THIS STUDY AND HOW LONG WILL IT LAST?

You are being asked to take part in a survey to assess the quality of your life and current health condition. You will also be asked questions about changes due to COVID-19. This is in reference to the impact of sheltering in place and social distancing measures instituted in mid to late March 2020. If you choose to participate in this study, you will begin by answering the health history questionnaire, followed by completing the Quality-of-Life survey.

WHAT ARE THE BENEFITS OF THIS STUDY?

Potential benefits associated with the study include increased awareness of lifestyle risk factors, and identification of indicators for metabolic syndrome obtained from the study's data. Health screening information includes waistline circumference, blood lipid, blood sugar, blood pressure, and other markers of metabolic health. General knowledge regarding the effect of quality of life on cardiometabolic risk factors in postmenopausal women will be available in manuscript form after the study has ended.

WHAT ARE THE RISKS OF THIS STUDY?

The risks associated with this research are small, but possible due to the nature of the survey questions. A list of mental health support organizations is included. If you should experience any of these discomforts, please be aware that you may contact the researchers for assistance. Chavela Riotutar at 707-633-8453 or cld24@humboldt.edu, and Taylor Bloedon at 707-826-5967 or tkb95@humboldt.edu.

WHO WILL SEE THE INFORMATION I GIVE?

Your confidentiality will be protected by assigning a unique identification number to you which will be used in place of your name on data collected from the survey. When completing any of the questions in the study, you may omit items you prefer not to answer. To ensure confidentiality, data will be collected from computer-based questionnaires using only the participant ID number. All electronic files will be kept in the Qualtrics database, and data access will be strictly limited to key study personnel. Following data entry, hard copy data will be destroyed within 3 years of final data analysis. The results of the study may be published in a scientific journal and other types of publications. If you would like to see your final results, please contact Chavela Riotutar at cld24@humboldt.edu.

DO I HAVE A CHOICE TO BE IN THE STUDY?

Your participation in this study is entirely voluntary. You are not required to participate in this research, and you may stop your participation at any time without penalty. You may skip any survey questions if you prefer not to answer.

CAN I BE DISMISSED FROM THE STUDY?

It is possible that research staff need to dismiss participants for variety of reasons. If there is a discrepancy in health assessment results and/or survey responses and eligibility criteria, as approved by the HSU Institutional Review Board for Human Subjects, research staff will need to dismiss the participant from the study.

WHAT IF I HAVE QUESTIONS?

If you have questions regarding this study or would like to be informed of the results when the study is completed, please feel free to contact the researcher. *Chavela Riotutar: cld24@humboldt.edu.*

OTHER CONCERNS?

If you have any concerns with this study or questions about your rights as a participant, contact the Institutional Review Board for the Protection of Human Subjects at irb@humboldt.edu or (707) 826-5165. If you agree to voluntarily participate in this research project as described, please indicate your agreement by clicking the YES button below. We thank you for your participation in this research.

- Yes, I consent to participating in this survey. (1)
- No, I don't consent to participating in this survey. (2)

End of Block: Informed Consent

Start of Block: Inclusion Requirements

Do you identify your sex as female since birth?

Yes (1)

No (2)

Are you older than 45 years of age?

Yes (1)

No (2)

Has it been at least one year since your last menstrual cycle?

Yes (1)

No (2)


End of Block: Inclusion Requirements

Start of Block: Demographics

Welcome to the Postmenopause Quality of Life Survey! This survey asks questions about your health, lifestyle, and the quality of your life. You will also be asked questions about changes due to COVID-19. This is in reference to the impact of sheltering in place and social distancing measures instituted in mid to late March 2020. It will take about 20 minutes to complete. There are no right or wrong answers, please answer as honestly as you can. The survey can be completed on your mobile device, but you may have the best survey response experience using a desktop or laptop computer. Please use the survey's navigation buttons below to go backward or forward within the survey. Using your device or browser's navigation buttons might result in lost answers. Thank you for your participation in this study!

Age

45 51 56 62 67 73 78 84 89 95 100

What is your current age? ()	
------------------------------	--

Menopausal Status

0 5 10 15 20 25 30 35 40 45 50

Approximately how many years has it been since your last
menstrual cycle? ()



Ethnicity: Select all that apply;

- White (1)
 - Black or African American (2)
 - American Indian or Alaska Native (3)
 - Asian Indian (4)
 - Chinese (5)
 - Filipino (6)
 - Japanese (7)
 - Korean (8)
 - Vietnamese (9)
 - Guamanian or Chamorro (10)
 - Native Hawaiian or Pacific Islander (11)
 - Samoan (12)
 - Other (13)
 - I prefer not to answer (14)
-

Are you of Hispanic or Latino origin?

- No, not Hispanic, Latino or Spanish origin (1)
 - Yes, Mexican, Mexican-American, Chicano (2)
 - Yes, Puerto Rican (3)
 - Yes, Cuban (4)
 - Yes, other Hispanic or Latino origin (5)
-

What is your employment status?

- Working full-time (35 or more hours per week (1)
 - Working part-time (34 or fewer hours per week (2)
 - Looking for work (3)
 - Unemployed or laid off (4)
 - Retired (5)
 - Disabled (6)
-

As you complete the remainder of this survey there are questions about changes due to COVID-19. This is in reference to the impact of sheltering in place and social distancing measures instituted in mid to late March 2020.

Has your employment changed due to COVID-19?

Yes (1)

No (2)

Has your occupation changed due to COVID-19?

Yes (1)

No (2)

What was your total household income, before taxes and other deductions, during the past 12 months?

Less than \$5000 (1)

\$5,000 - \$11,999 (2)

12,000 - \$15,999 (3)

\$16,000 - \$24,999 (4)

\$25,000 - \$34,999 (5)

\$35,000 - \$49,999 (6)

\$50,000 - \$74,999 (7)

\$75,000 - \$99,999 (8)

\$100,000 and greater (9)

Has your income changed due to COVID-19?

Yes (1)

No (2)

What is the highest degree you have earned?

Less than high school (1)

High school graduate (2)

Some college (3)

2-year degree (4)

4-year degree (5)

Professional degree (6)

Doctorate (7)

What is your current marital status?

- Married (1)
 - Living with Partner (2)
 - Divorced (3)
 - Separated (4)
 - Widowed (5)
 - Never Married (6)
-

Do you?

- Own your home? (1)
 - Rent your home? (2)
 - Live with a friend? (3)
 - Live with a relative? (4)
 - Other (5)
-

Has this recently changed due to COVID-19?

- Yes (1)
 - No (2)
-

Has your housing situation changed due to COVID-19?

Yes (1)

No (2)

In the past 12 months, how often were you not able to pay the mortgage or rent on time?

Always (1)

Most of the time (2)

About half the time (3)

Sometimes (4)

Never (5)

End of Block: Demographics

Start of Block: Living Environment

What is your housing situation today?

I have a steady place to live (1)

I have a place to live today, but I am worried about losing it in the future (2)

I do not have a steady place to live (e.g., temporarily staying with others, in a hotel, in a shelter, living on the street, in a car, abandoned building, bus or train station) (3)

I prefer not to answer (4)

Has this recently changed due to COVID-19?

Yes (1)

No (2)

Think about the place you live. Do you have problems with any of the following? Please check all that apply.

pests such as bugs, ants, or mice (1)

mold (2)

lead paint or lead pipes (3)

lack of heat (4)

oven or stove not working (5)

smoke detectors missing or not working (6)

water leaks (7)

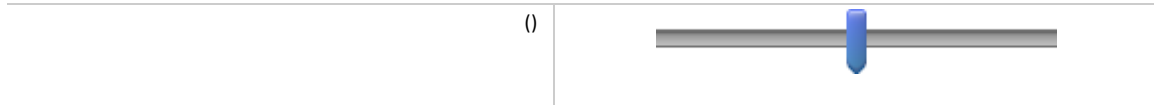
neighbor (8)

I prefer not to answer (9)

none of the above (10)

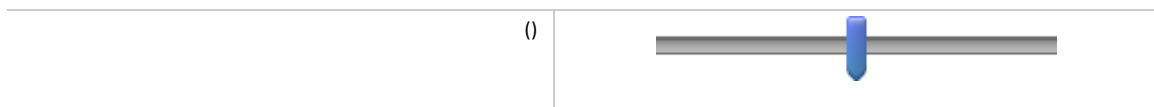
How many people are currently living in your household, including yourself?

0 3 6 9 12 15 18 21 24 27 30



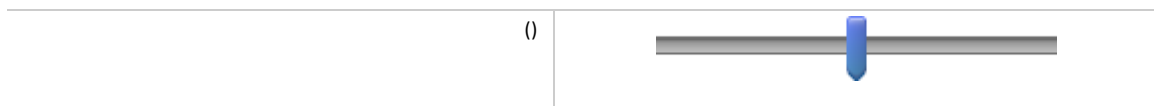
Of the people living in your household, how many are over the age of 18, including yourself?

0 3 6 9 12 15 18 21 24 27 30



Of the people living in your household, how many are under the age of 18?

0 3 6 9 12 15 18 21 24 27 30



Has this recently changed due to COVID-19?

Yes (1)

No (2)

If yes, how has your household changed since COVID-19?

Are you responsible for the care of someone else?

Yes (1)

No (2)

If yes, who are you responsible for? Check all that apply.

spouse (1)

parent (2)

child (3)

grandchild (4)

sibling (5)

friend (6)

client (7)

partner (8)

other (9)

no one (10)

Has this recently changed due to COVID-19?

Yes (1)

No (2)

If yes, have your caregiving responsibilities

increased (1)

decreased (2)

no change (3)

End of Block: Living Environment

Start of Block: Health History

Please answer the following questions about your health history as it would stand without any changes that may have occurred due to COVID-19 as accurately and honestly as possible. All information obtained will remain confidential.

Weight

50 85 120 155 190 225 260 295 330 365 400

What is your current weight in pounds? ()



How has your body weight changed with age?

- significantly decreased (1)
- moderately decreased (2)
- slightly decreased (3)
- slightly increased (4)
- moderately increased (5)
- significantly increased (6)
- no change (7)

Height

40 44 49 53 58 62 66 71 75 80 84

What is your current height in inches? (for example, 5 feet
6 inches = 66 inches) ()



Waistline Circumference

20 38 56 74 92 110 128 146 164 182 200

What is the circumference of your waistline in inches,
measured at the belly button? ()



If you don't know the measurement of your waistline, please estimate the amount of your belly fat.

- Large amount (1)
- Medium amount (2)
- Small amount (3)
-

Has your weight fluctuated (up or down) by more than 5 pounds in the past 6 months?

- Yes (1)
- No (2)
-

Are these changes due to COVID-19?

- Yes (1)
- No (2)
-

How would you rate your overall health at the present time?

	Excellent (1)	Good (2)	Average (3)	Poor (4)	Terrible (5)
Select one (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Has your overall health changed due to COVID-19?

Yes (1)

No (2)

If yes, please rate the change.

Better (1)

Worse (2)

No change (3)

Do you have a history of or are currently diagnosed with any Cardiovascular disorders? Please indicate:

Heart attack (1)

Hypertension (high blood pressure) (2)

Hypotension (low blood pressure) (3)

Angina (4)

Shortness of breath (5)

Other (6)

None of the above (7)

What is your blood pressure?

- Low, less 90/60 (4)
 - Normal, less than 120/80 (5)
 - Elevated, 120-139/80-89 (6)
 - High, 140/90 (7)
 - I don't know (8)
-

Has your healthcare provider told you that your cholesterol was high or low?

- Yes (1)
 - No (2)
-

What is your Total Cholesterol level?

- less than 200 mg/dL (5)
 - more than 200 mg/dL (6)
 - I don't know (10)
-

What is your LDL-C level? (bad cholesterol)

- less than 100 mg/d (1)
 - more than 100 mg/d (2)
 - I don't know (3)
-

What is your HDL-C level? (good cholesterol)

- more than 50 mg/dL (1)
 - less than 50 mg/dL (2)
 - I don't know (3)
-

What is your Triglyceride level?

- less than 150 mg/dL (1)
 - 150-300 mg/dL (2)
 - more than 300 mg/dL (3)
 - I don't know (4)
-

Do you have a history of or are you currently diagnosed with any Metabolic/Endocrine disorders?

- Type 1 Diabetes (1)
 - Type 2 Diabetes (2)
 - Hyperthyroid (overactive thyroid) (3)
 - Hypothyroid (underactive thyroid) (4)
 - Elevated Fasting Glucose (5)
 - None of the above (6)
-

Are you currently experiencing menopause symptoms?

- Yes (1)
 - No (2)
-

What type of menopause symptoms?

- Hot Flashes (1)
 - Sleep Disturbance (2)
 - Mood Changes (3)
 - Night Sweats (4)
 - Chills (5)
 - Cognitive Issues (i.e., brain fog) (7)
 - None of the above (8)
-

How do you treat your menopausal symptoms?

- Hormone replacement therapy (1)
 - Nonhormonal/Complimentary herbal medicine (2)
 - Cannabis (3)
 - No treatment (4)
-

Are you experiencing any of the following?

- Depression (1)
 - Substance abuse (2)
 - Cancer (3)
 - None of the above (4)
 - Other mental health issues (5)
-

Is this more or less than before COVID-19?

- More (1)
 - Less (2)
 - No change (3)
-

Q168 Call 1-800-662-HELP (4357) if you need information about treatment. The Substance Abuse and Mental Health Service Administration Helpline (SAMHSA) is a free, confidential, 24/7, 365-day-a-year treatment referral and information service (in English and Spanish) for individuals and families facing mental and/or substance use disorders.

End of Block: Health History

Start of Block: Lifestyle

Do you drink beverages containing alcohol at least once per week?

Yes (1)

No (2)

Skip To: Q47 If Do you drink beverages containing alcohol at least once per week? = No

If yes, how many days per week do you drink alcoholic beverages?

▼1 (1) ... 7 (7)

Is this more or less than before COVID-19?

More (1)

Less (2)

No change (3)

Do you currently use tobacco?

Yes (1)

No (2)

Skip To: Q52 If Do you currently use tobacco? = No

If yes, do you smoke cigarettes?

Yes (1)

No (2)

How many cigarettes do you smoke per day?

▼ (1) ... more than 6 per day (8)

Is this more or less than before COVID-19?

More (1)

Less (2)

No change (3)

If yes, do you use e-cigarettes (vapor)?

Yes (1)

No (2)

How many e-cigarettes do you smoke per day?

▼ (1) ... more than 6 per day (8)

Is this more or less than before COVID-19?

- More (1)
- Less (2)
- No change (3)
-

Do you engage in any regular physical activity?

- Yes (1)
- No (2)

Skip To: Q56 If Do you engage in any regular physical activity? = No

If yes, what is the intensity?

- Low (light yard/housework, slow walking, sitting at computer) (1)
- Medium (brisk walking, bicycling, vacuuming, hiking) (2)
- High (jogging/running, treading water) (3)
-

If yes, how many minutes per occasion?

▼5 (1) ... more than 60 minutes (13)

How many times per week do you exercise?

▼ 0 (1) ... more than 7 (9)

Is this more or less than before COVID-19?

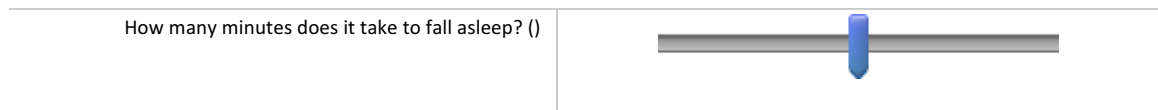
- More (1)
- Less (2)
- No change (3)

End of Block: Lifestyle

Start of Block: Sleep Pattern

Typical time to fall asleep?

1 7 13 19 25 31 36 42 48 54 60



Is this more or less than before COVID-19?

- More (1)
- Less (2)
- No change (3)

Typical Awakenings

0 6 12 18 24 30 36 42 48 54 60

How many times do you awaken per night? ()



Typical hours in bed?

1 3 6 8 10 13 15 17 19 22 24

How many hours of one day do you spend in bed? ()



Is this more or less than before COVID-19?

- More (1)
- Less (2)
- No change (3)

Typical hours of sleep?

1 3 6 8 10 13 15 17 19 22 24

How many hours of one day do you sleep? ()



Is this more or less than before COVID-19?

- More (1)
- Less (2)
- No change (3)

My sleep pattern is irregular.

- Yes (1)
- No (2)

Is this more or less than before COVID-19?

- More (1)
- Less (2)
- No change (3)

I awaken early in the morning still tired but unable to return to sleep.

- Yes (1)
 - No (2)
-

Is this more or less than before COVID-19?

- More (1)
- Less (2)
- No change (3)

End of Block: Sleep Pattern

Start of Block: QOL Satisfaction Measure

The next series of questions ask about your Quality of Life. **When answering all of these questions please consider how you are feeling right now.** At the very end you will have the opportunity to indicate if your Quality of Life has changed due to the COVID-19 pandemic.

Please rate your responses to the questions with the following 11-point response scale:

- 0: Extremely dissatisfied/unhappy
- 1 or 2: Somewhat dissatisfied/unhappy
- 3 or 4: A little dissatisfied/unhappy
- 5: Neither satisfied/happy or dissatisfied/unhappy
- 6 or 7: A little satisfied/happy
- 8 or 9: Somewhat satisfied/happy
- 10: Extremely satisfied/happy
-

QOL1 How dissatisfied or satisfied are you with your physical health?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL2 How dissatisfied or satisfied are you with how well you care for yourself, for example, preparing meals, bathing, or shopping?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL3 How dissatisfied or satisfied are you with how well you think and remember?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL4 How dissatisfied or satisfied are you with the amount of walking you do?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL5 How dissatisfied or satisfied are you with how often you get outside the house, for example, going into town, using public transportation, or driving?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL6 How dissatisfied or satisfied are you with how well you carry on a conversation, for example, speaking clearly, hearing others, or being understood?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL7 How dissatisfied or satisfied are you with the kind and amount of food you eat?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL8 How dissatisfied or satisfied are you with how often you see or talk to your family and friends?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL9 How dissatisfied or satisfied are you with the help you get from your family and friends, for example, helping in an emergency, fixing your house, or doing errands?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL10 How dissatisfied or satisfied are you with the help you give to your family and friends?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL11 How dissatisfied or satisfied are you with your contribution to your community, for example, a neighborhood, religious, political, or other group?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL12 How dissatisfied or satisfied are you with your work situation, for example, your current job, retirement for any reason, or never having worked?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL13 How dissatisfied or satisfied are you with the kind and amount of recreation or leisure you have?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL14 How dissatisfied or satisfied are you with your level of sexual activity or lack of sexual activity?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL15 How dissatisfied or satisfied are you with the way your income meets your needs?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL16 How dissatisfied or satisfied are you with how respected you are by others?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL17 How dissatisfied or satisfied are you with the meaning and purpose of your life?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL18 How dissatisfied or satisfied are you with the amount of variety in your life?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	C	C	C	C	C	C	C	C	C	C	C

QOL19 How dissatisfied or satisfied are you with the amount and kind of sleep you get?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Dissatisfied											
0: Satisfied											
10 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

QOL20 How happy are you?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
Unhappy											
0: Very											
Happy											
10 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Reflecting upon your responses, have the changes due to the COVID-19 pandemic increased or decreased the satisfaction with your Quality of Life?

- Yes, increased satisfaction with Quality of Life (28)
- No, decreased satisfaction with Quality of Life (29)
- No change (30)

End of Block: QOL Satisfaction Measure

Start of Block: Personal Habits and Social Engagement

Please answer the following questions about your personal habits at the present time, as honestly as possible.

How often do you compare your body weight to health standards (e.g. BMI)?

- Most of the time (1)
- About half the time (2)
- Rarely (3)
-

Is there someone available to whom you can count on to listen to you when you need to talk?

- Most of the time (1)
- About half the time (2)
- Rarely (3)
-

What is your relationship to the listener?

- spouse (1)
 - partner (2)
 - friend (3)
 - sister (4)
 - brother (5)
 - parent (6)
 - doctor (7)
 - nurse (8)
 - therapist (9)
 - spiritual counselor (10)
 - support group (11)
 - other (12)
-

Is there someone available to you who shows you love and affection?

- Most of the time (1)
 - About half the time (2)
 - Rarely (3)
-

Is there someone you talk to about post-menopausal changes?

- Most of the time (1)
 - About half the time (2)
 - Rarely (3)
-

What is your relationship to the listener?

- spouse (1)
- partner (2)
- friend (3)
- sister (4)
- brother (5)
- parent (6)
- doctor (7)
- nurse (8)
- therapist (9)
- spiritual counselor (10)
- support group (11)
- other (12)

How do you view menopause?

- Positively (no more periods or contraception) (1)
 - Negatively (loss of fertility and youth) (2)
 - Neutral (3)
-

Is there someone available to you who helps you make decisions about your health?

- Most of the time (1)
 - About half the time (2)
 - Rarely (3)
-

Is there someone in your life who can support you in an exercise and diet program?

- Most of the time (1)
 - About half the time (2)
 - Rarely (3)
-

How important is family and friend support in managing your health issues?

- Extremely important (1)
- Very important (2)
- Moderately important (3)
- Slightly important (4)
- Not at all important (5)

What are the current major stressors or changes in your life?

Are there more or less stressors than before COVID-19?

- More (1)
- Less (2)
- No change (3)

End of Block: Personal Habits and Social Engagement

Start of Block: Sexual Health

The next series of questions relate to your sexual health and activity at the present time. Please answer as honestly as possible.

Q124 Are you currently sexually active? (not limited to sexual intercourse)

- Yes (3)
- No (5)
- Prefer not to answer (4)
-

Q125 Do you have any pain with intercourse? (vaginal penetration)

- Yes (3)
- No (5)
- Prefer not to answer (4)
-

Q126 If yes, how long ago did the pain start?

- Recently (1)
- 1 year ago (2)
- More than 1 year ago (3)
- Never (4)
- Prefer not to answer (5)
-

Q127 Are you in a committed, mutually monogamous relationship?

- Yes (3)
 - No (5)
 - Prefer not to answer (4)
-

Q128 How long have you been with your current sex partner(s)?

- 1 month or less (1)
 - 1 to 12 months (2)
 - More than 1 year (3)
 - More than 10 years (4)
 - More than 20 years (5)
 - I don't have a sex partner (6)
-

Q129 Do you have concerns about your sex life?

- Yes (3)
 - No (5)
 - Prefer not to answer (4)
-

Q130 Do you have a loss of interest in sexual activities? (libido, desire)

- Yes (3)
- No (5)
- Prefer not to answer (4)
-

Q131 Do you have a loss of arousal? (e.g., tingling in the genitals or breasts; vaginal moisture, warmth)

- Yes (1)
- No (2)
- Prefer not to answer (3)
-

Q132 Do you have a loss of response? (weaker or absent orgasm)

- Yes (1)
- No (2)
- Prefer not to answer (3)
-

Q133 Do you currently experience orgasms?

- Yes (3)
- No (5)
- Prefer not to answer (4)
-

Q134 If you do experience orgasms, are they?

- Self-stimulated (1)
- With a partner (2)
- Both, with self and partner (3)
- None (4)
-

Q166 Has your sexual health changed due to COVID-19?

- Yes, improved (1)
- Yes, declined (5)
- No change (2)
- Prefer not to answer (7)

End of Block: Sexual Health

Start of Block: Debrief

Q152 Would you be interested in participating in a program that addresses any of the following?

- Yes, to improve my Quality of Life (26)
 - Yes, to understand and improve my health (27)
 - Yes, for menopause support (29)
 - No (28)
-

Q153 If a program becomes available and the COVID-19 pandemic is not an issue, what is your preference for program participation?

Please check all that apply.

- Weekly (1)
 - Monthly (2)
 - Indoor (3)
 - Outdoor (4)
 - Virtual (5)
 - In person (6)
 - Group Activities (7)
 - Individual Activities (8)
 - Group Dialogue (9)
 - Group Lead (10)
 - Instructor Lead (11)
 - Exercise/physical Activity (12)
 - Meditation/mindful movement (13)
-

Q154 When a program becomes available, may we contact you for participation?

- Yes (1)
- No (2)

Q164 If yes, please enter your email address. In order to keep your responses anonymous, email addresses will be disassociated from the rest of the survey data after the window closes.

End of Block: Debrief
