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# Motivation for Tobacco Cessation Among Nicotine Dependent Postmenopausal Females

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Motivation for Tobacco Cessation Among Nicotine Dependent Postmenopausal Females

A Dissertation

Submitted to the Graduate Faculty of  
Louisiana State University  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Doctorate in Philosophy

in

The Department of Psychology

by

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## ABSTRACT

Postmenopausal females continue to smoke despite considerable health risks related to low levels of estrogen in combination with antiestrogenic effects of nicotine. These females face barriers to cessation that are more severe than their male and pre-menopausal counterparts. These barriers include negative affect, weight concerns, and menopausal symptom severity. Brief motivation-based interventions (B-MIs) that incorporate individualized health-related feedback have demonstrated efficacy for smoking cessation, but have not been tested among postmenopausal females. The current study explored the effect of negative affect, weight concerns, and menopausal symptom severity on motivation and readiness to quit smoking, and the effectiveness of a B-MI to increase motivation and readiness to quit, among postmenopausal females. Eighteen postmenopausal smokers were randomized to receive B-MI ( $n=8$ ) or control treatment ( $n=10$ ). Participants completed measures of negative affect, weight concerns, and menopausal symptoms, as well as measures of motivation, readiness and self-efficacy to quit at pre- and post-treatment. Motivation and readiness to quit were reassessed one week following treatment, to test the stability of treatment effects. At baseline, weight concerns, specifically surrounding smoking to prevent overeating, were identified as related to increased motivation to quit smoking. Menopausal symptoms severity, specifically somatic symptoms, assessed at baseline, was associated with increased readiness for cessation. B-MI did not increase motivation, readiness or self-efficacy to quit; however, results indicate that motivation and readiness to quit increased over time and cigarettes per day decreased from baseline to follow-up by approximately 20-30%, despite no treatment group differences observed. These results provide valuable insight into enhancing engagement in a cessation treatment among this population. Future research recommendations are discussed.

## INTRODUCTION

Cigarette smoking is the leading cause of preventable death in the United States, with more than 480,000 deaths resulting from cigarette smoking each year (Centers for Disease Control and Prevention [CDC], 2012; United States Department of Health & Human Services [USDHHS], 2014; USDHHS, 2010). Cigarette smoking is associated with an increased risk of cardiovascular disease, stroke and lung cancer, as well as diminished overall health. Among smokers, females have higher rates of serious smoking-related illnesses (i.e., myocardial infarctions, lung cancer; Perkins, 2001; USDHHS, 2014). Despite the fact that the risk of dying from tobacco use has increased over the past 50 years, approximately 40 million adults (14.8% of all females) in the United States continue to smoke (CDC, 2015). Female smokers continue to use cigarettes for longer periods of time and have poorer treatment outcome rates when compared to male counterparts (CDC, 2012; Cepeda-Benito, Reynoso, & Erath, 2004; Perkins, 2001). Overall, females have more difficulty quitting smoking than men, despite equal levels of motivation to quit and increased likelihood of seeking assistance for a quit attempt (Perkins, 2001).

Recent data suggests that cigarette smoking remains relatively common among older females, with 16.8% of 45 to 64-year-old women reporting current cigarette smoking and 7.5% of females 65 years old or older identify as current smokers (CDC, 2015). Many of these females are less willing to quit smoking as they increase in age (Breitling, Rothernbacher, Stegmaier, Raum, & Brenner, 2009). The smoking rate among older females is especially problematic given that nicotine is associated with lower levels of biologically active estrogen (Mueck & Seeger, 2005). Among females in menopause, this antiestrogenic effect has been reported to contribute to and even exacerbate adverse health effects, including increased risk of

cardiovascular disease, cancer and osteoporosis (Tanko´ & Christiansen, 2004). Several studies have proposed additional barriers to successful quit attempts among older female smokers when compared to male and pre-menopausal female counterparts. These include increasing changes in affect and being more prone to weight gain, as well as experiencing more severe menopausal symptoms (McVay & Copeland, 2011). Based on these findings, it is clear that interventions are needed to reduce these barriers and increase motivation to quit smoking in postmenopausal females.

Motivational Interviewing (MI; Miller & Rollnick, 2013) is a style of communication used to help individuals resolve ambivalence towards changing behavior. MI has demonstrated efficacy to treat a variety of substance use disorders, including smoking cessation (Hettema & Hendricks, 2010). Brief MI-based interventions (B-MIs), which incorporate the style and techniques of MI and include assessment of an individual’s behavior, have proven to be effective methods to increase motivation to quit smoking among females (Curry, Ludman, Granham, Stoute, Grothaus, & Lozano, 2003; Dunn, Deroo, & Rivaria, 2001; Glasgow, Whitlock, Eakin, & Lichtenstein, 2000; Miller, Zweben, DiClemente, & Rychtarik, 1992; Whitlock, Vogt, Hollis, & Lichtenstein, 1997). Additionally, research suggests that many older smokers are motivated to quit due to smoking-related illnesses (Ockene, 1987). Thus, it may prove to be advantageous to explore the unique factors affecting motivation to quit smoking among postmenopausal female smokers and whether an established B-MI, which includes individualized smoking-related health feedback, will increase motivation to quit smoking among this population.

## **Menopause**

Menopause is the cessation of menses, typically occurring at approximately 51 years old. It is the result of a depletion of ovarian primordial follicles, which eventually leads to insufficient estrogen available to regulate the menstrual cycle (Jensvold, 1996; Lobo, 2009; Sherwin, 1996). However, it should be noted that menopause occurs gradually, in phases, over a 10-year period, beginning when a female is approximately 40 years old (Jensvold, 1996). Conventional menopause is frequently divided into two phases, perimenopause (also encompassing the menopausal transition) and postmenopause (Lobo, 2009). The beginning of perimenopause occurs when the menstrual cycle becomes irregular, with variable cycle length and periods of amenorrhea (Burger, Hale, Robertson, & Dennerstein, 2007; Lobo, 2009).

Significant endocrine changes occur during perimenopause. Inhibin B and antimullerian hormone begins to decrease as follicle numbers in the ovary decline with older age. As the follicles are less responsive to follicle-stimulating hormone (FSH) and luteinizing hormone (LH), there is a decrease in secreted estradiol ( $E_2$ ). The low levels of  $E_2$  result in an increase in FSH to levels greater than 25 IU/L. It should be noted that these endocrine changes do not occur in a linear pattern and levels of hormones fluctuate throughout perimenopause (Burger et al., 2007; Hale, Zhao, Hughes, Burger, Roberston, & Fraser, 2007; Kimball, 1993; Lobo, 2009; Soule, Sherman, Parrott, Rebar, Santoro, Utian, & Woods, 2001). Vasomotor symptoms, as a result of these endocrine changes, occur in approximately 85% of perimenopausal women and continue for up to 5 years following amenorrhea (Israel & Youngkin, 1997). These symptoms include vasomotor, vaginal dryness, sleep disturbance, dysphoric mood, pain, and urinary and sexual symptoms, among other symptoms (McVay & Copeland, 2011; Woods & Mitchell, 2005). These symptoms are not specific to

perimenopause, as they can be experienced throughout the menopause phases (Woods & Mitchell, 2005).

Following one year of amenorrhea, individuals are typically classified as postmenopausal. Postmenopause is defined by markedly low levels of  $E_2$ , due to rising levels of FSH, which continue to rise for approximately two years. Additionally, there are decreases in levels of progesterone and undetectable levels of inhibin B and antimullerian hormone (Burger et al., 2007; Hale et al., 2007; Kimball, 1994; Lobo, 2009; Soule et al., 2001). The stabilization of the high FSH and low  $E_2$  levels occurs approximately 3 to 6 years following amenorrhea. During postmenopause, vasomotor symptoms, especially vaginal dryness and urogenital atrophy are commonly reported (Soule et al., 2001). Also, postmenopausal women have an increased risk for cardiovascular disease (CVD), bone loss/osteoporosis, and urinary incontinence (National Institute on Aging, 2015).

### **Postmenopause and Smoking Cessation**

Postmenopausal smokers are at increased risk for the adverse health effects related to menopause (i.e., cardiovascular disease, cancer, and osteoporosis; Tanko' & Christiansen, 2004). Previous research has attributed this increase in health consequences to the antiestrogenic properties of smoking cigarettes. Cigarette smoking has been associated with increased hepatic estrogen metabolism and decreased serum estrogen levels, which exacerbate negative health outcomes, related to menopause and even attenuate protective effects of hormone therapies (Michnovicz, Hershcopf, Naganuma, Bradlow & Fishman, 1986; Tanko' & Christensen 2004). Furthermore, previous research has shown that female smokers enter menopause 1.8 years earlier than non-smoking counterparts, with mixed evidence that smoking history or quantity of cigarettes smoked may affect early menopause (McKinaly, Brambilla &

Posner, 1992; Parente, Faerstein, Celeste, & Werneck, 2008). Beginning the menopausal transition earlier is especially problematic as it is associated with increased and worsened health consequences (McVay & Copeland, 2011).

Given the exacerbated health effects of smoking, greater efforts to promote smoking cessation are necessary for this population. Despite the need for effective treatments for postmenopausal smokers, no study to date has directly compared cessation outcomes among premenopause, perimenopause, and postmenopausal smokers. One study examined the effectiveness of transdermal nicotine replacement in 152 postmenopausal smokers. Participants receiving a 21-mg nicotine patch were more likely to remain abstinent at 1, 2, 6 and 12-week follow-ups then compared to individuals receiving a placebo transdermal patch. Among these participants, those endorsing a history of depression were less likely to have abstained at follow-up, and hormone therapy (HT) did not moderate outcomes (Oncken, Cooney, Feinn, Lando, & Kranzler, 2007).

Additionally, when controlling for HT among postmenopausal smokers during a quit attempt, change scores of withdrawal, craving and primary intention to smoke were lower among females receiving a transdermal nicotine patch than those not receiving the active treatment (Allen, Hatsukami, Bade, & Center, 2004). Nicotine replacement therapy (NRT) is less effective among female smokers (Cepeda-Benito et al., 2004; Perkins, Conklin, & Levine, 2008). Given the evidence that NRT is less effective among female smokers, the fact that NRT seemed effective among postmenopausal smokers is promising.

Previous research demonstrates that females taking estrogen-based, hormonal contraceptives have faster nicotine metabolism and receive decreased positive reinforcement from nicotine (Benowitz et al., 2006; Dreher, Schmidt, Kohn, Furman, Rubinow, & Berman,

2007). This suggests that estrogen may accelerate nicotine metabolism while simultaneously decreasing its reward. Thus, females in postmenopause, when estrogen levels are low and more stable, are in a potentially advantageous position to make a cessation attempt (Benowitz, Lessovschlaggar, Swan, & Jacob, 2006; Benowitz, 2009; Franklin, Ehrman, Lynch, Sciortino, O'Brien, & Childress, 2008). These results provide preliminary evidence that postmenopause may be a particularly opportune time for a female to make a quit attempt (McVay & Copeland, 2011).

Despite this hypothesis, the smoking rates remain relatively high among older females (ages 45-65 years old), suggesting that there may be additional barriers for these women, which negatively affect their ability to quit smoking (CDC, 2015). Research to date has focused on the impact of diminishing levels of estrogen and the effectiveness of HT to influence smoking cessation outcomes and nicotine withdrawal symptoms, most notably mood, appetite, and weight changes related to perimenopause and postmenopause (Copeland, Waldo, Peltier, & Hecht, 2015). However, these collective empirical studies have provided mixed evidence to suggest that HT impacts these variables or smoking cessation outcomes and few consistent conclusions can be drawn regarding the impact of negative affect, weight concerns and postmenopausal symptoms severity (Copeland, Peltier, & Geiselman, 2016; Copeland et al., 2015). This highlights the need to further explore the potential barriers to cessation, which may be negatively affecting postmenopausal smokers' quit attempts.

### **Negative Affect**

An increase in negative affect, most notably depressive symptoms, is associated with a decrease in estrogen levels during and following menopause. For example, 221 females participated in a community-based study of menopausal symptoms, where they attended study

visits both during the perimenopause and postmenopause phases. Participants were two to four times more likely to experience a major depressive episode when they were in perimenopause or postmenopause, as opposed to when they were premenopausal (Bromberger, Kravitz, Change, Cyranowski, Brown, & Matthews, 2011). Furthermore, a cross-sectional study demonstrated that 24.7% of postmenopausal females in Turkey endorsed current levels of depression, as measured by the Beck Depression Inventory (Turkish Version; Unsal, Tozun, & Ayranci, 2011). These results indicate that a substantial number of postmenopausal females experience depression following the menopausal transition.

There is strong evidence that negative affect impacts smoking cessation efforts for female smokers. Among female smokers, 33.6% of current daily smokers meet diagnostic criteria for a current major depressive episode and many females report a depressed mood following nicotine abstinence (Allen, Hatsukami, & Christianson, 2003; Husky, Mazure, Paliwal, & McKee, 2008). It is likely that this increased negative affect is exacerbated among postmenopausal female smokers during a quit attempt. The monoamine oxidase inhibiting (MAOI) content of cigarette smoke has historically been connected with antidepressant effects of cigarette smoking and increases in MAO-A distribution correlate with declining levels of estrogen. This indicates that antidepressant effects of cigarette smoking are heightened during perimenopause and postmenopause and may further complicate quit attempts (Copeland et al., 2015). Furthermore, given that many women endorse symptoms of negative affect (i.e., depression, irritability, nervousness) during perimenopause and postmenopause, it has been proposed that a variety of factors, including vasomotor symptoms, sleep difficulties, and lifestyle/social factors may contribute to elevated levels of negative affect in this population (McVay & Copeland, 2011).

It has been suggested that HT may reduce negative affect among postmenopausal females making a quit attempt. However, current evidence demonstrates mixed results, with studies showing that taking HT during a cessation attempt both improves and worsens mood (Allen et al., 2003; Allen et al., 2004b). To date, there are no studies that directly explore the role of negative affect and motivation to quit smoking among this population, suggesting that further research is needed to establish the relationships among negative affect and smoking cessation, and motivation to quit smoking.

### **Weight Concerns**

Weight gain is a common effect of smoking cessation and data demonstrates that women are more likely than men to have concerns about weight gain during a quit attempt (Perkins et al., 2008). Additionally, female smokers gain more weight than their male counterparts when quitting smoking. Williamson and colleagues (1991) reported that among those making a cessation attempt within a cohort of smokers, males gained 2.8kg, and females gained 3.8kg. Additionally, 13.4% of females who quit smoking gained greater than 13kg (Williamson, Madans, Anda, Kleinman, Giovino, & Byers, 1991). Further research indicates that approximately 19% of females who quit smoking gained more than 20% of their body weight (O'Hara, Connett, Lee, Nides, Murrar, & Wise, 1998). This weight gain is problematic as women may be more likely to relapse due to post-cessation weight gain when attempting to quit smoking (Swan, Ward, Jack, & Carmelli, 1993).

Weight gain during a quit attempt is further compounded during perimenopause and postmenopause, as many women gain weight and increase body fat during this time. One study cited an average weight gain of 2.3 kg over a 3-year period with 20% of participants gaining 4.5 kg or more (Wing, Matthews, Kuller, Neilahn, & Plantinga, 1991). Among postmenopausal

female smokers on HT, those who abstained from smoking for two weeks gained 1.28 kg, while non-abstainers lost 0.54kg (Allen, Brintnell, Hatsukami, & Reich, 2004). Additionally, those abstaining from smoking reported an increase in total kilocalorie and carbohydrate consumption during the 2-week period of abstinence (Allen et al., 2004a).

The concern about gaining weight when quitting smoking has been identified as an obstacle to a successful quit attempt across populations and has been proposed as a reason female smokers drop out of cessation programs (Copeland, Martin, Geiselman, Rash, & Kendzor, 2006; McVay & Copeland, 2011). Among female smokers, 39% of older women (over 40 years old) were unwilling to gain any weight if they quit smoking (Pomerleau & Kurth, 1996). Postmenopausal females report being less positive about their appearance than premenopausal females. However surprisingly, the importance of positive body shape and weight decrease with age (Tiggemann, 2004). Research has demonstrated that despite high levels of smoking-related weight concerns among postmenopausal females, these individuals are more likely to enter treatment than pre-menopausal women with elevated levels of smoking-related weight concerns. It has been hypothesized that this may be associated with an increase in health concerns or more experience with past quit attempts, especially given the decrease in importance of positive body shape and weight decrease (Copeland et al., 2006; Tiggemann, 2004). Thus far, no studies directly explore the role of weight gain concerns and motivation to for smoking cessation among this population. Further research is needed to establish the relationship between weight concerns and motivation to quit smoking.

### **Menopausal Symptoms**

The antiestrogenic effect of cigarette smoking has been shown to increase the symptomatology associated with menopause (McVay & Copeland, 2011). For instance, in a

recent survey, Whiteman and colleagues (2003) found that 56% of females between 40-60 years old endorsed moderate to severe hot flashes, with smokers reporting an increased risk of hot flashes. Furthermore, among current smokers, those with a more significant smoking history (i.e., greater amount smoked) had an increased risk for hot flashes (Whiteman, Staropoli, Langenberg, McCarter, Kjerulff, & Flaws, 2003). These findings support previous research establishing that smokers report more severe and more frequent hot flashes (Staropoli, Flaws, Bush, & Moulton, 1998).

Cigarette smoking among postmenopausal females has also been associated with increased vaginal atrophy when compared to non-smoking counterparts (Kalogeraki et al., 1996). Copeland and colleagues (2016) assessed the severity of menopausal symptoms among postmenopausal females following a quit attempt. Among participants, smokers reported significantly greater reports of tingling, fatigue, and muscle aches, when compared to postmenopausal females who had abstained for two weeks following the initial quit attempt (Copeland et al., 2016). While research has established a connection between menopausal symptoms, including vasomotor symptoms, and cigarette smoking, no research to date has explored the effect these menopausal symptoms (i.e., hot flashes, sweating, vaginal atrophy, etc.) have on motivation to quit smoking. It is possible that more frequent or more severe menopausal symptoms would be associated with less motivation to quit smoking, as greater reports of menopausal symptoms have been related to decreased rates of abstinence (Copeland et al., 2016).

### **Motivational Interviewing**

William Miller pioneered Motivational Interviewing (MI) in 1983 as a psychotherapeutic intervention for substance use disorders. MI is a client-centered, directive

communication style that helps individuals explore and resolve ambivalence to positive behavioral change (Miller, 1983; Miller & Rose, 2009). Since its original development, MI has established itself as an efficacious treatment which helps increase one's intrinsic motivation, resolve ambivalence and commit to making a behavioral change (Dunn et al., 2001; Miller & Rose, 2009; Madson, Schumacher, Baer, & Martino, 2016).

### **MI Theoretical framework**

MI's theoretical underpinnings are grounded in several psychological theories. Cognitive dissonance, initially framed by Leon Festiger, is the recognition that one's actions are inconsistent with one's beliefs. This recognition is theorized to motivate an individual to solve this discrepancy through the change of beliefs and/or behaviors (Festiger, 1957). MI conceptualizes cognitive dissonance as a vital motivational factor in developing a gap between status quo and positive behavioral change. MI theory asserts that behavioral change occurs when an individual recognizes such a discrepancy between one's values and/or goals and his or her current status quo, although this difference should not be so large that it demoralizes an individual (Miller & Rollnick, 2013). It has been theorized that, in accordance with the theory of self-perception, allowing an individual to defend the logic underlying a behavioral change, will increase one's commitment to such change (Bem, 1972; Hettema, Steele & Miller, 2005; Miller & Rose, 2009). Thus, MI dialogue strives to foster language that argues for change, also known as "change talk," as increases in discussion of change often predicts one's commitment to change (Miller & Rollnick, 2013; Miller & Rose, 2009). To support such "change talk" and subsequent behavioral changes, implementation of a supportive and nonjudgmental context is required (Miller & Rose, 2009). MI draws from Carl Roger's theory of "necessary and sufficient" interpersonal conditions, which is thought to be required to explore and resolve

ambivalence while developing discrepancy (Miller & Rollnick, 2013; Miller & Rose, 2009; Rogers, 1959). Overall, the inclusion and development of these theories has advanced MI to be an efficacious intervention, through its collaborative conversation style and exploration of values and motivations, which foster positive behavioral change (Hetteman et al., 2005; Miller & Rollnick, 1992; Miller & Rollnick, 2002; Miller & Rollnick, 2013).

### **MI Processes, Strategies, Skills and Principles**

In order to identify and resolve ambivalence towards a behavioral change, MI includes four processes: engaging, focusing, evoking and planning. The foundation of a MI conversation is *engaging* the patient in a collaborative relationship. This begins to foster a cooperative and supportive context, which allows an individual to feel comfortable and actively participate in the MI-based conversation. Initially, the clinician and participant engage in *focusing*, to clarify the goal that will be worked towards within the MI discussion. This ensures that the MI-based conversation will be a goal-directed discussion, in which ambivalence is explored and countered constructively. A successful MI-based discussion will lead to *evoking* behavioral change and fostering an individual's intrinsic motivation for change, through eliciting and responding to "change talk." The culmination of these above-mentioned processes results in *planning*, in which one makes a specific plan for positive behavioral change and assesses one's intention to implement the plan (Miller & Rollnick, 2013). These processes are implemented in discussion through the use of a variety of MI-based strategies, including reflective listening (accurate empathy), eliciting motivational statements, examining ambivalence, and reducing resistance (Dunn et al., 2001; Rubak, Sanbaek, Lauritzen & Christensen, 2005).

MI also employs basic principles in addition to these processes and strategies to help an individual work towards a behavioral change. These principles include: expressing empathy, developing discrepancy, responding to sustain talk, and supporting self-efficacy (Miller & Rollnick, 2013; Miller & Rollnick, 2002). Expressing empathy describes a clinician's accurate understanding of the individual's status quo and values, communicated through reflective listening techniques. Expressing empathy is the communication of accurate empathy, which allows the clinician to understand the patient's perspective and ambivalence towards change in a non-judgment and supportive context that is congruent with the MI processes (Burke, Arkowitz, & Menchola, 2003; Miller & Rollnick, 2013). Within this regard, MI encourages the expression of empathy to allow the patient the environment to explore and reflect on one's values and goals (Miller & Rollnick, 2013).

MI strives to have an individual identify one's values and goals, while also assessing how the current behavior supports or discourages said values and goals. This development of discrepancy is the fundamental goal of MI, as it emphasizes the importance of behavioral change. Framed within the context of cognitive dissonance, MI helps an individual develop discrepancy between the status quo and desired behavioral change (Festinger, 1957; Miller & Rollnick, 2013). Through MI-based skills and strategies, such as selective reflection and open-ended questions, an individual will develop a discrepancy between one's current behaviors and overall values (Burke et al., 2003). Engagement in the MI-based conversation will give an individual the opportunity to voice reasons for and against change, thus building one's intrinsic motivation to make a behavioral change (Miller & Rollnick, 2013). Through articulating and resolving this discrepancy, an individual will increase his or her commitment to making the stated behavioral change (Bem, 1972; Miller & Rollnick, 2013).

During the exploration of ambivalence, it is common for individuals to minimize the need to make the targeted change. Commonly referred to as sustain talk, this further reveals one's ambivalence and is a normal and expected part of change (Burke et al., 2003; Miller & Rollnick, 2013). Miller and Rollnick (2013) advise that it is necessary to accept such sustain talk as reflections of ambivalence and utilize skills of reflective listening, emphasis of autonomy and reframe this opposed perspective. Such response is theorized to help empower the individual to problem solve and develop novel solutions to the disagreement, through change talk (Miller & Rollnick, 2013).

Through the processes of MI, the individual establishes both an understanding of the importance of the behavioral change and begins to develop the confidence to change one's status quo (Burke et al., 2003). For behavioral change to occur, it is essential for the individual to develop confidence, known also self-efficacy, in one's ability to make the behavioral change (Miller & Rollnick, 2013). Self-efficacy is one's belief that goals that one sets for oneself are achievable (Bandura, 1977). This belief in one's ability to achieve and maintain behavioral goals is a reasonable predictor of treatment outcomes (Miller & Rollnick 2002). Bandura's proposed theory of self-efficacy postulates that an individual estimates his or her *efficacy expectation*, which is the belief that one is able to complete a given task to accomplish the set goal. These efficacy expectations determine the amount of effort and one will put forth to accomplish the set goal. The stronger one's self-efficacy the more effort an individual will demonstrate (Bandura, 1977). Thus, improving self-efficacy requires the fostering of hope that the behavioral change is possible and developing the confidence that one is able to accomplish the set behavior. If there is no hope or confidence to change, it is likely that no change will occur (Miller & Rollnick, 2013).

It has been proposed that self-efficacy may be one of the mediating factors of MI enacting change (Miller & Rollnick, 2013). MI enhances self-efficacy through its collaborative, supportive nature, fostering of autonomy and evocation of intrinsic motivation to accomplish the targeted behavioral change (Miller & Rollnick, 2013; Miller & Rollnick, 2002). It is thought that through these principles, MI helps evoke and strengthen hope already present in the individual (Miller & Rollnick, 2013). Miller & Rollnick propose that the use of techniques, including providing information/advice, identifying/affirming strengths, reviewing past successes, and reframing fosters this hope, builds confidence talk and thus increases the likelihood of a behavioral change (Miller & Rollnick, 2013).

MI is frequently adapted into interventions to foster specific behavioral changes, including smoking cessation (Heckman, Egleston, & Hofmann, 2010). These MI-based interventions assert that the responsibility and capability for behavioral change are within the individual. The treatment strives to create an environment in which an individual's motivation and commitment to change will be enhanced and strengthened. To accomplish this, MI interventions often include personalized feedback presented to the individual in a structured manner. This feedback allows he or she to compare one's personal results to normative ranges while also focusing on developing action plans for the targeted change (Finney, Wilbourne & Moos, 2007; Miller et al., 1992). These interventions allow the clinician to provide psychoeducational information and feedback to the individual, in an MI-consistent manner. Thus, the clinician explores the individual's prior knowledge and assesses interest in the behavior change. It is recommended that the clinician shares information regarding the assessment and then utilizes open-ended questions to explore the individual's personal

responses. Doing so will elicit the individual's interpretations and concerns, thus increasing commitment to the behavioral change (Miller & Rollnick, 2013; Miller & Sanchez, 1993).

Miller and Sanchez (1993) provide a list of "active ingredients," of empirically supported brief MI-based interventions (B-MI). These components include feedback regarding substance use risk, emphasis on personal responsibility for the proposed change and advice for the change. Additionally, detailing a "menu" of alternative change options, emphasis on empathy and promotion of the individual's self-efficacy have been shown to be successful in fostering behavior change (Miller & Sanchez, 1993). These ingredients are found in numerous brief interventions, and substantial evidence suggests that these low-cost B-MIs are effective for increasing motivation among a range of substance use disorders (Finney et al., 2007).

However, it should be noted that a common critique of B-MIs is that it has a rapid impact, but the effect gradually decreases across time (Hettema, et al., 2005). One meta-analysis demonstrated that effect sizes for short-term follow-up decreased from 0.77 to 0.30 one year later and another meta-analysis indicated the benefits of MI decreased as follow-up times increased (Hettema et al., 2005; Lundahl, Kunz, Brownness, Tollefson, & Burke, 2010). It has been hypothesized that this decrease in effect size is at least in part observed due to control or comparison treatments "catching up" over time, as seen with pharmacological or medical interventions. Further, the observed effect is diminished when the MI precludes another treatment, which increases its efficacy and the length of its effect (Hettema, et al., 2005).

### **MI's and Smoking Cessation**

MI-based interventions (including B-MIs) have been proved to be effective interventions for smoking cessation among varying populations and health care settings (Lai, Cahill, Qin, & Tang, 2011). A meta-analysis, including 14 randomized control trials (RCTs),

demonstrated the MI-based treatments resulted in a significant effect on the nicotine abstinence, when compared to brief advice or treatment as usual. Effect sizes of these RCTs, included in the meta-analysis, ranged from 1.22-3.49 (Lai et al., 2011). Further, another meta-analysis indicated that smokers (82% female) receiving MI-based interventions were 45% more likely to be nicotine abstinence at follow-up than the control groups (Heckman et al., 2010). Among a population of female smokers, MI interventions outperformed other treatment conditions at long-term follow-up time points (Hetteema & Hendricks, 2010).

B-MIs for smoking cessation have increased quit attempts, reduced number of cigarettes smoked per day and greater motivation to quit in a variety of treatment settings and populations (Colby, et al., 1998; Curry et al., 2003; Glasgow et al., 2000; Harris, Catley, Good, Cronk, Harrar & Williams, 2010; Manuel, Lum, Hengl & Sorensen, 2013). For instance, among undergraduate student smokers, receiving four, 20-30 minute sessions of MI for smoking cessation, a reduction in the number of days smoked and the number of cigarettes smoked per day through a 30-day period were observed (Harris et al., 2010). Additionally, a single session MI decreased the mean number of cigarettes smoked per day when compared to an advice-only group among HIV+ female smokers (Manuel et al., 2013). It should be noted that no increase in effectiveness has been observed when patients receive more than a single session of MI or multiple sessions in both smoking cessation treatments and other interventions, including alcohol-based interventions (Kulesza, Apperson, Larimer & Copeland, 2010; Lai et al., 2011). A single MI session for smoking cessation appears sufficient to produce positive treatment effects.

According to relapse models described in the literature to date, self-efficacy has been identified as a key component to enhance positive behavioral changes and treatment outcomes,

including modestly predicting cessation outcomes among smokers (Gwaltney, Metrik, Kahler, & Shiffman, 2009). Research has demonstrated that individuals who abstain from smoking during a quit attempt report a higher level of baseline self-efficacy than those who did not have a successful cessation attempt (Gwaltney et al., 2009). Given that female smokers often report lower rates of self-efficacy to make a quit attempt, it seems as though fostering self-confidence will be an important factor in a successful cessation attempt (Perkins, 2001). Previous research among female smokers has demonstrated that in a path analysis, smoking cessation interventions have an effect on readiness to quit, which subsequently increases self-efficacy, further enhancing readiness to quit (Warnecke et al., 2001). In light of the relationship between self-efficacy and readiness to quit smoking, it is likely advantageous to foster an individual's self-efficacy to quit smoking when attempts to build motivation and readiness for cessation.

Despite lower rates of self-efficacy to make a successful cessation attempt among female smokers, B-MIs are effective in both male and female smokers (Dunn et al., 2001; Perkins, 2001; Whitlock, et al., 1997). In fact, women have even demonstrated long-term cessation success when using a B-MI. Among low-income female adult smokers in a pediatric-based clinic, a greater number reported nicotine- abstinence when compared to treatment as usual at both a 3-month and 12-month follow-up (7.7% vs. 3.4% and 13.5% vs. 6.9%, respectively; Curry et al., 2003). Additionally, Ruger and colleagues (2008) reported that among low-income pregnant smokers, MI helped prevent relapse when compared to usual care (Ruger, Weinstein, Hammond, Kearney, & Emmons, 2008).

The promising findings among female smokers' response to MIs also extend to increasing motivation to quit smoking among those not wanting to stop smoking (i.e.,

precontemplation/ contemplation stages of the Stages of Change algorithm; Haug, Svikis & DiClemente, 2004; Stotts, DiClemente, & Dolan-Mullen, 2002). For instance, following four study sessions, there was a significant difference in motivation to quit smoking among methadone-maintained pregnant females receiving a MI (with personalized feedback) than those receiving usual care. Those who received the MI were also more likely to have advanced to the next stage of change (i.e., moved from precontemplation to contemplation) than with usual care (35% vs. 15%; Haug et al., 2004).

Overall, evidence suggests that MIs for smoking cessation are a promising treatment for increasing motivation among female smokers. Further MIs for smoking cessation may increase cessation rates among those female smokers making a quit attempt.

### **Summary**

Postmenopausal females are smoking at relatively high rates (CDC, 2015). This is concerning considering the increased health consequences associated with the synergistic effect of decreased levels of estrogen related to both menopausal and smoking status (Lobo, 2009; Benowitz, 2006). Evidence suggests that low levels of estrogen may provide greater success during a quit attempt. However, limited research has explored the unique barriers that affect postmenopausal female smokers' motivation and readiness to quit smoking (McVay & Copeland, 2011). Furthermore, evidence suggests that B-MIs (with smoking-related health feedback) may increase motivation to quit smoking among postmenopausal females (Haug et al., 2004; Stotts et al., 2002).

## **PURPOSES AND HYPOTHESES OF THE PRESENT STUDY**

### **Specific Aim 1**

To determine the impact of negative affect, weight concerns, and menopausal symptoms on motivation and readiness to quit smoking among postmenopausal females.

#### **Hypothesis 1**

Research to date has demonstrated that negative affect, weight concerns, and menopausal symptoms affect smoking behavior and cessation (McVay & Copeland, 2011). Thus, the current study tested the hypothesis that participants receiving higher scores on measures of negative affect, weight concern, and menopausal symptoms will report lower motivation and readiness to quit smoking at baseline (T1).

### **Specific Aim 2**

To determine the effects of a MI on motivation and readiness to quit smoking in postmenopausal females.

#### **Hypothesis 2**

Previous research has found that female smokers respond to B-MIs (Stotts et al., 2002; Haug et al., 2004). Given this evidence, it is plausible that B-MIs may increase motivation to quit smoking among postmenopausal females. Thus, the present study tested the hypothesis that participants receiving the B-MI will report an increase in motivation and readiness to quit smoking from baseline (T1) to post-intervention (T2) when compared to participants in the control condition.

### **Hypothesis 3**

In order to verify the stability of this B-MI, the present study tested the hypothesis that participants receiving the B-MI will report higher levels of motivation and readiness to quit at 1-week follow-up (T3) as compared to individuals in the control condition.

### **Specific Aim 3**

To determine the impact of a B-MI on self-efficacy to quit smoking.

### **Hypothesis 4**

It has been asserted that MI-based interventions increase self-efficacy (Miller & Rollnick 2013). Thus, the present study tested the hypothesis that participants receiving the B-MI will report an increase in self-efficacy to quit smoking from baseline (T1) to post-intervention (T2) when compared to participants in the control condition.

### **Hypothesis 5**

To verify the stability of this B-MI to increase self-efficacy to quit over time. The current study tested the hypothesis that participants receiving the B-MI will report higher levels of self-efficacy to quit at 1-week follow-up (T3) as compared to individuals in the control condition.

## **METHOD**

### **Participants**

Participants included members of the Baton Rouge community who were recruited through advertisements (print and Internet) and fliers posted on the campus of Louisiana State University (LSU) and the surrounding community, as well as through the local libraries, churches and bingo halls. All advertisement materials were tailored to recruit nicotine-dependent participants. Inclusion criteria included female participants over the age of 40 years old, who self-reported cessation of menses for at least one year. Participants were required to

smoke at least ten cigarettes/day, have a carbon monoxide (CO) level of > 10 ppm and an FSH screen of > 25 mIU/mL. Exclusion criteria included current menses within the past year.

Interested participants, who contacted the laboratory either by E-mail or telephone, as listed in advertisements, were called by the experimenter to complete a phone screening to determine study eligibility. Those participants who were eligible for the study were invited to the Psychological Services Center (PSC) on the campus of LSU to complete the study session. Ineligible participants were queried regarding interest in additional ongoing research in the laboratory and subsequently screened for inclusion/exclusion criteria for other research protocols. If not enrolled in an additional study, individuals were asked if they were interested in remaining on a contact list for future studies. Participants enrolled received \$50 compensation for completing the study.

A total of 18 participants (8 in treatment group; 10 in control group) were recruited. This was less than the proposed 64 participants (32 in each group) needed to obtain an estimated large effect size (Cohen's  $f = 0.40$ ) with a power of .80 and alpha level of .05 (calculated with G\*power; Faul, Erdfelder, Lang & Buchner, 2007; based on meta-analysis of short-term treatment follow-up, Hettema & Hendricks, 2010). All reasonable recruitment efforts were made to achieve the proposed sample size, including strategic placement of advertisements (i.e., community centers, coffee shops, bingo halls, and 12-step meeting locations) and allowing participants to refer friends; however similar to previous research involving female smokers with hormonal-based inclusion/exclusion criteria, conducted in similar clinical settings, this was not possible (McVay, 2011). Given that the sample size was smaller than anticipated, and therefore the power of significance tests reduced, effect sizes and/or confidence intervals for all groups were also calculated.

## Measures

**Phone Screening** (See Appendix A). This screening consisted of questions to determine participant eligibility and assessed gender, age, daily smoking rate (i.e., number of cigarettes smoked per day), number of years smoked, and last menses. The phone screening was used in the present study to assess inclusion and exclusion criteria of potential participants before being enrolled in the current study.

**Demographic Questionnaire** (See Appendix A). This questionnaire was administered to eligible participants upon attending the in-person visit. It consists of 12 items and assessed age, gender, race, relationship status, level of education, last reported menses, daily smoking rate, years smoked, preferred brand of cigarettes, and previous quit attempts. Additionally, the questionnaire assessed if the participant has undergone surgical menopause, or currently taking a hormonal therapy (HT), as well as the type of HT, if applicable. In the present study, the demographics questionnaire was used to assess differences in demographic data between treatment groups.

**Fagerström Test for Nicotine Dependence** (FTND; Heatherton, Kozlowski, Frecker & Fagerström, 1991; see Appendix A). The FTND is a six-item questionnaire assessing for nicotine dependence. It evaluates the quantity of cigarette consumption, frequency of use and craving to smoke. Possible scores range from zero to ten, with a higher score suggesting greater dependence. The FTND score has been shown to correlate with physiological measurements, including pack years smoked and cotinine (Dijkstra & Tromp, 2002). High scores on the measure have been shown to correspond with more expected withdrawal symptoms and lower self-efficacy to quit (Etter, 2005; Etter, Duc, & Perneger, 1999; Pomerleau, Carton, Lutzke, Flessland, & Pomerleau, 1994). The FTND was used in the

current study to assess the level of nicotine dependence, which was used to evaluate differences in severity of nicotine dependence between treatment groups.

**University of Rhode Island Change Assessment (URICA;** DiClemente & Hughes, 1990; McConaughy, DiClemente, Prochaska, & Velicer, 1989; See Appendix A). The URICA is a 32 item, self-administered instrument designed to assess the readiness for behavioral change. The questionnaire is adapted from the categorical stages of change model to provide a continuous score for an individual's readiness to quit a variety of behaviors (e.g., smoking, weight loss, alcohol use). Researchers can insert the behavior targeted for change into the instrument; the current study utilized applied the URICA to assess readiness to quit smoking (DiClemente & Hughes, 1990; DiClemente, Prochaska, Fairhurst, Velicer, Velasquez, & Rossi, 1991; Prochaska, DiClemente, & Norcross, 1992). The URICA includes four subscales (Precontemplation, Contemplation, Action, and Maintenance) and responses are given on a 5-point Likert scale ranging from 1 to 5 ("strongly disagree" to "strong agreement"). These scales are combined arithmetically into a composite score to assess changes in readiness to quit the designated behavior in response to treatment (Amodei & Lamb, 2003; DiClemente & Hughes, 1990). Originally developed as a generic assessment of readiness to the targeted behavior in psychotherapy, the URICA has been successfully adapted to assess readiness to engage in smoking cessation treatment, as well as other cessation-based psychotherapies. Its composite score has been shown to be sensitive to B-MIs for smoking cessation, as well as drug use, domestic violence, alcohol use (Amodei & Lamb, 2003; Levesque, Gelles, & Velicer, 2000; Soderstrom et al., 2007; Stephens, Cellucci, & Gregory, 2004;). When adapted for smoking cessation, it is positively correlated with the traditional, categorical stages of change ladder ( $r = .42$ ) and shows adequate concurrent and convergent

validity with the stages of change ladder (Amodei & Lamb, 2003; Stephens et al., 2004). The composite score of the URICA was used to assess readiness to quit smoking in the present study.

**Motivation to Stop Scale (MTSS;** Kotz, Brown, & West, 2013; See Appendix A). The MTSS is a single-item question, which asks current smokers to describe his/her current motivation to quit smoking. It includes a seven-point Likert scale, which ranges from 1 (“I don’t want to stop smoking”) to 7 (“I REALLY want to stop smoking and intend to in the next month.” MTSS scores have predicted quit attempts after a six-month follow-up in a linear fashion (Kotz et al., 2013). Further, the MTSS has demonstrated adequate accuracy in discriminating among smokers who did and did not quit smoking at follow-up (Area Under the Receiver Operating Characteristic [ $ROC_{AUD}$ ]=0.67; Kotz et al., 2013). In the present study, the MTSS score was used to assess motivation to quit smoking.

**Smoking Self-Efficacy Questionnaire (SEQ-12;** Etter, Bergman, Humair & Perneger, 2000; see Appendix F). The SEQ-12 is a self-report measure used to assess an individual’s confidence to abstain from smoking when exposed to both external and internal stimuli. The measure includes two, six-item subscales which assess the individuals’ ability to refrain from smoking when facing both internal (Scale 1) and external (Scale 2) stimuli. Individuals respond to a 5-point Likert scale (ranging from “*not at all sure*” to “*absolutely sure*”). The SEQ-12 has demonstrated high internal consistency in the present study (“internal stimuli,”  $\alpha = 0.92$ ; “external stimuli,”  $\alpha = 0.88$ ) and similarly high test-retest correlation coefficients in previous research ( $r = 0.95$ ;  $r = 0.93$ , respectively; Etter et al., 2000). The total score of the SEQ was used to assess self-efficacy to quit in the present study.

**Positive and Negative Affect Schedule (PANAS;** Watson et al., 1988; See Appendix A). The PANAS is a 20-item measure of affect designed to assess an individual's positive and negative affect. It includes two, 10-item mood scales (Positive and Negative Affect Scales). Individuals rate items on a Likert scale from 1 (*very slightly or not at all*) to 5 (*extremely*). In the present study, the measure demonstrated good internal consistency for the positive affect and negative affect ( $\alpha = 0.86$ ;  $\alpha$ 's = 0.86, respectively) and moderate concurrent validity in previous research ( $r$ 's = .51-.74; Watson et al., 1988). The negative affect scale was used in the present study to assess negative affect among postmenopausal smokers.

**Smoking-Related Weight and Eating Episodes Test (SWEET;** Adams, Baillie, & Copeland, 2011; See Appendix A). The SWEET is a 10-item measure designed to assess an individual's tendencies to smoke in response to body image concerns, as well control appetite and overeating. It includes four content domains (smoking to suppress appetite, smoking to prevent overeating, smoking to cope with body dissatisfaction, and withdrawal-related appetite increases). Individuals rate items on a 5-point Likert scale (ranging from 1 = *never*, 5 = *always*). The SWEET demonstrates excellent internal consistency ( $\alpha = 0.88$ , in the present study), as well as validity in predicting smoking frequency, eating pathology, and body image concerns ( $p$ 's < 0.05; Adams et al., 2011). The SWEET total score was used in the present study to assess weight concerns related to smoking among postmenopausal smokers.

**Menopause Rating Scale (MRS;** Hauser, Huber, Keller, Lauritzen, & Schneider, 1994; Heinemann et al., 2004; Potthoff, Heinemann, Schneider, Rosemeier, & Hauser GA, 2000; See Appendix A). The MRS is an 11-item measure designed to assess 11 symptoms of menopause. It asks respondents to rate symptoms across five severity categories (no symptom, mild, moderate, marked, and severe). The items are computed to calculate a total score, as well as

three subscales (psychological, somatic and urogenital). The measure demonstrates adequate internal consistency ( $\alpha = 0.68$ ) in the present study. Additionally, the measure is highly correlated with the Kupperman index (a numerical index of menopausal symptoms;  $r = 0.91$ ; Schneider, Heinemann, Rosemeier, Potthoff, & Behre, 2000). The MRS total score was used in the present study to assess menopause symptoms severity among postmenopausal smokers.

**Geriatric Depression Scale- Short form (GDS; Sheikh & Yesavage, 1986; See Appendix A).** The GDS is a 15-item measure of depressive symptoms in older adults. Individuals chose “yes” or “no” to a series of questions regarding how one has felt over the past week. Individuals who score 0-5 are considered “normal,” while scores of 6-8 are indicative of mild depression, 9-12 of moderate depression and 12-15 of severe depression. Previous research has indicated that the GDS had a sensitivity of 92% and specificity of 81% (Lyness, Noel, Cox, King, Conwell, & Caine, 1997). The GDS total score was used in the present study as a second measure of negative affect in postmenopausal smokers.

**Alcohol Use Disorders Identification Test—Self-Report Version (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001; See Appendix A).** The AUDIT is a 10-item screening instrument to detect excessive drinking patterns. The brief questionnaire contains questions assessing the amount and frequency of drinking, alcohol dependence and problematic drinking. Items are scored on a five-point Likert scale, with higher scores indicative of more problematic alcohol use. A cutoff score of eight has produced sensitivities generally in the mid 0.90’s, and specificities in the mid 0.80’s. Given the established relationship between alcohol consumption and tobacco use, the AUDIT was used to measure problematic drinking patterns in the present sample (Bobo & Husten, 2000; Grant, Hasin, Chou, Stinson, & Dawson, 2004).

## Materials

**FSH Urine Test Cassette** (BTNX Inc., Ottawa, Canada). The Rapid Response Menopause FSH (urine) Test Cassette is a non-invasive, qualitative method to aid in the detection of menopause. The cassette is a lateral flow immunoassay designed to detect urine FSH levels above 25 mIU/ml. Urinary FSH test cassettes are a reliable and valid method of detecting FSH levels, to evaluate the onset of menopause. The cassette detects FSH levels above 25 mIU/ml with 100% specificity and 99% accuracy; there is no cross-reaction with human chorionic gonadotropin (hCG), thyroid stimulating hormone (TSH), and luteinizing hormone (LH; BTNX Inc., 2015).

The test is conducted by pipetting a urine specimen into the test cassette. The test can be interpreted after 3 minutes, with a positive result indicated by two lines in the test line window that are the same color or darker than the control line. It is recommended that the test is repeated one week after the initial test to confirm results due to the instability of FSH levels (BTNX Inc., 2015). In the present study, the FSH urine test cassette was used at T1 and T3 to assess the FSH levels and confirm that the participant was postmenopausal.

**Carbon Monoxide Level.** The level of carbon monoxide was determined with the Vitalograph-BreathCO Monitor. This monitor is a non-invasive instrument used to measure the concentration of carbon monoxide, as displayed in parts per million, (ppm), within a single breath (Vitalograph Inc., Lenexa, KS). In the present study, the level of carbon monoxide served as biological confirmation of daily smoking. Additionally, it was used in the Health Effects of Smoking B-MI protocol (Copeland, 2015) as biofeedback information related to smoking behaviors.

**Lung Age.** (Vitalograph Inc., Lenexa, KS). Lung age was determined with the Vitalograph- Lung Age Indicator, which is a non-invasive instrument used to identify individuals in pre-symptomatic stage of chronic obstructive pulmonary disease (COPD; Vitalograph Inc., Lenexa, KS). The instrument compares an individual's FEV1 reading, as based upon three breath samples, with predicted normative values to interpret one's lung age. This reading can be utilized when illustrating the negative consequences of smoking on lung functioning. In the present study, lung age was used in the Health Effects of Smoking B-MI protocol as biofeedback information related to smoking behaviors (Copeland, 2015).

**Blood Pressure and Heart Rate.** Blood pressure and heart rate will be collected with the Walgreen Digital Blood Pressure Monitor HD 2000, which is a non-invasive instrument used to measure the systolic and diastolic blood pressure, as well as heart rate measurements. In the present study blood pressure and heart rate measures was utilized in the Health Effects of Smoking B-MI protocol as biofeedback information related to smoking behaviors (Copeland, 2015).

**Smart Weigh™ Digital BMI Body Fat Weight Scale.** The Smart Weigh™ scale calculates BMI, body fat percentage, body water percentage, muscle mass and bone mass. The scale utilizes bioimpedance analysis technology, which sends a mild electrical current through its stainless steel bars on the platform. In the present study, body mass indices were controlled for between treatment groups. BMI is a measure of height and weight that is a commonly used screening tool to determine body fatness. BMI was measured through the use of the Smart Weigh™ Digital BMI Body Fat Weight Scale. BMI is typically calculated as weight (kilograms)/height<sup>2</sup> (square meter). Typical classifications for body fatness are as follows:

below 18.5—underweight, 18.5-24.9—normal weight, 25.0-29.9—overweight, and 30.0 and above—obese (CDC, 2015b).

## **Interventions**

**Health Effects of Smoking** (Copeland, 2015). Health Effects of Smoking is a systematic B-MI for smoking cessation. It incorporates both the principles of MI and personalized, health-based feedback for smoking cessation. This B-MI consists of standard MI-based strategies and techniques including, establishing rapport, assessing motivation, readiness, and confidence to quit (through the use of scaling questions), decisional balancing tasks and identifying and generating a plan of action. The systematic intervention includes personalized health feedback comments, in which the therapist discusses the biological feedback (i.e., an individual's cardiovascular functioning/blood pressure, carbon monoxide readings, pulmonary lung functioning/lung age). Additionally, the protocol provides the patient with worksheets, to allow her to review her biological feedback information, as well as work alongside the therapist completing the decisional balance tasks and generating a plan for action. Preliminary data suggests that the individuals receiving the Health Effects of Smoking B-MI protocol progressed in terms of stages of change algorithm (i.e., moved from precontemplation to contemplation) 3-months following the intervention (Copeland, 2015). The Health Effects of Smoking B-MI protocol served as the active treatment condition in the present study.

All therapists administrating the B-MI protocol were trained regarding the general protocol and the main components of MI. This training included reading *Motivational Interviewing 3<sup>rd</sup> edition* (Miller & Rollnick, 2013) and watching training videos (Hettema, 2009). Furthermore, all therapists were supervised in weekly practicum meetings to discuss treatment and therapeutic techniques to insure that therapists were adhering to the protocol.

**Yosemite: The High Sierras** (Meyer, 2012). This documentary explores the geographical area and features included within the Sierra Mountain range. This documentary acted as the control condition in the present study to control for time of B-MI intervention.

### **Procedure**

Louisiana State University's Institutional Review Board approved all study procedures, including recruitment advertisements and practices. Participants were recruited via advertisements at various locations around the community (e.g., libraries, churches, etc.) and on campus. Additionally, paid advertisements were placed weekly on Internet platforms (e.g., Craigslist). If interested in participating in the study, the advertisement instructed the participants to call or E-mail the experimenter. Participants were then contacted by the experimenter to complete a phone screening to determine study eligibility. If the participant smoked at least ten cigarettes per day and did not meet any additional exclusion criteria, she was invited to participate in the study.

Participants self-selected an experiment date from given available times and arrived for the study portion in the Psychological Services Clinic (PSC) in Johnston Hall on the LSU campus. When participants arrived for the scheduled study session, they were asked to complete the informed consent form for the experimental session. They were then asked to provide a carbon monoxide reading to verify eligibility status and a urine sample for FSH analysis, utilizing the Vitalograph-BreathCO Monitor and Rapid Response Menopause 25mIU FSH (Urine) Test Cassette. Any participant that had a carbon monoxide level below 10 parts per million (ppm) or an FSH level below 25 mIU/mL was not eligible to participate in the study visit.

Following the carbon monoxide reading and urine sample collection, participants had their height and weight taken to determine body mass index, as well as have blood pressure, heart rate and lung age recorded, utilizing the Vitalograph- Lung Age Indicator and Walgreens Digital Blood Pressure Monitor HD2000, respectively. Additionally, they completed the URICA, SEQ-12, MRS, MTSS, SWEET, and PANAS.

Participants, based upon random group assignment, then either engaged in the B-MI or control group. This process utilized urn randomization controlling for age, nicotine dependence (as measured by the FTND; Heatherton et al., 1991), body mass index, and the number of pack years. Number of pack years was calculated by multiplying the number of cigarettes currently smoked per day by the number of years the participant has smoked and dividing this number by 20). A pack year is a unit of measurement for the quantification of the history of cigarette consumption (Prigot, 1987). Participants in the B-MI intervention participated in a one-session, 1-hour B-MI intervention regarding smoking cessation (Copeland, 2015). This intervention was led by the study therapist and followed the B-MI protocol. To control for time, those who did not participate in the B-MI viewed a 1-hour video on the Yosemite National Park (Meyer, 2012; similar procedure for controlling time utilized in Waldo, 2014).

Following the B-MI or 1-hour video, all participants then completed URICA, MTSS, and SEQ-12. Once these measures were completed; the participant received \$50 for completion of the study. FSH levels fluctuate, and a confirmatory FSH test of above 25 mIU/ml is needed to confirm postmenopausal status. Accordingly, the participants were then given a FSH urinary kit, including explicit instructions to take home, and a follow-up phone call at seven days' post-intervention was scheduled at the participant's convenience. A telephone visit was selected to decrease the burden of transportation to laboratory and thus improve study

retention. Seven days following the study session, the study therapist called the participant to obtain the results of the FSH urine analysis and complete the URICA, MTSS and SEQ-12 over the phone. If the study therapist was unable to reach the participant (e.g., call went to voicemail), three additional efforts were made to contact the participant. Participants were then thanked for their participation and referred to the LSU Smoking Cessation Group at the PSC if a desire to quit was expressed at any point during the study visit.

### **Data Analytic Strategy**

Differences in demographic data between the treatment and control groups regarding age, race and ethnicity, education level, body mass index, daily smoking rate, number of years smoked, level of nicotine dependence (as measured by the FTND), number of pack-years, number of previous quit attempts, alcohol use (as measured by the AUDIT) and HT status (i.e., currently taking an HT) were calculated. These differences were calculated utilizing one-way analyses of variance (ANOVAs) for each of the seven continuous variables. Chi-square analyses were conducted on the three categorical variables (i.e., race/ethnicity, education level and HT status).

**Hypothesis 1.** In order to determine the impact of variables, including negative affect, weight concerns and menopausal symptom severity on motivation and readiness to quit smoking, correlations were calculated between the negative affect scale of the PANAS, SWEET and MRS, as well as baseline measures of URICA and MTSS. Further, two multiple linear regressions were conducted to assess whether the combination of negative affect, weight concerns, and menopausal symptom severity predicted motivation and readiness to quit smoking at baseline. Independent variables included the negative affect scale of the PANAS, SWEET, and MRS, while the first linear regression included the dependent variable of the

baseline measure of URICA. The second linear regression included the same independent variables (PANAS, SWEET, and MRS) and the dependent variable included the baseline measure of MTSS. For both regressions, a standard enter method was applied and all independent variables were entered simultaneously into the models. Additionally, for each regression,  $R^2$  was calculated to assess the amount of variance the set of independent variables accounted for and the significance of the betas will be examined to see which of the independent variables were contributing uniquely.

**Hypotheses 2-5.** To determine the effects of the B-MI on motivation, readiness and self-efficacy to quit smoking across time, a repeated measures multivariate analysis of variance (MANOVA) were conducted. Intervention group (control vs. B-MI) and Time (baseline [T1], following intervention [T2] and 1-week follow-up [T3]) were entered as the independent variables. The SEQ-12 (measures self-efficacy to quit smoking), URICA (measures readiness to quit smoking), and MTSS (measures motivation to quit smoking) were entered as the dependent variables.

## RESULTS

A total of 198 individuals contacted the laboratory to participate in the present study. Of these individuals, 43 individuals were eligible to participate, and 22 participants completed the initial study session. Two participants were lost to follow-up and thus excluded from subsequent analyses, due to no having biological confirmation of postmenopausal status. An additional two participants were deemed ineligible at follow-up due to having FSH levels below 25 mIU/ml. Eighteen participants completed the initial study session and follow-up questionnaires. See Figure 1 for additional recruitment details.

Of those participants completing the initial study session and follow-up procedures ( $n=18$ ), the average age was 54.78 ( $SD=6.47$ ) and participants were primarily non-Hispanic (94.44%), Caucasian (77.80%) females. The majority of the participants were overweight, with an average BMI of 26.72 ( $SD=8.23$ ), and moderately nicotine dependent (FTND;  $M=5.17$ ,  $SD=1.69$ ). Ten participants were randomized to the control treatment group, and eight participants were randomized to the B-MI treatment group. See Table 1 for complete demographic data. No differences were observed between the group groups in regards to age, race and ethnicity, education level, body mass index, daily smoking rate, number of years smoked, level of nicotine dependence (as measured by the FTND), number of pack-years, number of previous quit attempts, alcohol use (as measured by the AUDIT) and HT status (i.e., currently taking an HT).

### **Specific Aim 1**

**Hypothesis 1.** In order to determine the impact of negative affect, weight concerns, and menopausal symptoms on motivation and readiness to quit smoking among postmenopausal females, correlations were calculated between the negative affect scale of the PANAS, SWEET and MRS, as well as baseline measures of URICA and MTSS. See Table 2 for descriptive data related to the above-mentioned variables.

Contrary to expectations, negative affect was not correlated with URICA,  $r(16)=0.13$ ,  $p=0.61$  and MTSS,  $r(16)=0.23$ ,  $p=0.37$ . In regards to smoking-related weight concerns, SWEET total score was positively correlated with baseline readiness to quit (measured via the URICA),  $r(16)=0.50$ ,  $p=0.04$ , with higher SWEET total scores associated with higher ratings of readiness to quit smoking, but motivation to quit smoking (measured via MTSS) was not significantly correlated with the SWEET total score,  $r(16)=0.08$ ,  $p=0.76$ . Menopausal

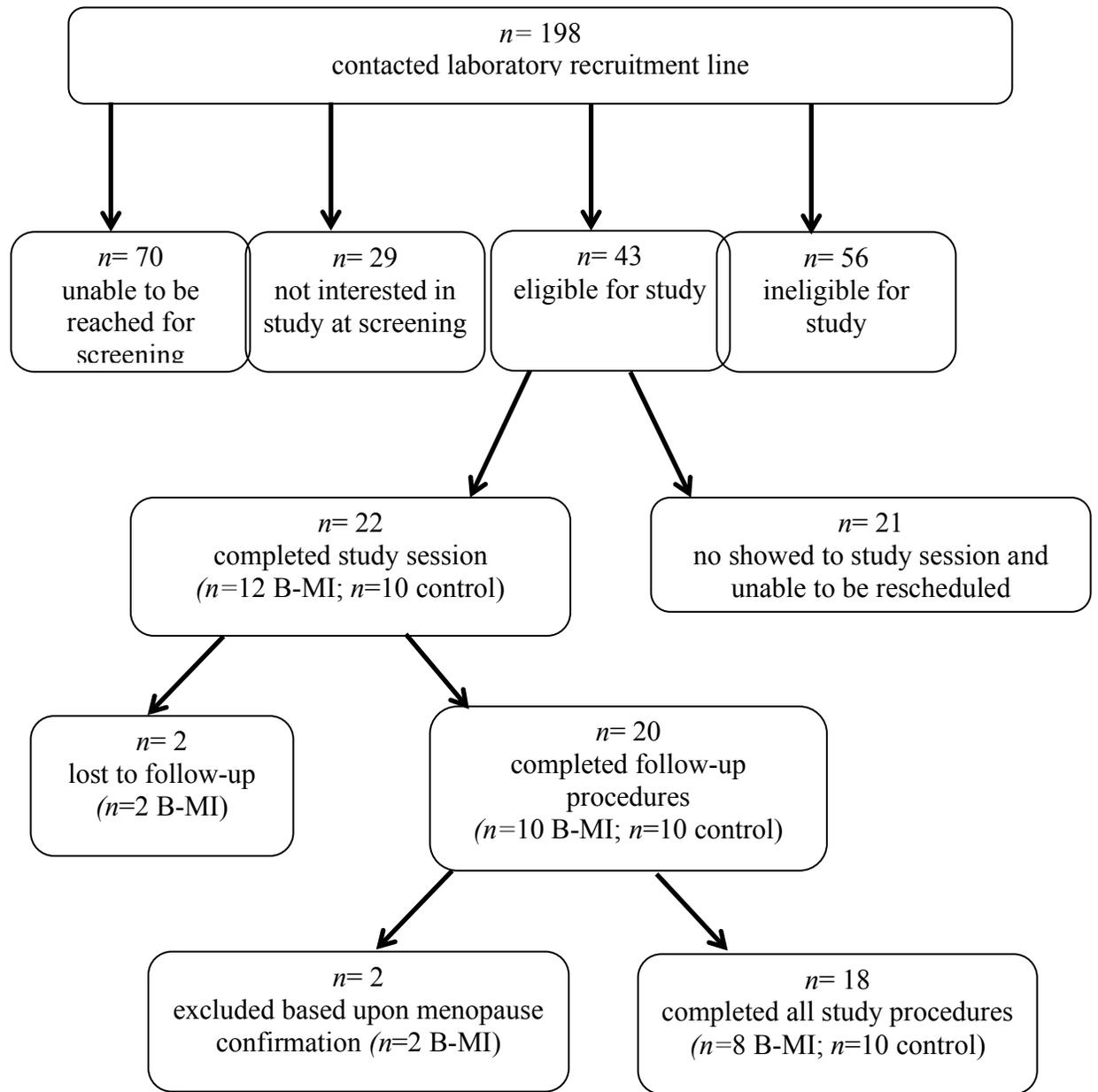


Figure 1. Participant recruitment data.

symptoms severity was positively correlated with motivation to quit smoking,  $r(16)=0.50$ ,  $p=0.04$ , with more severe menopausal symptom severity indicative of increased reports of motivation to quit smoking, but not readiness to quit,  $r(16)=0.37$ ,  $p=0.14$ .

Table 1. Differences between treatment groups (B-MI vs. Control) demographic variables (n = 18)

Demographic Variable	Treatment Group		B-MI Group 95% CI	Control Group 95% CI	F or $\chi^2$	p	Cohen's D or Cramer's V
	B-MI Group	Control Group					
Mean Age (SD)	55.13 (7.72)	54.50 (5.70)	[48.67, 61.58]	[50.42, 58.58]	0.04	0.85	0.09
Cigarettes per day	15.75 (4.62)	17.30 (4.79)	[11.89, 19.61]	[13.88, 20.72]	0.48	0.50	0.33
Years smoked	39.63 (7.52)	29.80 (17.35)	[33.34, 45.91]	[17.39, 42.21]	2.21	0.16	0.74
Pack years	31.06 (10.54)	26.71 (16.28)	[22.25, 39.88]	[15.06, 38.35]	0.43	0.52	0.32
Number of quit attempts	5.38 (4.84)	4.50 (4.09)	[1.33, 9.42]	[1.57, 7.43]	0.17	0.68	0.20
CO level	26.00 (19.11)	19.50 (5.62)	[10.03, 41.98]	[15.47, 23.52]	1.06	0.32	0.46
FTND	5.13 (1.73)	5.20 (1.75)	[3.68, 6.57]	[3.95, 6.45]	0.01	0.93	0.04
Lung Age	80.75 (8.94)	84.90 (25.53)	[82.28, 97.22]	[66.64, 103.16]	0.26	0.62	0.23
BMI	25.85 (7.56)	27.42 (9.07)	[19.53, 32.17]	[20.93, 33.91]	0.15	0.70	0.19
Body fat (%)	32.16 (11.27)	39.08 (24.19)	[22.74, 25.63]	[21.78, 56.38]	0.55	0.47	0.37
GDS	5.25 (3.45)	4.30 (3.97)	[1.22, 2.36]	[1.26, 1.46]	0.28	0.60	0.26
AUDIT	4.64 (6.95)	2.90 (3.60)	[-1.18, 10.43]	[0.32, 5.48]	0.47	0.51	0.31
Days until follow-up	8.00 (1.2)	7.7 (1.25)	[7.00, 89.00]	[6.81, 8.60]	0.27	0.61	0.25
Race (%)					2.09	0.55	0.34
Caucasian	75.00%	80.00%	---	---			
African American	12.50%	10.00%	---	---			
Multiracial	12.50%	0%	---	---			
Other	0%	10.00%	---	---			
Ethnicity (%)					1.32	0.25	0.27
Hispanic	12.50%	0.00%	---	---			
Non-Hispanic	87.50%	100.00%	---	---			
Education level (%)					2.96	0.23	0.41
High school/GED	37.50%	40.00%	---	---			
Some college	37.50%	50.00%	---	---			
Bachelor's degree	25.00%	0.00%	---	---			

(Table 1 continued)

Current HT status (%)					1.32	0.25	0.27
Taking HT	12.50%	0.00%	---	---			
Not taking HT	87.50%	100.00%	---	---			
Surgical menopause					0.68	0.41	0.19
Yes	37.50%	80.00%	---	---			
No	62.50%	20.00%	---	---			

Note. B-MI Group= Brief Motivation Interviewing Group; SD= Standard Deviation; CI = Confidence Interval; FTND= Fagerström Test for Nicotine Dependence; BMI= Body Mass Index; GDS= Geriatric Depression Scale; AUDIT= Alcohol Use Disorders Identification Test; HT= Hormone Therapy

Table 2. Differences between treatment and control groups for negative affect, smoking-related weight concerns, menopausal symptoms severity and baseline measures of motivation and readiness to quit (n = 18)

Variable	Treatment Group		B-MI Group 95% CI	Control Group 95% CI	F	p	Cohen's D
	B-MI Group	Control Group					
MTSS at baseline (SD)	3.63 (1.60)	2.70 (1.60)	[2.29, 4.96]	[1.58, 3.82]	1.52	0.27	0.58
URICA at baseline	7.94 (0.81)	8.19 (1.63)	[7.27, 8.62]	[7.02, 9.35]	0.14	0.71	0.19
PANAS							
negative affect	14.00 (5.83)	15.30 (4.50)	[9.13, 18.88]	[12.08, 18.52]	0.28	0.60	0.25
MRS							
total	15.75 (5.09)	11.50 (5.36)	[11.49, 20.01]	[7.77, 15.43]	2.78	0.12	0.81
somatic	6.50 (3.34)	4.80 (2.90)	[3.71, 9.29]	[2.73, 6.87]	1.34	0.26	0.54
urogenital	3.50 (2.27)	2.30 (2.06)	[1.60, 5.40]	[0.83, 3.77]	1.38	0.26	0.55
psychological	5.75 (2.71)	4.50 (2.68)	[0.96, 3.48]	[0.85, 2.59]	0.96	0.34	0.46

(Table 2 continued)

Variable	Treatment Group		B-MI Group 95% CI	Control Group 95% CI	<i>F</i>	<i>p</i>	<i>Cohen's</i> <i>D</i>
	B-MI Group	Control Group					
SWEET							
total	16.63 (4.34)	19.70 (7.65)	[13.00, 20.25]	[14.23, 25.17]	1.02	0.33	0.50
suppress appetite	6.25 (2.49)	7.00 (2.75)	[4.17, 8.33]	[5.03, 8.97]	0.36	0.56	0.29
prevent overeating	4.63 (0.92)	5.60 (2.68)	[3.86, 5.39]	[3.69, 7.51]	0.96	0.34	0.48
body dissatisfaction	2.38 (0.74)	2.70 (1.34)	[1.75, 3.00]	[1.74, 3.67]	0.38	0.55	0.30
withdrawal	3.38 (1.69)	4.40 (2.07)	[1.97, 4.78]	[2.92, 5.88]	1.28	0.27	0.54

Note. B-MI Group= Brief Motivation Interviewing Group; SD= Standard Deviation; CI = Confidence Interval; MTSS= Motivation To Stop Smoking; URICA= University of Rhode Island Change Assessment; PANAS= Positive and Negative Affect Scale; MRS= Menopause Rating Scale; SWEET= Smoking-Related

Given that the MRS and SWEET have subscales, exploratory analyses were conducted to investigate the relationship between specific subscales and motivation and readiness to quit. The MRS subscale of somatic menopausal symptoms was positively correlated with motivation to quit,  $r(16)=0.50, p=0.03$ ; however it was not correlated with readiness to quit,  $r(16)=0.37, p=0.14$ . The urogenital and psychological subscales were not significantly correlated with motivation or readiness to quit smoking. Additionally, the SWEET subscale of smoking to prevent overeating was positively correlated with readiness to quit,  $r(16)=0.66, p<0.01$ ; the other three SWEET subscales, smoking to suppress appetite, smoking to cope with body dissatisfaction, and withdrawal-related appetite increases, were not significantly correlated with motivation or readiness to quit smoking. See Table 3 for complete correlation data.

Table 3. Pearson's correlations for negative affect, smoking-related weight concerns, menopausal symptoms severity and baseline measures of motivation and readiness to quit (n = 18; df= 16)

	Motivation to quit smoking ( <i>r</i> )	Readiness to quit smoking ( <i>r</i> )
PANAS-negative affect scale	0.13	0.23
MRS- total	0.50*	0.37
MRS- somatic scale	0.50*	0.16
MRS- urogenital scale	0.16	0.22
MRS- psychological scale	0.31	0.38
SWEET- total	0.08	0.50*
SWEET- suppress appetite scale	0.14	0.33

(Table 3 continued)

	Motivation to quit smoking ( <i>r</i> )	Readiness to quit smoking ( <i>r</i> )
SWEET- prevent overeating scale	0.13	0.66**
SWEET- body dissatisfaction scale	-0.17	0.34
SWEET- withdrawal scale	0.21	0.31

Note. PANAS= Positive and Negative Affect Scale; MRS= Menopause Rating Scale; SWEET= Smoking-Related Weight Eating Episodes Test; \* $p \leq 0.05$ ; \*\*  $p \leq 0.01$

Table 4. Multiple linear regressions of potential predictors of motivation and readiness to quit smoking

	$\Delta R^2$	$\Delta F$	$\beta$	<i>t</i>	<i>p</i>
Readiness to stop smoking					
Model 1	0.39	2.99			0.07
PANAS- negative affect scale			0.29	1.37	0.19
MRS- total score			0.29	1.34	0.20
SWEET- total score			0.44	2.04	0.06
Motivation to stop smoking					
Model 1	0.30	1.91			0.18
PANAS- negative affect scale			0.20	0.87	0.40

(Table 4 cont.)

MRS- total score	0.54	2.30	0.04
SWEET- total score	-0.05	-0.22	0.83

Note. PANAS= Positive and Negative Affect Scale; MRS= Menopause Rating Scale; SWEET= Smoking-Related Weight Eating Episodes Test

To test the hypothesis that the combination of negative affect, weight concerns, and menopausal symptom severity predict readiness to quit smoking at baseline a multiple linear regression was conducted. A non-significant regression equation was found,  $R^2=0.39$ ,  $F(3,14)=2.99$ ,  $p=0.07$ ,  $f^2=0.64$ . Although not statistically significant, 39% of the variance in readiness to quit can be attributed to negative affect, weight concerns and menopausal symptom severity. Additionally, to test whether these variables predict motivation to quit smoking at baseline, a second multiple linear regression was conducted. A non-significant regression equation was found,  $R^2=0.29$ ,  $F(3,14)=1.92$ ,  $p=0.18$ ,  $f^2=0.41$ . Results are included in Table 4.

### Specific Aim 2

**Hypotheses 2-3.** To investigate the hypothesis that B-MI would increase motivation and readiness to quit smoking across time, a mixed-model MANOVA was conducted. Results indicated no significant main effect of Treatment Group,  $F(2,15)=0.63$ ,  $p=0.55$ , partial  $\eta^2 = 0.08$ ; however, there was a significant main effect of Time,  $F(4,13)=3.20$ ,  $p=0.05$ , partial  $\eta^2 = 0.50$ . The interaction between Time and Treatment Group was not significant,  $F(4,13)=0.68$ ,  $p=0.62$ , partial  $\eta^2 = 0.17$ . The significant results, were followed-up with a repeated measures, within subjects MANOVA; this provided significant results across time points,  $F(2,32)=4.68$ ,  $p=0.02$ , partial  $\eta^2 = 0.23$ . Follow-up ANOVAs investigated the results across time points, and both MTSS,  $F(2, 16)=3.08$ ,  $p=0.06$ ,  $d=0.88$  and URICA,  $F(2,16)=2.84$ ,  $p=0.07$ ,  $d=0.85$ ,

approached significance. Figure 2 illustrates means across time points and Table 5 displays these means. Pairwise comparisons comparing each time point were not significant (Table 6).

Table 5. Means and standard deviations of motivation and readiness to quit smoking

Measure	Time		
	Baseline	Post-treatment	Follow-up
MTSS ( <i>SD</i> )			
All participants ( <i>n</i> =18)	3.11 (1.61)	2.94 (1.70)	3.50 (1.58)
B-MI group ( <i>n</i> =8)	3.63 (1.60)	3.38 (1.85)	3.63 (1.60)
Control group ( <i>n</i> =10)	2.70 (1.57)	2.60 (1.58)	3.40 (1.65)
URICA ( <i>SD</i> )			
All participants ( <i>n</i> =18)	8.08 (1.30)	8.44 (1.60)	8.63 (1.97)
B-MI group ( <i>n</i> =8)	7.95 (0.81)	8.45 (1.55)	8.88 (1.86)
Control group ( <i>n</i> =10)	8.19 (1.63)	8.44 (1.72)	8.43 (2.14)

Note. MTSS= Motivation to Stop Smoking; URICA= University of Rhode Island Change

Table 6. Pairwise comparisons of URICA and MTSS at each time point

Measure	Time	Time	Mean Difference	Standard Error	<i>p</i>	95% CI	Cohen's <i>D</i>
MTSS	1	2	0.18	0.15	0.78	[-0.23, 0.58]	0.10
		3	-0.35	0.25	0.55	[-1.02, 0.32]	0.24
	2	1	-0.18	0.15	0.78	[-0.58, 0.23]	---
		3	-0.53	0.23	0.11	[-1.14, 0.09]	0.34
	3	1	0.35	0.25	0.55	[-0.32, 1.02]	---
		2	0.53	0.23	0.11	[-0.91, 1.14]	---
URICA	1	2	-0.38	0.20	0.21	[-0.90, 0.15]	0.25
		3	-0.59	0.31	0.23	[-1.42, 0.25]	0.34
	2	1	0.38	0.20	0.21	[-0.15, 0.90]	---
		3	-0.21	0.23	1.00	[-0.81, 0.40]	0.11
	3	1	0.59	0.31	0.23	[-0.25, 1.41]	---
		2	0.21	0.23	1.00	[-0.40, 0.81]	---

Note. MTSS= Motivation to Stop Smoking; URICA= University of Rhode Island Change

### Specific Aim 3

**Hypotheses 4-5.** To investigate the hypothesis that MI would increase self-efficacy (internal and external) to quit smoking across time, a second mixed-model MANOVA was conducted. Results indicated no significant main effect for Treatment Group,  $F(2,15)=0.82$ ,  $p=0.46$ , partial  $\eta^2 = 0.10$ , Time,  $F(4,13)=1.21$ ,  $p=0.36$ , partial  $\eta^2 = 0.27$ , or the interaction between Time and Treatment Group,  $F(4,13)=1.69$ ,  $p=0.21$ , partial  $\eta^2 = 0.34$ . Figure 3 illustrates means across time points. Given the lack of significant main effect results, follow-up analyses were not conducted.

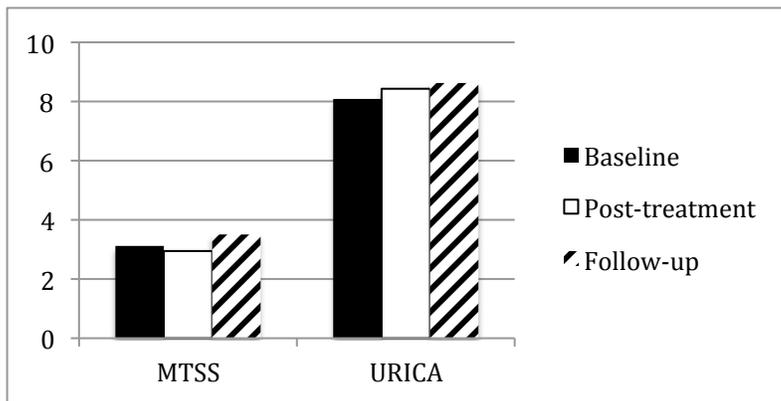


Figure 2. Means of motivation and readiness to quit smoking

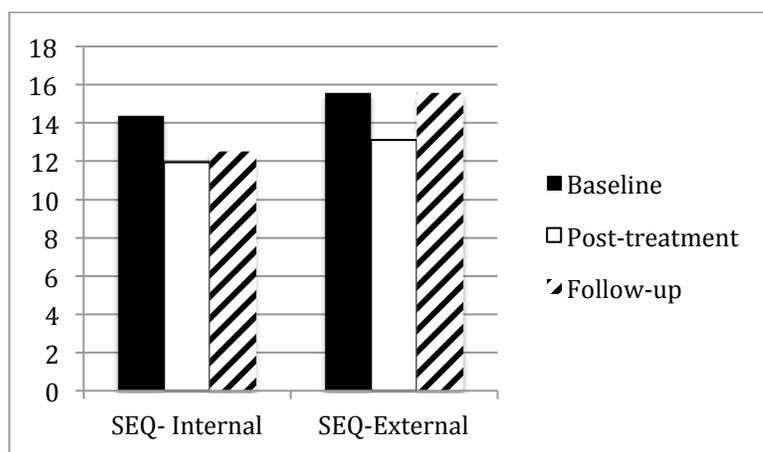


Figure 3. Means of internal and external self-efficacy.

## Exploratory Analyses

A mixed model MANOVA investigating whether MI would increase motivation and readiness to quit smoking across time was also conducted including the AUDIT score as a covariate, given the strong relationship between alcohol and tobacco consumption in the literature. However, similar to the above-described analyses there were no significant main effect for Treatment Groups,  $F(2,14)=1.01$ ,  $p=0.20$ , partial  $\eta^2 = 0.13$ , but there was a significant main effect of Time,  $F(4,12)=5.52$ ,  $p=0.01$ , partial  $\eta^2 = 0.67$ . Both the interaction between Time and Treatment Group,  $F(4,12)=0.67$ ,  $p=0.63$ , partial  $\eta^2 = 0.18$ , and Time and AUDIT score,  $F(4,12)=1.99$ ,  $p=0.16$ , partial  $\eta^2 = 0.40$ , were not significant. These findings indicate that problematic drinking did not affect above-mentioned findings.

Given the results that indicated that motivation and readiness to stop smoking increased at follow-up, exploratory analyses were conducted to see if these findings impacted the number of cigarettes smoked per day as measured at baseline and follow-up. Results showed a significant decrease ( $M= 3.87$ ,  $SD=4.25$ ) in cigarettes smoked per day from baseline to follow-up,  $t(17)=3.86$ ,  $p<0.01$ ,  $d=0.74$ , with a large effect size. Additionally, a correlation was also run using the GDS as a measure of negative affect to further explore the impact of negative affect, on motivation and readiness to quit smoking. Similar to the negative affect scale of the PANAS, the GDS did not significantly correlated to motivation to stop smoking (MTSS),  $r(16)=-0.74$ ,  $p=0.77$ , or readiness to quit (URICA),  $r(16)=-0.14$ ,  $p=0.58$ .

## DISCUSSION

The present study sought to explore the barriers related to postmenopausal female smokers' motivation and readiness to make a quit attempt, as well as enhance this motivation and readiness to make a behavioral change. Given that postmenopausal females continue to

smoke despite significantly increased health-related concerns related to low levels of estrogen in combination with the antiestrogenic effects of nicotine consumption, it is especially important to identify significant barriers to quit smoking and to motivate this population to engage in smoking cessation treatment. The present study identified that increased menopausal symptoms severity and smoking-related weight concerns were related to increased motivation to quit smoking. Additionally, although a B-MI did not significantly increase motivation or readiness to quit smoking when compared to the control condition, participants in both groups did increase on measures of motivation and readiness to quit from pre-treatment to follow-up.

Previous research has established that postmenopausal females endorse high levels of smoking-related weight concerns; however, despite these concerns, these females are more likely to enter smoking cessation than premenopausal counterparts (Copeland et al., 2006). The current results expand this research to demonstrate that higher levels of smoking-related weight concerns, especially concerns related to smoking to prevent overeating, are associated with higher levels of endorsed readiness to quit smoking. Additionally, results approached significance, which showed that smoking-related weight concerns accounted for 44% of the variance related to readiness to stop smoking at baseline. This may be related to augmented health concerns surrounding weight and smoking behaviors (Copeland et al., 2006; Ockene, 1987). Future research may explore the effectiveness of incorporating a weight loss intervention into smoking cessation treatment among postmenopausal smokers, to simultaneously address concerns related to both weight and smoking.

Reports of menopausal symptoms and smoking cessation have indicated that the presence of menopausal symptoms is associated with decreased rates of abstinence (Copeland et al., 2016). However, current results indicated a discrepant effect, with increased reports of

menopausal symptoms associated with increased endorsed motivation to make a cessation attempt. This contrary finding provides evidence that postmenopausal females may have significant concerns surrounding health and thus augment motivation for cessation to potentially combat these concerns. Previous research has suggested that many older smokers are motivated to quit due to smoking-related illnesses (Ockene, 1987). Furthermore, research identified that older women (aged 61-92 years old) express that health risks often drive the need to lose weight, indicating that health evaluation and health orientation are more important to body satisfaction (Hurd Clarke, 2002; Copeland et al., 2006; Jafary, Farahbakhsh, Shafiabadi, & Delavar, 2011). This finding may be extrapolated to smoking cessation, as older women also indicate that health evaluation is correlated with quality of life (Jafary et al., 2011). This is supported in the present study, as both total score and somatic menopausal symptoms (e.g., complaints associated with increased sweating/flushing, cardiac discomfort, sleep problems, joint/muscle pain) were associated with increased motivation for cessation.

Contrary to the hypotheses, negative affect (measured via PANAS-negative affect scale) was not correlated nor did it predict motivation or readiness to quit smoking at baseline. The negative affect scale of the PANAS produces scores ranging from 10 to 50, with higher scores being indicative of higher levels of negative affect (Watson et al., 1988). Furthermore, depressive symptoms (measured via GDS) did not correlate with motivation or readiness to quit smoking and participants across groups scored in the “mild” depressive symptom range. Research indicates that greater negative affect is often associated with a greater desire to smoke to relieve the negative affect (Johnson & McLeish, 2016). The low baseline levels of negative affect and depressive symptoms endorsed in the current sample likely affected the present results. The relatively low scores on these measures potentially represent a decreased

need to smoke to relieve negative emotions and thus explains why one's negative emotions would not impact intentions surrounding quitting smoking as previously expected.

The present study did not demonstrate B-MI as an effective strategy to increase motivation or readiness to make a cessation attempt. Although this did not support the hypotheses, the sample size in the present study was smaller than the proposed sample required to detect the treatment response, which may explain a lack of differences between treatment groups. However, despite the low sample size, the present study did detect an increase in motivation and readiness to quit smoking across time, with a large effect size (Cohen, 1988). Furthermore, results indicated that across groups, participants decreased smoking rate by approximately 20-30% per day during the 7-day follow-up, reporting a mean decrease in cigarettes per day at follow-up ( $M= 3.87, SD=4.25$ ). These results indicate that it is beneficial to encourage postmenopausal females to evaluate smoking behaviors, as well as physical and psychological symptoms, as both groups did during the baseline assessments. This not only increased motivation and readiness to make a smoking cessation attempt but also helped postmenopausal females cut down their daily smoking rate, regardless of treatment group.

There is also evidence from meta-analyses, showing that individuals that are younger in age and endorse lower levels of nicotine dependence and motivation to quit smoking may exhibit an increase in response to MI (Hettinga & Hendricks, 2010). Given that the participants in the present study were older females, who identified as moderately nicotine dependent (FTND score,  $M=5.17, SD=1.69$ ) and on average endorsed intention to quit smoking (MTSS score at baseline,  $M=3.11, SD=1.61, 3=$  "I want to stop smoking but haven't thought about when"), this may have decreased the response to the B-MI intervention. Thus, it may be more advantageous to tailor a B-MI intervention, which incorporates the health concerns related to

weight and vasomotor symptoms of menopause in addition to tobacco-related concerns as observed in the present study. Further, a meta-analysis of MI effectiveness within the context of brief follow-up shows that MI produces a significant treatment effect when compared to a minimally active treatment as opposed to control treatments (Hettema & Hendricks, 2010). It may be beneficial for future research to test a B-MI intervention tailored to postmenopausal females against another active treatment.

The B-MI also did not increase internal or external self-efficacy to change. Self-efficacy to change is described by Miller and Rollnick (2013) as a critical component to fostering positive behavioral change. In light of this, it is not surprising the present intervention did not increase internal or external self-efficacy, as the B-MI had no observable effect on motivation for behavioral change. In order to foster self-efficacy, it is necessary for hope and likelihood of behavioral change to be supported (Center for Substance Abuse Treatment [CSAT], 1999). The present study was not a treatment study and did not explicitly recruit individuals who wanted to quit smoking. Thus, it is possible that participants did not feel as though the prospect of a successful cessation attempt was supported within the intervention and impacted the fostering of their self-efficacy to make a behavioral change. Further, it has been suggested that education increases self-efficacy among those making positive behavioral changes in the context of substance use (CSAT, 1999; Miller & Rollnick, 2013). The present intervention did not explicitly provide education related to specific concerns related to postmenopausal female smokers, including menopausal symptoms and weight-related education. Incorporating specific education into future MI interventions targeting this population, including how smoking impacts postmenopausal weight gain and the somatic symptoms of menopause, may support increased self-efficacy for smoking cessation.

## Limitations

The present study has several limitations that warrant mention. First, the sample size in the present study was smaller than the proposed sample determined a priori to detect a treatment response, and it included a limited and potentially biased participant pool. Participants included postmenopausal females who were able to contact the laboratory recruitment line via telephone or E-mail, representing a sampling bias. These individuals were able to attend study sessions on weekdays and evenings and provide their own transportation to these study sessions. While no treatment response was detected, a main effect of time on motivation and readiness to quit, as well as on cigarettes smoked per day, was found despite the limited sample size. Furthermore, both findings exhibited meaningful effect sizes, indicating clinically significant observations. While findings suggest positive outcomes for engaging postmenopausal females in contemplating smoking cessation treatment, these results should be viewed with caution given the small sample size and its limited generalizability. In light of this small sample size, future studies should consider planning data analysis for small sample sizes, given the present demonstrated recruitment difficulties.

The correlational design of the exploration of barriers to motivation to impact smoking prevents casual inferences to be drawn about the relationship between negative affect, weight concerns, menopausal symptoms and motivation and readiness to quit smoking. Future research may conduct experimental designs that investigate the impact of these barriers on motivation and readiness to make a cessation attempt. Additionally, the study was conducted in the Southeast United States, a geographical area that has higher smoking rates when compared to other parts of the country (e.g., Northeast, West; USDHHS, 2014). Thus generalizability of results may be limited to certain regions of the country.

The current study did not utilize standardized assessment tools, including ratings of global adherence to MI protocol and behavior tallies to measure elements of MI adherence (see Moyers, Manuel, & Ernst, 2015 for example). Given that the study therapists were actively enrolled in weekly clinical supervision to discuss implementing the intervention, the present study did not formally assess for adherence to the study protocol, as sessions were informally assessed during supervisions meetings. Future studies of B-MI within the population would benefit from including measures of protocol adherence. Finally, the study only included a one-week follow-up. In light of evidence that MI's effect may wane over time, a longer follow-up would have explored whether or not findings would decrease over a longer time period.

Despite these limitations, the present study exhibited several strengths. To the author's knowledge, it is the first study of its kind to investigate the barriers to motivation and readiness to make a cessation attempt among postmenopausal female smokers and the impact of B-MI on motivation and readiness to make a behavioral change among this population. It also biologically confirmed FSH level at two-time points to ensure participants were postmenopausal with stable hormone levels and not in pre- or perimenopause. Lastly, the present study maintained the majority of its participants through the study procedures, only losing two individuals (9% of participants) to follow-up.

### **Implications and future directions**

The present study identified smoking-related weight concerns, specifically surrounding smoking to prevent overeating, as related to increased motivation to quit smoking. The study identified menopausal symptom severity, most notably somatic symptoms, was associated with increased readiness for cessation. Additionally, results indicate that motivation and readiness to quit increased over time and cigarettes per day decreased from baseline to follow-up. Future

research should investigate how these barriers affect a smoking cessation attempt. Furthermore, given that the present study's detected an increase in motivation and readiness to quit across treatment groups, future studies may consider powering the study to include analysis percentage of point prevalence rates of abstinence or reduction in cigarettes per day between the subscales of the URICA (Precontemplation, Contemplation, Action, and Maintenance; DiClemente, et al., 1991). This would allow future research to investigate the movement between the stages of change and provide more insight to improve cessation outcomes among postmenopausal females.

Given that previous research has demonstrated that females will enter smoking cessation treatment despite health concerns, including weight concerns, it would be beneficial to explore how these noted barriers impact cessation treatment (Copeland et al., 2006; McVay & Copeland, 2011). For instance, research has shown that pre-treatment measures of variables including weight concerns significantly increased treatment drop out rates (Copeland et al., 2006). Research also suggests that nicotine replacement therapy (NRT) may provide short-term assistance for postmenopausal females making a quit attempt; however, NRT has not demonstrated to be helpful among postmenopausal smokers with a history of depression or with post-cessation weight gain (Oncken, Cooney, Feinn, Lando, & Kranzler, 2007; Allen, Kleppinger, Lando, & Oncken, 2013). Exploring these barriers' effect on a quit attempt may provide health care providers with valuable information to assist postmenopausal females in entering smoking cessation treatment, as well as potentially tailoring treatment to individuals.

Furthermore, it would be advantageous to investigate whether a MI-based intervention that was tailored to include education on such barriers (e.g., smoking-related weight concerns and menopausal symptoms) would positively affect a quit attempt. Previous research has

indicated that smoking cessation programs designed to address weight maintenance, depressive symptoms and peer support needs (e.g., group vs. individual treatment) may be beneficial when making a cessation attempt (Copeland et al., 2006). Thus, it could be helpful to include specific treatment components to target smoking-related weight concerns and menopausal symptoms and thus increase motivation to engage in cessation treatment.

Given the implications that postmenopausal females' motivation may be affected by health concerns surrounding weight and physical symptoms, it would be interesting to explore the relationship between health literacy, motivation/readiness to engage in a quit attempt and self-efficacy to quit (Copeland et al., 2006; Hurd Clarke, 2002; Jafary et al., 2011; Ockene, 1987). Lower health literacy has been associated with not only less knowledge regarding smoking-related health risks and increased dependence. Previous research has demonstrated that lower health literacy also more positive consequences of smoking and less negative expectancies of smoking; overall, lower health literacy was associated with less knowledge of the health risks of smoking (Stewart et al., 2013). Thus, identifying and potentially targeting low health literacy among this population with education regarding post-cessation weight and impact of cessation on menopausal symptom severity may increase motivation to engage in smoking cessation.

### **Summary**

In summary, the present study is the first to explore barriers related to motivation and readiness to make a quit attempt as well as employ a B-MI intervention to enhance motivation and readiness for cessation in postmenopausal females. Smoking-related weight concerns, specifically surrounding smoking to prevent overeating, were identified as related to increased motivation to quit smoking and menopausal symptoms severity, including somatic symptoms,

were associated with increased readiness for cessation. Additionally, although B-MI did not increase motivation or readiness to quit, results indicate that across groups, motivation and readiness to quit increased over time and cigarettes per day decreased from baseline to follow-up. These results provide important insight into enhancing engagement in a smoking cessation treatment among this population, who experiences increased health-related concerns related to low levels of estrogen in combination with the antiestrogenic effects of nicotine use. Future research based upon these results could explore the impact of these barriers on a cessation attempt, as well as to tailor treatments to include concerns unique to this population of smokers, including smoking-related weight concerns, menopausal symptoms severity and health literacy regarding smoking and menopause.

## REFERENCES

- Adams, C. E., Baillie, L. E., & Copeland, A. L. (2011). The Smoking-Related Weight and Eating Episodes Test (SWEET): Development and Preliminary Validation. *Nicotine & Tobacco Research, 13*(11), 1123-1131. doi: 10.1093/ntr/ntr162
- Allen, S. S., Brintnell, D. M., Hatsukami, D. K., & Reich, B. (2004a). Energy intake and physical activity during short-term smoking cessation in postmenopausal women. *Addictive Behaviors, 29*(5), 947-951. doi: 10.1016/j.addbeh.2004.02.041
- Allen, S. S., Hatsukami, D. K., Bade, T., & Center, B. (2004b). Transdermal nicotine use in postmenopausal women: does the treatment efficacy differ in women using and not using hormone replacement therapy?. *Nicotine and Tobacco Research, 6*(5), 777-88. doi: 10.1080/1462220042000274239
- Allen, S. S., Hatsukami, D. K., & Christianson, D. (2003). Nicotine withdrawal and depressive symptomatology during short-term smoking abstinence: a comparison of postmenopausal women using and not using hormone replacement therapy. *Nicotine and Tobacco Research, 5*(1), 49-59. doi: 10.1080/1462220021000060473
- Allen, A. M., Kleppinger, A., Lando, H., & Oncken, C. (2013). Effect of Nicotine Patch on Energy Intake and Weight Gain in Postmenopausal Women during Smoking Cessation. *Eating Behaviors, 14*(4), doi: 10.1016/j.eatbeh.2013.07.007.
- Amodei, N., & Lamb, R. (2004). Convergent and concurrent validity of the Contemplation Ladder and URICA scales. *Drug and Alcohol Dependence, 73*(3), 301-306. doi:10.1016/j.drugalcdep.2003.11.005
- Babor, T. F., Higging-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). *AUDIT: The Alcohol Use Disorders Identification Test: Guidelines for use in primary care*. World Health Organization.
- Bandura, A. (1977). Self-efficacy: Toward a Unifying Theory of Behavioral Change. *Psychological Review, 84*(2), 191-215. doi: 10.1037/0033-295X.84.2.191
- Bem, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology, 6*, 1-62. New York: Academic Press.
- Benowitz, N. L. (2009). Pharmacology of Nicotine: Addiction, Smoking-Induced Disease, and Therapeutics. *Annual Review of Pharmacology and Toxicology, 49*, 57-71. doi: 10.1146/annurev.pharmtox.48.113006.094742
- Benowitz, N., Lessovschlaggar, C., Swan, G., & Jacob, P. (2006). Female sex and oral contraceptive use accelerate nicotine metabolism. *Clinical Pharmacology & Therapeutics, 79*(5), 480-488. doi: 10.1016/j.clpt.2006.01.008

- Bobo, J.K., & Husten, C. (2000). Sociocultural Influences on Smoking and Drinking. *Alcohol Research & Health*, 24(4), 225-232. Retrieved from <https://pubs.niaaa.nih.gov/publications/arh24-4/225-232>
- Breitling, L. P., Rothenbacher, D., Stegmaier, C., Raum, E., & Brenner, H. (2009). Older Smokers' Motivation and Attempts to Quit Smoking: Epidemiological Insight into the Question of Lifestyle Versus Addiction. *Deutsches Ärzteblatt International*, 106(27), 451–455. doi: 10.3238/arztebl.2009.0451
- Bromberger, J. T., Kravitz, H. M., Chang, Y. F., Cyranowski, J. M., Brown, C., & Matthews, K. A. (2011). Major Depression During and After the Menopausal Transition: Study of Women's Health Across the Nation (SWAN). *Psychological Medicine*, 41(9), 1879–1888. doi: 10.1017/S003329171100016X
- BTNX Inc. (2015). Rapid response FSH menopause test cassette. Retrieved from <http://www.btnx.com/Product.aspx?id=1898>
- Burger, H. G., Hale, G. E., Robertson, D. M., & Dennerstein, L. (2007). A review of hormonal changes during the menopausal transition: Focus on findings from the Melbourne Women's Midlife Health Project. *Human Reproduction Update*, 13(6), 559-565. doi: 10.1093/humupd/dmm020
- Burke, B. L., Arkowitz, H., & Menchola, M. (2003). The efficacy of motivational interviewing: a meta-analysis of controlled clinical trials. *Journal of Consulting and Clinical Psychology*, 71(5), 843-861. doi: 10.1037/0022-006X.71.5.843
- Center of Disease Control and Prevention. (2015, May 15b). About Adult BMI. Retrieved from [http://www.cdc.gov/healthyweight/assessing/bmi/adult\\_bmi/index.html](http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html)
- Center of Disease Control and Prevention. (2015, November 13). Current Cigarette Smoking Among Adults — United States, 2005–2014. Retrieved from [http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6444a2.htm?s\\_cid=mm6444a2\\_w#Tab](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6444a2.htm?s_cid=mm6444a2_w#Tab)
- Center of Disease Control and Prevention. (2012, November 18). *Tobacco use: Targeting the nation's leading killer at a glance 2011*. Retrieved from <http://www.cdc.gov/chronicdisease/resources/publications/aag/osh.htm>
- Center for Substance Abuse Treatment (1999). Brief Interventions and Brief Therapies for Substance Abuse. Rockville (MD): Substance Abuse and Mental Health Services Administration (US). Treatment Improvement Protocol (TIP) Series, No. 34. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK64947/>
- Cepeda-Benito, A., Reynoso, J. T., & Erath, S. (2004). Meta-analysis of the efficacy of nicotine replacement therapy for smoking cessation: differences between men and

- women. *Journal of Consulting and Clinical Psychology*, 72(4), 712-722. doi: 10.1037/0022-006X.72.4.712
- Cohen, J. (1988). *Statistical power analysis for the behavioural sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Colby, S. M., Monti, P. M., Barnett, N. P., Rohsenow, D. J., Weissman, K., Spirito, A. ... Lewander, W. J. (1998). Brief motivational interviewing in a hospital setting for adolescent smoking: a preliminary study. *Journal of Consult and Clinical Psychology*, 66(3), 574-578. doi: 10.1037/0022-006X.66.3.574
- Copeland, A. L., Martin, P. D., Geiselman, P. J., Rash, C. J., & Kendzor, D. E. (2006). Predictors of pretreatment attrition from smoking cessation among pre- and postmenopausal, weight-concerned women. *Eating Behaviors*, 7(3), 243-51. doi: 10.1016/j.eatbeh.2005.10.001
- Copeland, A. L., Peltier, M. R., & Geiselman, P.J. (2016). Severity of Menopausal Symptoms and Nicotine Dependence among Postmenopausal Women Smokers. *Journal of Smoking Cessation*. doi: <http://dx.doi.org/10.1017/jsc.2016.14>
- Copeland, A. L., Waldo, K., Peltier, M. R., & Hecht, G. S. (2015). The Role of Hormone Therapy in Nicotine Dependence and Smoking Cessation (C. L. Owens, Ed.). In *Nicotine Dependence, Smoking Cessation and Effects of Secondhand Smoke*. Hauppauge, NY: Nova Science.
- Copeland, A. L. (2015, May). Brief motivational enhancement for smokers: Personalized health feedback. Paper presented at the meeting of The Smoking Science Summit, London, United Kingdom.
- Curry, S. J., Ludman, E. J., Gramham, E., Stout, J., Grothaus, L., & Lozano, P. (2003). Pediatric-based smoking cessation intervention for low-income women: a randomized trial. *Archives of Pediatric and Adolescent Medicine*, 157(3), 295-302. doi:10.1001/archpedi.157.3.295
- DiClemente, C.C. & Hughes, S.O. (1990). Stages of change profiles in alcoholism treatment. *Journal of Substance Abuse*, 2, 217-235. Retrieved from: <http://www.ncbi.nlm.nih.gov/pubmed/2136111>
- DiClemente, C. C., Prochaska, J. O., Fairhurst, S. K., Velicer, W. F., Velasquez, M. M., & Rossi, J. S. (1991). The process of smoking cessation: An analysis of precontemplation, contemplation, and preparation stages of change. *Journal of Consulting and Clinical Psychology*, 59(2), 295-304. doi: 10.1037/0022-006x.59.2.295
- Dijkstra, A., & Tromp, D. (2002). Is the FTND a measure of physical as well as psychological tobacco dependence?. *Journal of Substance Abuse Treatment*, 23(4), 367-374.

Retrieved from [http://www.journalofsubstanceabusetreatment.com/article/S0740-5472\(02\)00300-8/fulltext](http://www.journalofsubstanceabusetreatment.com/article/S0740-5472(02)00300-8/fulltext)

- Dreher, J. C., Schmidt, P. J., Kohn, P., Furman, D., Rubinow, D., & Berman, K. F. (2007). Menstrual cycle phase modulates reward-related neural function in women. *Proceedings of the National Academy of Sciences USA*, *104*(7), 2465-70. doi: 10.1073/pnas.0605569104
- Dunn, C., Deroo, L., & Rivara, F.P. (2001). The use of brief interventions adapted from motivational interviewing across behavioral domains: a systematic review. *Addiction*, *96*(12), 1725-1742. doi: 10.1046/j.1360-0443.2001.961217253.x
- Etter, J. F. (2005). Comparing the efficacy of two internet-based, computer-tailored smoking cessation programs: A randomized trial. *Journal of Medical Internet Research*, *7*(1), e2. doi: 10.2196/jmir.7.1.e2
- Etter, J. F., Bergman, M. M., Humair, J. P., & Perneger, T. V. (2000). Development and validation of a scale measuring self-efficacy of current and former smokers. *Addiction*, *95*(6), 901-913. doi: 10.1046/j.1360-0443.2000.9569017.x
- Etter, J. F., Duc, T. V., & Perneger, T. V. (1999). Validity of the fagerström test for nicotine dependence and of the heaviness of smoking index among relatively light smokers. *Addiction*, *94*(2), 269-281. doi: 10.1046/j.1360-0443.1999.94226910.x
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G\*power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavioral Research Methods*, *39*(2), 175-191. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/17695343>
- Festinger, L. (1957). *A Theory of Cognitive Dissonance*. Stanford, CA: Stanford University Press.
- Finney, J., Wilbourne, P., & Moos, R. (2007). Psychosocial Treatments for Substance Use Disorders. In P. Nathan & J. Gorman (Eds.), *A Guide to Treatments that Work* (3rd ed., p. 183). New York, New York: Oxford University Press.
- Franklin, T. R., Ehrman, R., Lynch, K. G., Sciortino, N., O'Brien, C. P., & Childress, A. R. (2008). Menstrual cycle phase at quit date predicts smoking status in an NRT treatment trial: a retrospective analysis. *Journal of Women's Health (Larchmt)*, *17*(2), 287-92. doi: 10.1089/jwh.2007.0423
- Glasgow, R. E., Whitlock, E. P., Eakin, E. G., & Lichtenstein, E. (2000). A brief smoking cessation intervention for women in low-income planned parenthood clinics. *American Journal of Public Health*, *90*(5), 786-789. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1446229/pdf/10800431.pdf>

- Grant, B.F., Hasin, D.S., Chou, S.P., Stinson, F.S., & Dawson D.A. (2004). Nicotine Dependence and Psychiatric Disorders in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Achieves of General Psychiatry*, 61(11),1107-1115. doi:10.1001/archpsyc.61.11.1107
- Gwaltney, C. J., Metrik, J., Kahler, C. W., & Shiffman, S. (2009). Self-Efficacy and Smoking Cessation: A Meta-Analysis. *Psychology of Addictive Behaviors : Journal of the Society of Psychologists in Addictive Behaviors*, 23(1), 10.1037/a0013529. <http://doi.org/10.1037/a0013529>
- Hale, G. E., Zhao, X., Hughes, C. L., Burger, H. G., Robertson, D. M., & Fraser, I. S. (2007). Endocrine Features of Menstrual Cycles in Middle and Late Reproductive Age and the Menopausal Transition Classified According to the Staging of Reproductive Aging Workshop (STRAW) Staging System. *Obstetrical & Gynecological Survey*, 63(1), 34-35. doi: 10.1097/01.ogx.0000298341.98325.81
- Harris, K. J., Catley, D., Good, G. E., Cronk, N. J., Harrar, S., & Williams, K. B. (2010). Motivational interviewing for smoking cessation in college students: A group randomized controlled trial. *Preventative Medicine*, 51(5), 387-393. doi: 10.1016/j.yjmed.2010.08.018
- Haug, N. A., Svikis, D. S., & Diclemente, C. (2004). Motivational Enhancement Therapy for Nicotine Dependence in Methadone-Maintained Pregnant Women. *Psychology of Addictive Behaviors*, 18(3), 289-292. doi: 10.1037/0893-164X.18.3.289
- Hauser, G. A., Huber, I. C., Keller, P. J., Lauritzen, C., & Schneider, H. P. (1994). Evaluation of climacteric symptoms (Menopause Rating Scale). *Zentralbl Gynakol*, 116(1), 16-23. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/8147175>
- Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerstrom, K. O. (1991). The Fagerström Test for Nicotine Dependence: a revision of the Fagerström Tolerance Questionnaire. *British Journal of Addiction*, 86(9), 1119-1127. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/1932883>
- Heckman, C. J., Egleston, B. L., & Hofmann, M. T. (2010). Efficacy of motivational interviewing for smoking cessation: a systematic review and meta-analysis. *Tobacco Control*, 19(5), 410-416. doi: 10.1136/tc.2009.033175
- Heinemann, K., Ruebig, A., Potthoff, P., Schneider, H. P., Strelow, F., Heinemann, L. A., & Thai, D. M. (2004). The Menopause Rating Scale (MRS) scale: A methodological review. *Health and Quality of Life Outcomes*, 2, 45. doi: 10.1186/1477-7525-2-45
- Hettema, J. E. (2009). *Motivational interviewing training video: A tool for learners* [DVD] available from <http://www.mittrainingvideo.com>

- Hettema, J. E., & Hendricks, P. S. (2010). Motivational Interviewing for smoking cessation: a meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*(6), 868-884. doi: 10.1037/a0021498
- Hettema, J., Steele, J., & Miller, W. R. (2005). Motivational interviewing. *Annual Review of Clinical Psychology, 1*, 91-111. doi: 10.1146/annurev.clinpsy.1.102803.143833
- Hurd Clarke, L. (2002). Older women's perceptions of ideal body weights: the tensions between health and appearance motivations for weight loss. *Ageing & Society, 22*(6), 751-773. doi: 10.1017/S0144686X02008905
- Husky, M. M., Mazure, C. M., Paliwal, P., & McKee, S. A. (2008). Gender differences in the comorbidity of smoking behavior and major depression. *Drug and Alcohol Dependence, 93*(1-2), 176-179. doi:10.1016/j.drugalcdep.2007.07.015
- Israel, D., & Youngkin, E. Q. (1997). Herbal therapies for perimenopausal and menopausal complaints. *The Journal of Human Pharmacology and Drug Therapy, 17*(5), 970-984. doi: 10.1002/j.1875-9114.1997.tb03786.x
- Jafary, F., Farahbakhsh, K., Shafiabadi, A., & Delavar, A. (2011). Quality of life and menopause: Developing a theoretical model based on meaning in life, self-efficacy beliefs, and body image. *Aging and Mental Health, 15*(5), 630-637, doi: 10.1080/13607863.2010.548056
- Jensvold, M. F. (1996). Nonpregnant reproductive-age women, part i: The menstrual cycle and psychopharmacology. In M. Jensvold, U. Halbreich & J. Hamilton (Eds.), *Psychopharmacology and women: Sex, gender and hormones* (pp. 139-70). Washington D.C.: American Psychiatric Press, Inc.
- Johnson, A.L., & McLeish, A.C. (2016). The indirect effect of emotion dysregulation in terms of negative affect and smoking-related cognitive processes. *Addictive Behaviors, 53*, 187-192. doi: 10.1016/j.addbeh.2015.10.023
- Kalogeraki A., Tamiolakis, D., Relakis, K., Karvelas, K., Froudarakis, G., Hassan, E., . . . Delides, G. (1996). Cigarette smoking and vaginal atrophy in postmenopausal women. *In Vivo, 10*, 597-600. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/8986469>
- Kimball, J. W. (2013, September 12). Hormones of the reproductive system. Retrieved January 07, 2016, from <http://biology-pages.info/S/SexHormones.html#menopause>
- Kotz, D., Brown, J., & West, R. (2013). Predictive validity of the Motivation To Stop Scale (MTSS): a single-item measure of motivation to stop smoking. *Drug & Alcohol Dependence, 128*(1-2). 15-9. doi: 10.1016/j.drugalcdep.2012.07.012

- Kulesza, M., Apperson, M., Larimer, M. E., & Copeland, A. L. (2010). Brief alcohol intervention for college drinkers: How brief is?. *Addictive Behaviors, 35*(7), 730-733. doi: 10.1016/j.addbeh.2010.03.011
- Lai D. T. C., Cahill, K., Qin Y., & Tang J. L. (2011). Motivational interviewing for smoking cessation. *Cochrane Database of Systematic Reviews, 2010*(1), CD006936. doi: 10.1002/14651858.CD006936.pub2.
- Levesque, D.A., Gelles, R.J., & Velicer, W.F. (2000). Development and validation of a stages of change measure for men in batterer treatment. *Cognitive Therapy and Research, 24*(2), 175-199. doi: 10.1023/A:1005446025201
- Lyness, J.M., Noel, T.K., Cox, C., King, D.A., Conwell, Y., & Caine E.D (1997). Screening for Depression in Elderly Primary Care Patients: A Comparison of the Center for Epidemiologic Studies—Depression Scale and the Geriatric Depression Scale. *Achieves of Internal Medicine, 157*(4), 449-454. doi:10.1001/archinte.1997.00440250107012
- Lobo, R. A. (2009). Menopause and Aging. In J. Strauss & R. Barbieri (Eds.), *Yen and Jaffe's reproductive endocrinology: Physiologic, pathophysiology and clinical management* (6th ed., pp. 325-355). Philadelphia: Saunders Elsevier.
- Lundahl, B.W., Kunz, C., Brownell, C., Tollefson, D., & Burke, B.L. (2010). A meta-analysis of motivational interviewing: Twenty-five years of empirical studies. *Research on Social Work Practice, 20*(2), 137-160. doi: 10.1177/1049731509347850
- Madson, M.B., Schumacher, J.A., Baer, J.S., & Martino, S. (2016). Motivational interviewing for substance use: Mapping out the next generation of research. *Journal of Substance Abuse Treatment, 65*, 1-5. doi: 10.1016/j.jsat.2016.02.003
- Manuel, J. K., Lum, P. J., Hengl, N. S., & Sorensen, J. L. (2013). Smoking cessation interventions with female smokers living with HIV/AIDS: a randomized pilot study of motivational interviewing. *AIDS Care, 25*(7), 820-827. doi: 10.1080/09540121.2012.733331
- McConaughy, E.A., DiClemente, C.C., Prochaska, J.O., & Velicer, W.F. (1989). Stages of change in psychotherapy: a follow-up report. *Psychotherapy: Theory, Research, Practice, Training, 26*(4), 494–503. doi: 10.1037/h0085468
- McKinlay, S. M., Brambill, D. J., & Posner, J. G. (1992). The normal menopause transition. *Maturitas, 14*(2), 103-115. doi: 10.1016/0378-5122(92)90003-M
- McVay, M.A. (2011). Food Cravings and Food Cue Responding Across the Menstrual Cycle (Doctoral Dissertation, Louisiana State University). Retrieved from [http://etd.lsu.edu/docs/available/etd-05312012-093118/unrestricted/Megan\\_McVay\\_diss.pdf](http://etd.lsu.edu/docs/available/etd-05312012-093118/unrestricted/Megan_McVay_diss.pdf)

- McVay, M. A., & Copeland, A. L. (2011). Smoking cessation in peri- and postmenopausal women: a review. *Experimental and Clinical Psychopharmacology*, *19*(3), 192-202. doi: 10.1037/a0023119
- Meyers, R. (Director). (2012). *Yosemite: The High Sierras* [Video file]. Mill Creek Entertainment.
- Michnovicz, J. J., Hershcopf, R. J., Naganuma, H., Bradlow, H. L., & Fishman, J. (1986). Increased 2-Hydroxylation of estradiol as a possible mechanism for the anti-estrogenic effect of cigarette smoking. *New England Journal of Medicine*, *315*(21), 1305-1309. doi: 10.1056/nejm198611203152101
- Miller, W. R. (1983). Motivational interviewing with problem drinkers. *Behavioural Psychotherapy*, *11*(2), 147-172. Retrieved from <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=5845668>
- Miller, W. R., & Rollnick, S. (2013). *Motivational interviewing: helping people change*. (3rd ed.). New York: Guilford Press.
- Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: preparing people change*. (2nd ed.). New York: Guilford Press.
- Miller, W. R., & Rollnick, S. (1992). *Motivational interviewing: preparing people change addictive behavior*. (1st ed.). New York: Guilford Press.
- Miller, W. R., & Rose, G. S. (2009). Toward a theory of motivational interviewing. *American Psychologist*, *64*(6), 527-537. doi: 10.1037/a0016830
- Miller W. R., & Sanchez, V. C. (1993) Motivating young adults for treatment and lifestyle change. In: Howard, G. (ed.) *Issues in Alcohol Use and Misuse in Young Adults*. Notre Dame, IN: University of Notre Dame Press.
- Miller, W. R., Zweben, A., DiClemente, C. C., & Rychtarik, R. G. (1992). *Motivational Enhancement Therapy Manual: A Clinical Research Guide for Therapists Treating Individuals with Alcohol Abuse and Dependence* (Vol. 2). Rockville, MD: National Institute on Alcohol Abuse and Alcoholism.
- Moyers, T.B., Manuel, J.K., & Ernst, D. (2015). *Motivational Interviewing Treatment Integrity Coding Manual 4.2.1*. Unpublished manual.
- Mueck, A., & Seeger, H. (2005). Smoking, Estradiol Metabolism and Hormone Replacement Therapy. *CMCCHA Current Medicinal Chemistry-Cardiovascular & Hematological Agents*, *3*(1), 45-54. doi: 10.2174/1568016052773270

- National Institute on Aging. (2015). Postmenopausal Health Concerns. *Menopause: A time for change*. Retrieved from <https://www.nia.nih.gov/health/publication/menopause-time-change/postmenopausal-health-concerns>
- Oncken, C., Cooney, J., Feinn, R., Lando, H., & Kranzler, H. R. (2007). Transdermal nicotine for smoking cessation in postmenopausal women. *Addictive Behaviors, 32*(2), 296-309. doi: 10.1016/j.addbeh.2006.04.004
- Ockene, J. K. (1987). Physician-delivered interventions for smoking cessation: strategies for increasing effectiveness. *Preventative Medicine, 16*(5), 723-37. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/3317393>
- O'Hara, P., Connett, J. E., Lee, W. W., Nides, M., Murray, R., & Wise, R. (1998). Early and Late Weight Gain following Smoking Cessation in the Lung Health Study. *American Journal of Epidemiology, 148*(9), 821-830. doi: 10.1093/oxfordjournals.aje.a009706
- Parente, R. C., Faerstein, E., Celeste, R. K., & Werneck, G. L. (2008). The relationship between smoking and age at the menopause: A systematic review. *Maturitas, 61*(4), 287-298. doi: 10.1016/j.maturitas.2008.09.021
- Perkins, K. A., Conklin, C. A., & Levine, M. D. (2008). *Cognitive-behavioral therapy for smoking cessation: A practical guidebook to the most effective treatments*. New York: Routledge.
- Perkins, K. A. (2001). Smoking cessation in women: Special considerations. *CNS Drugs, 15*(5), 391-411. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/11475944>
- Pomerleau, C. S., Carton, S. M., Lutzke, M. L., Flessland, K. A., & Pomerleau, O. F. (1994). Reliability of the Fagerstrom tolerance questionnaire and the Fagerstrom test for nicotine dependence. *Addictive Behaviors, 19*(1), 33-39. doi: 10.1016/0306-4603(94)90049-3
- Pomerleau, C. S., & Kurth, C. L. (1996). Willingness of female smokers to tolerate postcessation weight gain. *Journal of Substance Abuse, 8*(3), 371-8. Retrieved from: <http://www.ncbi.nlm.nih.gov/pubmed/8934441>
- Potthoff, P., Heinemann, L. A., Schneider, H. P., Rosemeier, H. P., & Hauser, G. A. (2000). The Menopause Rating Scale (MRS II): methodological standardization in the German population. *Zentralbl Gynakol, 122*(5), 280-6. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/10857215>
- Prignot, J. (1987). Quantification and chemical markers of tobacco-exposure. *European Journal of Respiratory Disease, 70*(1), 1-7. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/3545884>

- Prochaska, J. O., Diclemente, C. C., & Norcross, J. C. (1992). In search of how people change: Applications to addictive behaviors. *American Psychologist*, *47*(9), 1102-1114. doi: 10.1037/0003-066x.47.9.1102
- Rogers, C. (1959). A Theory of Therapy, Personality and Interpersonal Relationships as Developed in the Client-centered Framework. In (ed.) S. Koch, *Psychology: A Study of a Science. Vol. 3: Formulations of the Person and the Social Context*. New York: McGraw Hill.
- Rubak, S., Sandbaek, A., Lauritzen, T., & Christensen, B. (2005). Motivational interviewing: a systematic review and meta-analysis. *British Journal of General Practice*, *55*(513), 305-312. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1463134/>
- Ruger, J. P., Weinstein, M. C., Hammond, S. K., Kearney, M. H., & Emmons, K. M. (2008). Cost-Effectiveness of Motivational Interviewing for Smoking Cessation and Relapse Prevention among Low-Income Pregnant Women: A Randomized Controlled Trial. *Value in Health : The Journal of the International Society for Pharmacoeconomics and Outcomes Research*, *11*(2), 191-198. doi: 10.1111/j.1524-4733.2007.00240.x
- Schneider, H. P., Heinemann, L. A., Rosemeier, H., Potthoff, P., & Behre, H. M. (2000). The Menopause Rating Scale (MRS): Reliability of scores of menopausal complaints. *Climacteric*, *3*(1), 59-64. doi: 10.3109/13697130009167600
- Sheikh, J.I., & Yesavage, J.A. (1986). Geriatric Depression Scale (GDS): Recent evidence and development of a shorter version. *Clinical Gerontologist*, *5*(1-2), 165-173. doi: 10.1300/J018v05n01\_09
- Sherwin, B. (1996). Menopause, early aging and elderly women. In M. Jensvold, U. Halbreich & J. Hamilton (Eds.), *Psychopharmacology and women: Sex, gender and hormones* (pp. 225-40). Washington D.C.: American Psychiatric Press, Inc.
- Soderstrom, C.A., DiClemente, C.C., Dischinger, P.C., Hebel, J.R., McDuff, D.R., Auman, K.M., Kufera, J.A. (2007). A Controlled Trial of Brief Intervention Versus Brief Advice for At-Risk Drinking Trauma Center Patients. *Journal of Trauma-Injury Infection & Critical Care*, *62*(5), 1102-1112. doi: 10.1097/TA.0b013e31804bdb26
- Soules, M. R., Sherman, S., Parrott, E., Rebar, R., Santoro, N., Utian, W., & Woods, N. (2001). Executive summary: Stages of Reproductive Aging Workshop (STRAW). *DCLI Climacteric*, *4*(4), 267-272. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/11770182>
- Staropoli, C. A., Flaws, J. A., Bush, T. L., & Moulton, A. W. (1998). Predictors of menopausal hot flashes. *Journal of Women's Health*, *7*(9), 1149-55. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/9861592>

- Stephens, S., Cellucci, T., & Gregory, J. (2004). Comparing stage of change measures in adolescent smokers. *Addictive Behaviors, 29*(4), 759-764. doi:10.1016/j.addbeh.2004.02.004
- Stewart, D. W., Adams, C. E., Cano, M. A., Correa-Fernández, V., Li, Y., Waters, A. J., ... Vidrine, J. I. (2013). Associations Between Health Literacy and Established Predictors of Smoking Cessation. *American Journal of Public Health, 103*(7), e43–e49. <http://doi.org/10.2105/AJPH.2012.301062>
- Stotts, A. L., Di Clemente, C. C., & Dolan-Mullen, P. (2002). One-to-one: a motivational intervention for resistant pregnant smokers. *Addictive Behaviors, 27*(2), 275-92. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/11817768>
- Swan, G. E., Ward, M. M., Jack, L. M., & Carmelli, D. (1993). Weight-related factors as predictors of a high rate of relapse. *Annals of Behavioral Medicine, 15* (Suppl),S134.
- Tanko', L. B., & Christiansen, C. (2004). An update on the antiestrogenic effect of smoking: A literature review with implications for researchers and practitioners. *Menopause, 11*, 104-9. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/14716190>
- Tiggemann, M. (2004). Body image across the adult life span: stability and change. *Body Image, 1*(1), 29-41. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/18089139>
- United States Department of Health and Human Services. (2014). The Health Consequences of Smoking—50 years of Progress: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Humans Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. Retrieved from [http://www.cdc.gov/tobacco/data\\_statistics/sgr/50th-anniversary/index.htm](http://www.cdc.gov/tobacco/data_statistics/sgr/50th-anniversary/index.htm)
- United States Department of Health and Human Services. (2010). How tobacco smoke causes disease: The biological and behavioral basis for smoking-attributed disease: A report of the surgeon general. Atlanta, GA: U.S. Department of Health and Humans Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. Retrieved from [http://www.surgeongeneral.gov/library/reports/tobaccosmoke/full\\_report.pdf](http://www.surgeongeneral.gov/library/reports/tobaccosmoke/full_report.pdf)
- Unsal, A., Tozun, M., & Ayranci, U. (2011). Prevalence of depression among postmenopausal women and related characteristics. *Climacteric, 14*(2), 244-251. doi: 10.3109/13697137.2010.510912
- Waldo, K. (2014). Effects of brief motivational interviewing on motivation for weight loss (Master's Thesis, Louisiana State University). Retrieved from [http://etd.lsu.edu/docs/available/etd-04062014-213507/unrestricted/Waldo\\_Thesis.pdf](http://etd.lsu.edu/docs/available/etd-04062014-213507/unrestricted/Waldo_Thesis.pdf)

- Warnecke, R. B., Morera, O., Turner, L., Mermelstein, R., Johnson, T. P., Parsons, J., & ... Flay, B. (2001). Changes in self-efficacy and readiness for smoking cessation among women with high school or less education. *Journal Of Health And Social Behavior*, 42(1), 97-109. doi:10.2307/3090229
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-70. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/3397865>
- Whiteman, M. K., Staropoli, C. A., Langenberg, P. W., Mccarter, R. J., Kjerulff, K. H., & Flaws, J. A. (2003). Smoking, Body Mass, and Hot Flashes in Midlife Women. *Obstetrics & Gynecology*, 101(2), 264-272. doi: 10.1097/00006250-200302000-00012
- Whitlock, E.P., Vogt, T.M., Hollis, J.F., & Lichtenstein, E. (1997). Does gender affect response to a brief clinic-based smoking intervention?. *American Journal of Preventative Medicine*, 13(3), 159-66. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/9181202>
- Williamson, D. F., Madans, J., Anda, R. F., Kleinman, J. C., Giovino, G. A., & Byers, T. (1991). Smoking Cessation and Severity of Weight Gain in a National Cohort. *The New England Journal of Medicine*, 324, 739-745. doi: 10.1056/NEJM19910314324110
- Wing, R. R., Matthews, K. A., Kuller, L. H., Meilahn, E.N., & Plantinga, P. L. (1991) Weight Gain at the Time of Menopause. *Archives of Internal Medicine*, 151(1), 97-102. doi:10.1001/archinte.1991.00400010111016
- Woods, N. F., & Mitchell, E. S. (2005). Symptoms during perimenopause: Prevalence, severity, trajectory, and significant in women's lives. *American Journal of Medicine*, 118(12B), 14S-24S. doi: 10.1016/j.amjmed.2005.09.031

## Appendix A

### STUDY MEASURES

#### Phone Screening

Name: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Okay to leave a message? YES NO

1. Gender: Female Male
2. Age: \_\_\_\_\_
3. Number of Cigarettes per day: \_\_\_\_\_
4. Number of years smoking (continuously): \_\_\_\_\_
5. How many months since last menses (period)?: \_\_\_\_\_
  - a. Date: \_\_\_\_\_

#### Demographic Questionnaire

Please respond to each of the following questions.

1. Gender: Female Male
2. Age: \_\_\_\_\_
3. Race: White Black American Indian Asian  
Multirace Other
4. Ethnicity: Hispanic Non-hispanic
5. Relationship Status:  
Single In a relationship Married Divorced Widowed  
Other
6. Highest Level of Education Completed:  
Less than 8<sup>th</sup> grade 8<sup>th</sup> Grade Some High School  
High school graduate/GED Some College Bachelor's degree  
Some Graduate School Graduate Degree
7. In the past year have you had a period? Yes No
  - a. Date of last period: \_\_\_\_\_
8. Do you currently take any daily medications?: Yes No
  - a. If Yes, what type: \_\_\_\_\_
9. Do you smoke cigarettes daily?: Yes No
  - a. If yes, how many cigarettes do you smoke per day?: \_\_\_\_\_

10. How many years have you been smoking?: \_\_\_\_\_
11. What is your preferred brand of cigarettes?: \_\_\_\_\_
12. Have you ever tried to quit smoking before?:        Yes        No
- a. If Yes, how many times have you tried? \_\_\_\_\_
13. Have you ever undergone menopause as the result of a surgery?:    Yes    No
- a. If Yes, what procedure? \_\_\_\_\_
14. Are you currently taking a hormonal replacement therapy? YES    NO
- a. If Yes, what type? \_\_\_\_\_

### **Fagerström Test for Nicotine Dependence (FTND)**

Please read each question below. For each question check the answer choice which best describes your responses.

1. How soon after you wake up do you smoke your first cigarette?
- \_\_\_\_\_ Within 5 Minutes
- \_\_\_\_\_ Within 6-30 minutes
- \_\_\_\_\_ Within 31-60 minutes
- \_\_\_\_\_ More than 60 minutes
2. Do you find it difficult to refrain from smoking in places where it is forbidden (e.g. in church, at the library, at the movies, etc.)?
- \_\_\_\_\_ No
- \_\_\_\_\_ Yes
3. Which cigarette would you hate most to give up?
- \_\_\_\_\_ The first one in the morning
- \_\_\_\_\_ All others
4. How many cigarettes per day do you smoke?
- \_\_\_\_\_ 10 or less
- \_\_\_\_\_ 11-20
- \_\_\_\_\_ 21-30
- \_\_\_\_\_ 31 or more
5. Do you smoke more frequently during the first hours after waking than during the rest of the day?
- \_\_\_\_\_ No
- \_\_\_\_\_ Yes
6. Do you smoke if you are so ill that you are in bed most of the day?
- \_\_\_\_\_ No

\_\_\_\_\_ Yes

### University of Rhode Island Stages of Change Assessment (URICA)

Please indicate the extent to which you tend to agree or disagree with each statement. In each case, make your choice in terms of how you feel right now, not what you have felt in the past or would like to feel.

For all the statements that refer to your “problem”, answer in terms of your smoking. And “here” refers to the place of treatment.

There are FIVE possible responses to each of the items in the questionnaire:

**1 = Strongly Disagree 2 = Disagree 3 = Undecided 4 = Agree 5 = Strongly Agree**

1.	As far as I'm concerned, I don't have any problems that need changing.	_____
2.	I think I might be ready for some self-improvement.	_____
3.	I am doing something about the problems that had been bothering me.	_____
4.	It might be worthwhile to work on my problem.	_____
5.	I'm not the problem one. It doesn't make much sense for me to be here.	_____
6.	It worries me that I might slip back on a problem I have already changed, so I am here to seek help.	_____
7.	I am finally doing some work on my problem.	_____
8.	I've been thinking that I might want to change something about myself.	_____
9.	I have been successful in working on my problem but I'm not sure I can keep up the effort on my own.	_____
10.	At times my problem is difficult, but I'm working on it.	_____
11.	Being here is pretty much a waste of time for me because the problem doesn't have to do with me.	_____
12.	I'm hoping this place will help me to better understand myself.	_____
13.	I guess I have faults, but there's nothing that I really need to change.	_____
14.	I am really working hard to change.	_____
15.	I have a problem and I really think I should work at it.	_____
16.	I'm not following through with what I had already changed as well as I had hoped, and I'm here to prevent a relapse of the problem.	_____
17.	Even though I'm not always successful in changing, I am at least working on my problem.	_____
18.	I thought once I had resolved my problem I would be free of it, but sometimes I still find myself struggling with it.	_____
19.	I wish I had more ideas on how to solve the problem.	_____
20.	I have started working on my problems but I would like help.	_____
21.	Maybe this place will be able to help me.	_____

22.	I may need a boost right now to help me maintain the changes I've already made.	_____
23.	I may be part of the problem, but I don't really think I am.	_____
24.	I hope that someone here will have some good advice for me.	_____
25.	Anyone can talk about changing; I'm actually doing something about it.	_____
26.	All this talk about psychology is boring. Why can't people just forget about their problems?	_____
27.	I'm here to prevent myself from having a relapse of my problem.	_____
28.	It is frustrating, but I feel I might be having a recurrence of a problem I thought I had resolved.	_____
29.	I have worries but so does the next guy. Why spend time thinking about them?	_____
30.	I am actively working on my problem.	_____
31.	I would rather cope with my faults than try to change them.	_____
32.	After all I had done to try to change my problem, every now and again it comes back to haunt me.	_____

### Motivation to Stop Smoking (MTSS)

Please indicate which of the following describes you?

1. "I don't want to stop smoking"
2. "I think I should stop smoking but don't really want to"
3. "I want to stop smoking but haven't thought about when"
4. "I really want to stop smoking but I don't know when I will"
5. "I want to stop smoking and hope to soon"
6. "I really want to stop smoking and intend to in the next 3 months"
7. "I really want to stop smoking and intend to in the next month".

### Smoking Self-Efficacy Questionnaire (SEQ-12)

The following are some situations in which certain people might be tempted to smoke. Please indicate whether you are sure that you could refrain from smoking in each situation using one of the following answers:

1 = Not at all sure    2 = Not very sure    3 = More or less sure  
4 = Fairly sure    5 = Absolutely sure

1. When I feel nervous \_\_\_\_\_
2. When I feel depressed \_\_\_\_\_
3. When I am angry \_\_\_\_\_
4. When I feel very anxious \_\_\_\_\_
5. When I want to think about a difficult problem \_\_\_\_\_
6. When I feel the urge to smoke \_\_\_\_\_
7. When having a drink with friends \_\_\_\_\_
8. When celebrating something \_\_\_\_\_

9. When drinking beer, wine, or other spirits \_\_\_\_\_  
 10. When I am with smokers \_\_\_\_\_  
 11. After a meal \_\_\_\_\_  
 12. When having coffee or tea \_\_\_\_\_

**Positive and Negative Affect Schedule (PANAS)**

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to the word. Indicated what extent you *feel in this moment*, that is, how you currently feel today. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely
_____	Interested	_____	Irritable	
_____	Distressed	_____	Alert	
_____	Excited	_____	Ashamed	
_____	Upset	_____	Inspired	
_____	Strong	_____	Nervous	
_____	Guilty	_____	Determined	
_____	Scared	_____	Attentive	
_____	Hostile	_____	Jittery	
_____	Enthusiastic	_____	Active	
_____	Proud	_____	Afraid	

**Smoking-related Weight and Eating Episodes Test (SWEET)**

1	2	3	4	5
<i>Never</i>	<i>Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Always</i>

1. When I feel hungry, I have a cigarette to curb my appetite \_\_\_\_\_

2. When I crave unhealthy food, I have a cigarette to avoid eating \_\_\_\_\_
3. When I feel like having a snack, I have a cigarette instead \_\_\_\_\_
4. If I don't smoke soon after a meal, I continue to eat more than I need \_\_\_\_\_
5. Smoking after a meal helps me to avoid overeating \_\_\_\_\_
6. When I am full, I smoke so that I won't eat more \_\_\_\_\_
7. When I feel fat, I have a cigarette \_\_\_\_\_
8. I smoke when I am worried about gaining weight \_\_\_\_\_
9. I crave tasty foods when I haven't smoked in a while \_\_\_\_\_
10. I feel hungrier when I haven't smoked in a while \_\_\_\_\_

### Menopause Rating Scale

Which of the following symptoms apply to you at this time? Please, mark the appropriate box for each symptom. For symptoms that do not apply, please mark 'none'.

**Symptoms:**

	none	mild	moderate	severe	very severe
	-----	-----	-----	-----	-----
<b>Score</b>	<b>= 0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
1. Hot flushes, sweating (episodes of sweating).....	<input type="checkbox"/>				
2. Heart discomfort (unusual awareness of heart beat, heart skipping, heart racing, tightness).....	<input type="checkbox"/>				
3. Sleep problems (difficulty in falling asleep, difficulty in sleeping through, waking up early).....	<input type="checkbox"/>				
4. Depressive mood (feeling down, sad, on the verge of tears, lack of drive, mood swings).....	<input type="checkbox"/>				
5. Irritability (feeling nervous, inner tension, feeling aggressive).....	<input type="checkbox"/>				
6. Anxiety (inner restlessness, feeling panicky).....	<input type="checkbox"/>				
7. Physical and mental exhaustion (general decrease in performance, impaired memory, decrease in concentration, forgetfulness).....	<input type="checkbox"/>				
8. Sexual problems (change in sexual desire, in sexual activity and satisfaction).....	<input type="checkbox"/>				
9. Bladder problems (difficulty in urinating, increased need to urinate, bladder incontinence).....	<input type="checkbox"/>				
10. Dryness of vagina (sensation of dryness or burning in the vagina, difficulty with sexual intercourse).....	<input type="checkbox"/>				
11. Joint and muscular discomfort (pain in the joints, rheumatoid complaints).....	<input type="checkbox"/>				

### Geriatric Depression Scale

Choose the best answer for how you have felt over the past week:

1. Are you basically satisfied with your life? YES / NO

2. Have you dropped many of your activities and interests? YES / NO
3. Do you feel that your life is empty? YES / NO
4. Do you often get bored? YES / NO
5. Are you in good spirits most of the time? YES / NO
6. Are you afraid that something bad is going to happen to you? YES / NO
7. Do you feel happy most of the time? YES / NO
8. Do you often feel helpless? YES / NO
9. Do you prefer to stay at home, rather than going out and doing new things? YES / NO
10. Do you feel you have more problems with memory than most? YES / NO
11. Do you think it is wonderful to be alive now? YES / NO
12. Do you feel pretty worthless the way you are now? YES / NO
13. Do you feel full of energy? YES / NO
14. Do you feel that your situation is hopeless? YES / NO
15. Do you think that most people are better off than you are? YES / NO

### Alcohol Use Disorders Identification Test: Self-Report Version

Questions	0	1	2	3	4	
1. How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week	
2. How many drinks containing alcohol do you have on a typical day when you are drinking?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more	
3. How often do you have six or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
4. How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
5. How often during the last year have you failed to do what was normally expected of you because of drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
7. How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
8. How often during the last year have you been unable to remember what happened the night before because of your drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	
9. Have you or someone else been injured because of your drinking?	No		Yes, but not in the last year		Yes, during the last year	
10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?	No		Yes, but not in the last year		Yes, during the last year	
					<b>Total</b>	

## APPENDIX B

### INSTITUTIONAL REVIEW BOARD APPROVAL

#### ACTION ON PROTOCOL APPROVAL REQUEST



Institutional Review Board  
Dr. Dennis Landin, Chair  
130 David Boyd Hall  
Baton Rouge, LA 70803  
P: 225.578.8692  
F: 225.578.5983  
[irb@lsu.edu](mailto:irb@lsu.edu) | [lsu.edu/irb](http://lsu.edu/irb)

**TO:** Amy Copeland  
Psychology

**FROM:** Dennis Landin  
Chair, Institutional Review Board

**DATE:** May 11, 2016

**RE:** IRB# 3733

**TITLE:** Women & Smoking

**New Protocol/Modification/Continuation:** New Protocol

**Review type:** Full  Expedited  **Review date:** 5/10/2016

**Risk Factor:** Minimal  Uncertain  Greater Than Minimal

**Approved**  **Disapproved**

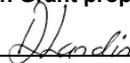
**Approval Date:** 5/11/2016 **Approval Expiration Date:** 5/10/2017

**Re-review frequency:** (annual unless otherwise stated)

**Number of subjects approved:** 500

**LSU Proposal Number** (if applicable):

**Protocol Matches Scope of Work in Grant proposal:** (if applicable) \_\_\_\_\_

**By:** Dennis Landin, Chairman 

**PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –  
Continuing approval is CONDITIONAL on:**

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects\*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE: When emailing more than one recipient, make sure you use bcc.**

*\*All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at <http://www.lsu.edu/irb>*

## VITA

MacKenzie Rae Peltier was born in Worcester, Massachusetts. She earned her Bachelor of Arts Degree in Health & Counseling Psychology and English Communications from Emmanuel College (Boston, MA) in 2010. Ms. Peltier went on to obtain a Master of Arts in Psychology from Louisiana State University, where she continued her doctoral work. Her work at Louisiana State University was conducted under the mentorship of Amy L. Copeland. Ms. Peltier completed an APA accredited predoctoral internship in Clinical Psychology in June 2017 at the Veterans Administration Connecticut Healthcare System in West Haven, Connecticut. She will begin her postdoctoral fellowship within the Department of Psychiatry at Yale School of Medicine in July 2017. Ms. Peltier's primary research interests include investigating gender/sex differences in the etiology and treatment of substance use disorders, with specific emphasis placed upon the role of endocrinology.