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Expectancy mediated effects of marijuana on menopause symptoms

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EXPECTANCY MEDIATED EFFECTS OF MARIJUANA ON MENOPAUSE SYMPTOMS

by

Melissa N. Slavin

A Thesis

Submitted to the University at Albany, State University of New York

in Partial Fulfillment of

the Requirements for the Degree of

Master of Arts

College of Arts & Sciences

Department of Psychology

2017
Preface

This work includes an expanded and revised version of the author’s previously published material of which she was the lead researcher: Slavin, M. N., Farmer, S., & Earleywine, M. (2016). Expectancy mediated effects of marijuana on menopause symptoms. *Addiction Research and Theory, 24*(4). [https://doi.org/10.3109/16066359.2016.1139701](https://doi.org/10.3109/16066359.2016.1139701). The study was part of programmatic line of research consisting of a coherent and appropriately sequenced investigation for purposes of this thesis. Permission has been obtained from the publisher: [http://authorservices.taylorandfrancis.com/copyright-and-you/](http://authorservices.taylorandfrancis.com/copyright-and-you/).
Abstract
Marijuana (MJ) alleviates a variety of symptoms, including those associated with menopause, such as insomnia, irritability, depression, and joint pain. However, little work has addressed the use of MJ in a menopausal population, or the role of menopausal women’s MJ treatment expectancies in their MJ consumption. The current study examined menopause symptoms, expectancies of MJ induced relief from symptoms, MJ monthly use, as well as average intoxication among menopausal and post-menopausal women (N=115) who endorsed lifetime MJ use. We hypothesized that women would expect MJ to alleviate symptoms that have already shown empirically supported MJ-induced relief. Second, based on the MJ expectancy literature, we hypothesized that links from menopause symptoms to MJ use would arise via indirect paths through expectancies. Third, we examined whether women’s expectancies, monthly use, and average intoxication level predicted MJ-related problems. Paired t-tests revealed that women expected MJ to improve joint/muscle discomfort, irritability, sleep problems, depression, anxiety, and hot flashes, but not decreased libido, heart discomfort, exhaustion, vaginal dryness, and bladder problems. Regression analyses and a bootstrapping technique found that expectancies mediated the links between menopause symptoms and monthly use. A regression analysis found that symptoms, expectancies, and monthly use predicted MJ-related problems; average intoxication positively predicted problems, while MJ expectancies negatively predicted problems. Particularly as the population ages, increased research on how MJ might help menopause symptoms without increasing MJ-related problems could prove heuristic.

Keywords: marijuana; menopause symptoms; treatment expectancies
Introduction

Menopause, the transition from a reproductive state to a non-reproductive state, is a natural progression in a woman’s life. Ill-treated symptoms, however, need not mar the experience. Symptoms that have come to widely represent the process include hot flashes, night sweats, insomnia, anxiety, depression, mood swings, joint pain, vaginal dryness, decreased libido, and urinary symptoms. This paper will briefly review current medical treatments for menopause, and provide a rationale for why MJ might have relevant utility in treating associated symptoms. In addition, the literature on MJ expectancies will be described, including the role they may play in predicting MJ use in menopausal women. Finally, the import of ensuring that MJ use does not lead to negative consequences will be addressed.

Current Medical Treatments

Insufficient management of menopause symptoms arises from a variety of factors, including lack of awareness of effective and safe treatment options, as well as increasing costs of medications (Im & Hwang, 2012). Supplemental estrogen, a Hormone Replacement Therapy (HRT) was prescribed as a first line treatment for menopause symptoms up until 2002. Around this time, the Women’s Health Initiative (WHI), a multi-site randomized clinical trial, found that the associated health risks of this treatment outweighed the benefits, and other treatments were more strongly considered (Burg et al., 2006). These risks include heightened chances of breast cancer, ovarian cancer, thromboembolic disease, stroke, and cardiovascular disease (Beral & Bull, 1997; Lacey et al., 2002). Although HRT has demonstrated success in treating vasomotor symptoms (hot flashes and night sweats), efficacy research in treating sexual issues as well as affective and emotional symptoms associated with menopause, for which it is sometimes used, is inconclusive (Waldman, 1998a). Furthermore, estrogen might not be the sole mechanism for the
efficacy of HRT in treating vasomotor symptoms, as levels have not shown to differ between symptomatic and non-symptomatic women (see for review Guidozzi, 2013).

Other treatments for hot flashes included antidepressants, although their underlying mechanism of action is also currently unclear (Kockler & McCarthy, 2004). A review of the role of antidepressants for hot flashes describes alternative explanations for hot flashes, potentially arising from neurotransmitter metabolites that might accompany estrogen withdrawal (Kockler & McCarthy, 2004). Nevertheless, the efficacy of antidepressant medications for treating hot flashes is not fully established and these medications are also associated with undesirable side effects related to sexual dysfunction (Kockler & McCarthy, 2004).

While hot flashes may be the most common symptom of menopause, only a minority of women finds them particularly distressing (Brockie, 2013). The emphasis placed on treating this symptom often overshadows the importance of managing other troubles including anxiety, depression, mood swings, insomnia, and joint pain. The general neglect of research and treatments for other major debilitating symptoms calls for greater investigation of alternative medications that may help ameliorate major discomfort in menopause. A holistic treatment plan that addresses all symptoms would be ideal, particularly given each symptom’s potential for exacerbating other symptoms. For example, anxiety, irritability, and mood swings can arise from insomnia and disturbed sleep, which might stem from night sweats (Waldman, 1998b; Thurston, Blumenthal, Babyak, & Sherwood, 2006). The vicious circle of one symptom exaggerating another suggests that any treatment for one could potentially benefit many, if not all.

**Alternative Treatments**
Heightened awareness about affordable alternative treatment options has the potential to improve the experience of menopause. Although research is limited, a few well-designed studies have indicated some positive effects of complementary therapies, particularly those with the potential to address more symptoms than only hot flashes (Ihenacho, 2009). Reviews of empirical work report that small trials appear suggestive but underscore the need for larger experiments and more research on herbal therapy, diet, and lifestyle changes (Brockie, 2013; Royal College of Obstetricians and Gynaecologists, 2010). In addition, behavioral treatments such as acupuncture and relaxation techniques have been shown to help calm the nervous system, and thus reduce the severity and frequency of hot flashes (Waldman, 1998; Kockler & McCarthy, 2004). Ultimately, if data warrant serious consideration of prescribing these alternative treatments in a healthcare setting, providers will likely want greater control over usage and adherence.

**MJ and Menopause**

MJ has potential as a non-hormonal alternative treatment for menopause symptoms, as research has found support for its treatment of sleep problems, irritability, depression, and joint pain (Earleywine, 2005; Russo & Hohmann, 2013; Russo, Guy, & Robson, 2007), symptoms that commonly occur during menopause (Schneider, Heinemann, Rosemeier, Potthoff & Behre, 2000). As described in Russo’s historical review (2002), a plethora of ancient literature suggests that MJ served as a medicine in obstetrics and gynecology. Russo (2002) confirms that these more primitive writings and references are consistent with current clinical and epidemiological reports. He suggests that cannabis extracts may represent an efficacious and safe alternative for treatment of a variety of women’s conditions, including menopause symptoms. Amongst his review is a description of “Dysmenine”, a late 19th century patent medicine in America for
treating menstrual cramps, containing cannabis. During this era, a popular medical text described cannabis as an analgesic for menopause, uterine disturbances, and painful menstruation (Sajous and Sajous 1924). Solomon Snyder, the discoverer of the opiate receptor, suggested the potential role of cannabis in treating migraine headaches or menstrual cramps, where treatment such as aspirin may be too mild, and opiates too powerful and risky (Snyder, 1971). A classic text in modern times also devotes an entire section to case studies of MJ’s impact on PMS, menstrual cramps, and labor pains, supporting excellent relief of symptoms at low doses without cognitive impairment (Grinspoon & Bakalar, 1993).

Further, as the reproductive system contains endogenous cannabinoid receptors that interact with estrogen, endocannabinoids play a direct role in the menstrual cycle and menopause (El-Talatini, Taylor, Elson, Brown, Davidson, and Konje, 2009). Both estrogen and endocannabinoids tend to peak at ovulation, as estrogen recruits the endocannabinoid system to help regulate emotional response and relieve anxiety and depression through its actions on the brain (Hill, Araceli, and Godzilla, 2007). As ovulation does not occur in menopausal women, lowered levels of estrogen lead to a reduction in activation of the endocannabinoid system, which may influence some of the negative symptoms associated with menopause, including lowered mood and a poorer ability to respond to stress (Hill, Karacabeyli, and Gorzalka, 2007). Regarding treatment implications, MJ can activate the reproductive system’s cannabinoid receptors, and have a positive effect on mood and other menopause-related symptoms. Premenopausal women may be at least 30 percent more sensitive than males to the pain-relieving qualities of tetrahydrocannabinol (THC) due to their estrogen levels, as Wakley, Wiley, and Craft (2014) found that female rats showed a clear spike in drug sensitivity right when they were ovulating. Menopausal women who consequently have lower estrogen levels and thus lower
sensitivity to THC than premenopausal women may require higher doses of MJ to achieve the same amount of pain relief, but are also less likely to experience problematic side effects such as tolerance, dependence, or anxiety (Wakley, Wiley, & Craft, 2014).

**MJ Expectancies and Use**

Individuals’ expectancies, including expectations about generally positive outcomes such as social and sexual facilitation or relaxation/tension reduction may influence the frequency or quantity of their MJ use (Schafer and Brown, 1991). Those who expect that the plant will create a favorable outcome tend to use more than those who expect otherwise (Metrik et al., 2009; Skenderian et al., 2008; Vangsness, Bry & LaBouvie, 2005). Initial work revealed that these expectancies may mediate established links between disinhibited or impulsive personality traits and MJ consumption (e.g. Hayaki et al., 2011; Vangsness, Bry & LaBouvie, 2005). Expectancies specific to the alleviation of symptoms fit a self-medication hypothesis of MJ consumption, where those who anticipate that the plant will improve their symptoms tend to use more often or in greater amounts. One example of this type of work addresses post-traumatic stress disorder (PTSD; Earleywine & Bolles, 2014). MJ users with PTSD symptoms hold measurable expectancies about the plant’s ability to attenuate symptom severity. These individuals’ MJ use correlates with their PTSD symptoms, and the expectancies they hold regarding MJ-associated symptom relief mediates the links between these symptoms and their MJ use (Earleywine & Bolles, 2014). Comparable symptom-specific expectancies might exist for women who use MJ during menopause, and these expectancies might mediate the link between symptoms and consumption in a similar manner.

**The Current Study**
In this current study, it was hypothesized that MJ would ameliorate menopause symptoms that have already shown empirically supported MJ-induced relief. Such symptoms include sleep problems, irritability, depression, and joint pain (Earleywine, 2005; Russo, Guy, & Robson, 2007; Russo & Hohmann, 2013). There were no hypotheses regarding bladder problems and vaginal dryness, based on ambiguous research findings. The role of cannabinoids in bladder function remains unclear and potentially inconsistent (Ruggieri, 2011). Clinical lore suggests that cannabis dries mucous membranes and exacerbates vaginal dryness, but the effect does not appear in every study (e.g. Smith et al., 2010). Second, it was hypothesized that correlations between symptoms and MJ use would arise via indirect effects through expectancies, as the work on PTSD revealed (Earleywine & Bolles, 2014). Lastly, common problems associated with MJ use was assessed. If MJ should alter menopause symptoms, it ideally should do so without increasing MJ-related problems. Thus, it was examined if women’s MJ expectancies, average intoxication level, monthly MJ use, and symptoms would predict MJ related problems including neglect of family, friends, work or school, job, productivity, medical issues, withdrawal, blackouts, sleep issues, finances, feeling bad, self-esteem, self-confidence, and procrastination.

Method

Menopausal and post-menopausal women (N=115) endorsing lifetime MJ use responded to an e-mail request or Facebook advertisement to complete an online survey assessing MJ use, expectancies of relief from menopausal symptoms, and menopause symptoms. To target potential cannabis users, the initial e-mail was sent to members of listservs associated with cannabis law reform, Oregon NORML and Ladybud.com. The e-mail stated that participants could complete the internet questionnaire and forward it to others (the “snowballing” technique;
Callow, 1996). The first online page of the study stated that continued participation beyond the first page implied participant consent. All procedures were in accordance with and approved by the local Institutional Review Board.

**Participants**

Ages of participants ranged from 30-72 with a mean of 49.7 (SD= 7.5). See Table 1 for participant demographics regarding race/ethnicity, education, recent cannabis use, and menopause symptoms.

**Measures**

**Menopause Rating Scale.** The assessment of menopause symptoms included 11 items and queried participants about their experience of the following: hot flashes, heart discomfort, sleep problems, depressed mood, irritability, anxiety, exhaustion, decreased libido, bladder problems, vaginal dryness, and joint/muscle discomfort (Heinemann et al., 2004). Individuals were queried about their occurrence of each symptom on a scale from “none (0)” to “extremely severe (4)”. Cronbach’s Alpha for the total symptoms scale was 0.86.

**Expectancies of MJ-induced changes in menopause symptoms.** This scale was adapted from the Menopause Rating Scale and queried participants on their expectancies of how MJ helps each of their symptoms on a five-point Likert scale ranging from “extremely worse (-2)” to “extremely better (2)”. Cronbach’s Alpha for the total expectancies scale was 0.81.

**Problems Scale.** An adapted version of the Cannabis Associated Problems Scale was used that is unlikely to show bias against women (Lavender, Looby, & Earleywine, 2008). Women were asked to rate their experience of problems on a 5 point Likert scale from 0 (none) to 5 (a serious problem) regarding the following items: neglect of family, friends, work or
school, job, productivity, medical issues, withdrawal, blackouts, sleep issues, finances, feeling bad, self-esteem, self-confidence, and procrastination. Cronbach’s alpha was .92.

**MJ use.** To assess frequency of use, participants were queried on the number of days a month they used MJ, ranging from zero to 31 days. As an index of intoxication, participants were queried on how “high” they usually get when using MJ, on a scale of 1 (light buzz) to 6 (very high). Walden and Earleywine (2008) point to the dose-related response of psychoactive substances as support for intoxication level as an indicator of quantity of consumption. This was found to be an appropriate form of assessment among a population of non-medical MJ users, as the wide range of products and means of MJ delivery as well as variations in THC content poses challenges in the quantification of MJ consumption, based on self-report. Indices of intoxication appear to relate to the addiction syndrome (López-Pelayo, Batalla, Balcells, Colom, & Gual, 2015), and this intoxication measure has been found to correlate with MJ use frequency and account for unique variance in MJ problems (Walden and Earleywine, 2008; Lavender, Looby, & Earleywine, 2008).

**Data Analysis**

The first aim was to determine whether participants held meaningful expectancies for MJ-induced changes in menopause symptoms. This was assessed by examining whether the mean expected relief scores for each symptom differed from zero. Paired t-tests were then used to reveal differences among means. Given the large number of analyses, we used a modified Bonferroni approach to balance power and Type I error (Wilcox, 2013). The next aim was to determine whether an association existed between menopause symptoms and MJ use, and if so, whether that link arose via indirect paths through expectancies. Two regression analyses were performed to determine whether menopause symptoms predicted monthly use as well as average
intoxication. Indirect effects of expectancies on monthly use were then computed via a bootstrapping method using MEDIATE, which was bias corrected. 1,000 bootstrap samples with replacement were generated to estimate the magnitude of the indirect effect, an associated standard error, and 95% confidence intervals (Preacher, 2008). The last aim was to determine whether MJ treatment expectancies, MJ monthly use, and average intoxication predicted MJ-related problems, which was determined through a regression analysis.

Results

Bivariate Links and Descriptive Statistics

All menopause symptoms were endorsed by a majority of participants (See Table 1). Table 2 reveals means (SD) and correlations among the variables. Menopause symptoms correlated significantly with monthly use and treatment expectancies. Expectancies also correlated significantly with monthly use and menopause symptoms. Average intoxication correlated significantly with MJ-related problems.

Differences between MJ Treatment Expectancies

All expectancies were significantly greater than 0, \(p<.01\), (\(t(111)\) ranging from 5.06 to 18.17), except for bladder problems, (\(t(111) = 3.13, p<.01\)). Paired t-tests revealed differences among several means with expectancies for joint/muscle discomfort receiving the highest score (Mean=1.34, SD=.73), and bladder problems receiving the lowest (Mean=.18, SD=.57) (See Table 2). These differences suggest that women who use MJ for menopause symptoms do not see MJ as equally effective for all symptoms.

Indirect Effects of Expectancies on Monthly Use

Two regression analyses were performed to determine whether menopause symptoms predicted measures of MJ use, including frequency and average intoxication. Only the
regression analysis indicating the prediction of frequency of MJ use from menopause symptoms was significant. The direct effect of menopause symptoms on average intoxication did not reach significance, making the search for indirect effects moot. Indirect effects of expectancies on the relationship between symptoms and frequency of use were computed via a bootstrapping method using MEDIATE, which was bias corrected. 1,000 bootstrap samples with replacement were generated to estimate the magnitude of the indirect effect, an associated standard error, and 95% confidence intervals (Hayes, 2014). The bootstrapping procedure supported the significant indirect path, suggesting that menopause symptoms lead to more frequent consumption via expectancies about the plant’s impact on symptoms. See Figure 1.

**Prediction of Problems**

MJ problems were significantly, positively skewed (Skew = 2.84, SE = 0.23), necessitating a transformation to meet parametric assumptions. A log transformation improved skew substantially (Skew= 0.25, SE = 0.23). Analyses were then performed on the transformed data. Symptoms, expectancies, and monthly use were all independent of problems. When monthly use, symptoms, expectancies, and intoxication appeared in the same equation F(4,107)=2.98, p<.05, intoxication was the only variable to positively and significantly predict MJ problems F(1,107)=2.63, p<.05. MJ treatment expectancies negatively predicted problems F(1,107)=2.32, p<.05.

**Discussion**

Given the aging population and the paucity of research on non-hormonal approaches to treatment of menopause symptoms, we examined self-reported responses to MJ in a sample of menopausal and post-menopausal women. Women reported symptoms, expectancies of MJ-induced relief, indices of MJ consumption, and a measure of MJ-related problems. Generally,
women expected MJ to help menopause symptoms that overlapped with other medical uses of MJ. Thus, they endorsed MJ-induced expectations of improvement in joint and muscle discomfort, irritability, sleep problems, depression, and anxiety significantly more than they did vaginal dryness and bladder problems. Notably, participants also expected relief from hot flashes—a symptom that has served as the focus of medical approaches like hormone replacement therapy (HRT). Many of these symptoms are not those best addressed by HRT, suggesting that medical cannabis might serve as a useful adjunct to other treatments of menopause symptoms if it does not handle symptoms well enough on its own.

**Expectancy Mediated Effects of Symptoms on Use**

The mediating role of expectancies on the link between menopause symptoms and MJ monthly use suggest the importance of educating medical MJ prescribers and consumers on the researched effects of the plant to help ensure that expectancies are in line with supported evidence. Ideally, those who wish to use MJ for menopause symptoms should only expect relief from symptoms that have responded well to medical MJ in previous research such as sleep problems, irritability, depression, and joint pain (Earleywine, 2005; Russo & Hohmann, 2013; Russo, Guy, & Robson, 2007). Patients and prescribers should consider the treatment of these described symptoms as part of a holistic treatment plan for menopause, as several of these symptoms may interact and transact in ways that can cause greater discomfort to the individual. Although participants expected anxiety to decrease in response to MJ, prescribers should likely avoid recommending the plant to the clinically anxious (Van Dam, Bedi, & Earleywine, 2012). Women searching for relief from bladder problems or vaginal dryness will likely find cannabis ineffective. Evidently, the field would benefit from continued research on medical MJ and menopause. Disseminating new developments can help patients and prescribers better
understand which symptoms are most likely to improve.

In this current study, menopause treatment expectancies did not correlate with average intoxication—a proxy for MJ quantity (Lavender, Looby, & Earleywine, 2008). Thus, MJ treatment expectancies may influence consumers’ frequency of use greater than their intoxication level. Prescribers may take this as a sign to be explicit in their description of dosage frequency, as well as in their education on the plant’s effects, for patients who express such expectancies. Keeping expectancies accurate has the potential to keep frequency of use at a reasonable level. Substance use research may benefit from investigating the mediating role of expectancies on the association between symptoms and frequency of use of other medications. Longitudinal work might reveal that use in response to initial symptoms creates expectancies of relief, which subsequently mediate links between symptoms and frequency of use.

**Prediction of Problems**

Lastly, symptoms, expectancies, nor frequency of use positively correlated with problems. Therefore, even if an individual’s expectancies lead to more frequent use, it need not lead to problems. Moreover, individuals who believed that MJ would help their menopause symptoms were significantly less likely to experience cannabis-related problems. Recent, comparable work revealed an inverse association between cannabis-related problems and expectancies for cannabis-induced relief of PMS/PMDD symptoms (Slavin, Barach, Farmer, Luba, and Earleywine, 2017). Thus, two samples of women have reported expecting MJ to relieve symptoms in a way that does not appear to increase cannabis-related problems. Nevertheless, these women could have consumed MJ for other reasons, and these expectancies for relief of menopause symptoms do not necessarily guarantee non-problematic use. These women may likely hold other motives and expectancies regarding cannabis use that could be
associated with an increased risk for problems, such as global negative expectancies (e.g. Beraha, Cousijn, Hermanides, Goudriaan, & Wiers, 2013; Hayaki, 2010; Pearson, Bravo, & Conner, 2016). Future research should examine how symptoms, MJ use, and treatment expectancies covary with MJ-related problems among a population of medical users who are primarily consuming MJ for a specific condition.

Average intoxication—a proxy for MJ quantity, was the only variable to significantly and positively predict problems in an equation that also included menopause symptoms, expectancies, and frequency of use. These data highlight cautions about using quantities that exceed the dose needed for symptom relief. Keeping quantity to a minimum likely decreases the potential for the development of tolerance, and can minimize the chances for developing negative consequences. In line with this finding, research has shown that frequency alone does not significantly account for an individual’s dependence among MJ consumers. In 2003, the National Survey on Drug Use and Health found that over 60% of daily cannabis users were non-dependent, suggesting that other factors, such as quantity, must play a critical role in dependence. Walden and Earleywine (2008)’s data show the measure of usual intoxication level, as an indicator of quantity, significantly accounting for unique and significant variance relating to respiratory symptoms and dependence after controlling for the effects of frequency. More intense usual and maximum intoxication levels were also predictive of a greater number of social problems.

Limitations

Limitations to these current findings should be addressed in future research. To ensure generalizability, replication with a more diverse population seems advised, as the majority of participants in this current study identified as Caucasian. The unequal distribution of minority
women in clinical research, including menopause research remains troublesome (Montgomery Rice, 2005). Assessment of a more diverse population can help researchers gain a greater perspective on the menopause experience as a whole. Comparable work can improve the understanding of women’s reactions to different treatment options. Ethnicity influences women’s attitudes toward menopause symptoms, as well as their expectations for treatment options and medical adherence (Montgomery Rice, 2005). For instance, African American women show 1.5 times the risk of Caucasian women for experiencing hot flashes (Gold et. al, 2005; Montgomery Rice, 2005). Still, Caucasian women are more likely to be offered and to take HRT than African Americans, Hispanics, and Asians (Im & Hwang, 2012). Interpretively, choice of treatment for menopause symptoms often depends on the perceived cause and meaning of the symptoms. Viewing symptoms as part of the normal aging process would lead to less seeking of medications (Im & Hwang, 2012). A greater number of randomized clinical trials may help address the variety of perspectives and symptomology across different races and ethnicities.

In addition, these findings rely on self-report. While symptom severity experiences as well as expectancies are inherently subjective, inquiries regarding frequency and amount of MJ consumption are subject to inaccuracies due to self-report biases or difficulties in recall. Ensuring anonymity of responses may have helped control self-report bias, but distorted recall could improve with experience-sampling or detailed diary techniques. Another limitation may be the way in which the expectancy questions were framed. Items queried participants on how MJ makes each of their menopause symptoms feel; MJ was not administered to participants in response to their symptoms to get a direct, immediate measure of relief. In a clinical trial, a more detailed log could help the individuals document these several components: symptoms,
expectancies before MJ usage, subsequent amount of MJ used, as well as the actual relief they experienced once the effects took place. Tracking these experiences and behaviors can also serve as an active intervention in helping individuals gain awareness of how their expectancies influence their consumptive behaviors, and ultimately how consistent such expectations are with reality. Lastly, both a limitation of this current study and MJ research in general, is the difficulty in obtaining a suitable placebo for the plant. A randomized clinical trial might do better comparing MJ to HRT or other active treatments rather than some sort of MJ placebo.

Despite these potential limitations, the current data suggest that women expect medical MJ to alleviate a subset a menopause symptoms. Their symptoms predict their monthly use, and this link is mediated by expectations of MJ-induced relief. Expectancies, symptoms, and monthly use do not correlate with problems, suggesting that MJ might have potential in making the menopause experience less aversive without creating negative consequences. These data help address an important, under-investigated topic. Particularly as the number of older adults continues to increase, it will be important to make menopause as trouble-free as possible without creating drug problems. These initial data suggest that MJ could alleviate relevant symptoms without increasing MJ related problems. A randomized clinical trial of medical MJ for menopause, particularly given the absence of increased problems, seems a reasonable next step in this line of work.

**Acknowledgements**

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Table 1

*Characteristics of Study Sample*

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</tr>
<tr>
<td>2. Symptoms</td>
<td>18.22 (7.86)</td>
<td>.20*</td>
</tr>
<tr>
<td>3. Expectancies</td>
<td>10.14 (4.93)</td>
<td>.32*</td>
</tr>
<tr>
<td>4. MJ Problems</td>
<td>8.72 (11.42)</td>
<td>.14</td>
</tr>
<tr>
<td>5. Intoxication</td>
<td>3.14 (1.34)</td>
<td>.01</td>
</tr>
</tbody>
</table>

*Note. *p < .05.
**Table 3. Differences among expectancies for individual menopause symptoms**

| Symptom                     | Mean(SD) | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |
|-----------------------------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. joint/muscle discomfort  | 1.34 (.73)|     |     |     |     |     |     |     |     |     |     |     |
| 2. irritability             | 1.32 (.76)|     |     |     |     |     |     |     |     |     |     |     |
| 3. sleep problems           | 1.29 (.78)|     |     |     |     |     |     |     |     |     |     |     |
| 4. depression               | 1.24 (.77)|     |     |     |     |     |     |     |     |     |     |     |
| 5. anxiety                  | 1.20 (.81)|     |     |     |     |     |     |     |     |     |     |     |
| 6. hot flashes              | 1.07 (.78)|     |     |     |     |     |     |     |     |     |     |     |
| 7. sex problems             | .87 (.86) | *   | *   | *   | *   | *   |     |     |     |     |     |
| 8. heart discomfort         | .72 (.82) | *   | *   | *   | *   | *   | *   |     |     |     |     |
| 9. exhaustion               | .63 (.91) | *   | *   | *   | *   | *   | *   | *   |     |     |     |
| 10. vaginal dryness         | .33 (.67) | *   | *   | *   | *   | *   | *   | *   | *   |     |     |
| 11. bladder problems        | .18 (.57) | *   | *   | *   | *   | *   | *   | *   | *   | *   |     |

**Note.** *p<.001. Asterisks indicate a significant difference between expectancies. Expectancies are ordered highest (most expected marijuana-induced relief) to lowest.
Figure 1. Mediation model for self-reported marijuana expectancies as a mediator of the relation between self-reported menopause symptoms and days a month of marijuana consumption with standardized regression coefficients; * = p < .05.
Table 4. Predicting MJ problems from symptoms, expectancies, monthly use, and intoxication

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>.16</td>
<td>.15</td>
<td>.11</td>
<td>1.10</td>
</tr>
<tr>
<td>Expectancies</td>
<td>-.57</td>
<td>.24</td>
<td>-.25</td>
<td>-.2.32*</td>
</tr>
<tr>
<td>Monthly Use</td>
<td>.08</td>
<td>.10</td>
<td>.07</td>
<td>.75</td>
</tr>
<tr>
<td>Intoxication</td>
<td>2.10</td>
<td>.80</td>
<td>.25</td>
<td>2.63*</td>
</tr>
</tbody>
</table>

F (4,107) = 2.98, p<.05

*Note. *p<.05.