

# Research

## iRest Meditation for Older Adults with Depression Symptoms: A Pilot Study

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### Abstract

Older adults, a rapidly growing population in the United States, have fewer physiological reserves and are more likely to be affected by stress, making them especially susceptible to depression symptoms. Meditation offers promising potential as an effective treatment; however, few studies have evaluated meditation interventions for this demographic. The objectives of this pilot study were to evaluate the feasibility and acceptability of an iRest meditation program in older adults with depression symptoms and to collect preliminary data on its effect on depression and depression-related symptoms compared to a vacation control. The study occurred at the Institute of Noetic Sciences EarthRise Retreat Center and participants' homes. Thirty generally healthy older adults, aged 55–90, with depression symptoms were recruited. Participants were randomly assigned to a 2-day retreat of either iRest meditation training or vacation. After the retreat, participants were asked to complete 20 minutes of home practice per day for 6 weeks; this consisted of either guided meditations (iRest) or music (vacation). Data were collected pre- and post-retreat and then 6 weeks later. Measures included depression-related variables (expectancy, depression symptoms, perceived stress, resilience, pain, sleep quality, and spirituality) and biomarkers (voice stress analysis, heart rate, heart rate variability). We found the iRest intervention for older adults with depression symptoms to be feasible and acceptable. Preliminary results at 6 weeks demonstrated improvements in sleep impairment in older adults compared to the control group and promising trends in improvements in depression symptoms and pain severity. *Wahbeh & Nelson. Int J Yoga Therapy 2019(29). doi: 10.17761/2019-00036.*

**Keywords:** Integrative Restoration (iRest), mindfulness, meditation, yoga nidra, older adults, depression

### Introduction

Depression affects most people in the United States in some way. Many of us have experienced depressive symptoms or witnessed a friend or family member suffer, perhaps unsure of how to support them. Major depression is one of the most common mental health disorders in the United States. In 2016, an estimated 16.2 million adults had experienced at least one major depressive episode in the past year.<sup>1</sup> Globally, depression is one of the leading causes of disease burden.<sup>2</sup>

Older adults are a growing population in the United States and are especially at risk of being affected by stress and depression because they have fewer physiological reserves. The number of U.S. adults over 55 will continue to rise as the 78 million children born during the Baby Boom age. The nation's 65-and-older population is projected to reach 83.7 million in the year 2050, almost double in size from the 2012 level of 43.1 million.<sup>3</sup> A recent study examining this generation's health records found increased rates of chronic disease with the likelihood of increased healthcare needs and costs compared to previous generations.<sup>4</sup> Late-life depression has devastating consequences—such as increased risk of morbidity and suicide; decreased physical, cognitive, and social functioning; and greater self-neglect—all of which are associated with increased mortality.<sup>5</sup> Late-life depression represents a serious public health issue. Although medication and psychotherapy are recommended by the National Institute of Mental Health as first-line treatments, they are not effective for everyone suffering from depression. Effective interventions that can be used for older adults to reduce depression symptoms and improve health and well-being are needed.

Meditation therapy has growing evidence for its positive benefits to treat depression symptoms. Mindfulness meditation is an attractive therapy because of the relatively low cost, low physical and emotional risk, ease of implementation, and because it facilitates patients taking a more

active role in their treatment.<sup>6</sup> Mindfulness meditation consistently improves depression symptoms, with effect sizes similar to traditional cognitive behavioral therapy, behavior therapy, and pharmaceuticals.<sup>7</sup> Meditation offers promising potential as an effective treatment for depression that capitalizes on the interactions among the psychological, neurological, immunological, and endocrine systems to support the body's innate ability to heal. Large systematic reviews point to a growing body of evidence for meditation decreasing depression symptoms.<sup>7,8</sup> That said, few studies have evaluated meditation specifically for older adults with depression.

iRest (Integrative Restoration) as a clinical meditation program shows positive preliminary benefits. iRest is based on Yoga Nidra, which is a state of meditation and complete relaxation where meditators withdraw into an inner sensory world. The goal of this type of meditation is to observe sensations without responding to them.<sup>9</sup> The practice begins with a body scan that can be done sitting, lying down, or standing. Meditators are encouraged to explore sensations, emotions, and thought patterns, moving back and forth between feeling and witnessing and allowing both to reside simultaneously in awareness.<sup>9</sup> One of iRest's hallmarks in helping people with depression is that it focuses on emotional regulation in the present moment, teaching the skill of comfort with emotions. iRest also incorporates a technique to reconcile opposing emotions, allowing participants to become comfortable with the full range of human emotions. iRest promotes the direct experience of positive emotions during the guided meditations, nurturing the practitioner's ability to recall positive emotions at will, even in times of stress.

iRest has been shown to be feasible and acceptable to over 1,300 veterans in a group clinic.<sup>10</sup> Studies have demonstrated that iRest reduces anxiety and hostility<sup>11</sup> as well as stress<sup>12</sup> in participants with chronic illness; stress and fatigue in school counselors<sup>13</sup>; and perceived stress, worry, and depression in college students (age range 18–56).<sup>14</sup> Small pilot studies with veterans have shown reduced rage, anxiety, and emotional reactivity; increased feelings of relaxation, peace, self-awareness, and self-efficacy<sup>15</sup>; and significantly decreased depression, increased feelings of joy, and improved quality of sleep and ability to manage stress.<sup>16</sup> Although significant positive preliminary data have been collected on iRest, no studies have evaluated its ability to reduce depression symptoms in older adults.

The objectives of this pilot study were to evaluate the feasibility, acceptability, and preliminary effects of an iRest meditation program for older adults with depression symptoms. We conducted a randomized controlled trial (RCT) in which 30 older adults were assigned to either an iRest meditation program or a Vacation time, attention, and

environmental control. The specific aims of the study were to (1) evaluate feasibility and acceptability a 2-day iRest retreat for older adults with depression symptoms; (2) assess changes in depression symptoms of iRest participants compared to the Vacation control; and (3) examine changes in depression-related outcomes of iRest participants compared to the Vacation control.

## Methods

### Study Overview

We conducted an RCT of 30 older adults with depression symptoms in the North Bay Area of California. All participants underwent a phone screening, 2-day retreat, and measure collections before, immediately after, and 6 weeks after the retreat. Participants randomized to the meditation program attended a 2-day retreat at the Institute of Noetic Sciences (IONS) EarthRise Retreat Center, where they received the iRest meditation training. After the retreat, they received an iPod (Apple Inc.) installed with iMINDr,<sup>17</sup> a software application that administered and tracked their home meditation practice for 6 weeks. Participants in the Vacation control also stayed at the EarthRise Retreat Center for 2 days but did not receive the meditation training; instead, they engaged in various leisure activities. After their stay, they also received an iPod with iMINDr installed and songs from multiple genres of music downloaded. Participants were asked to listen to their favorite music from the selection of genres for 20 minutes per day. The study was approved by the IONS Institutional Review Board.

Mind-body medicine clinical trials are often disadvantaged by inappropriate control arms. The present study used an active control arm to control for nonspecific effects, which has been recommended for rigorous mind-body medicine trials.<sup>18</sup> The iRest and Vacation arms mirrored each other with regard to physical environment, nutrition, overall time of intervention, and at-home practice time and methods.

### Participants

Potential participants were screened by self-report to ensure appropriate enrollment according to the inclusion/exclusion criteria. Inclusion criteria were age 55–90 years, baseline Center for Epidemiologic Studies Depression Scale (CESD)-5 score  $\geq 4$ ,<sup>19</sup> stable on medications for 6 weeks prior to and during the study, willing to learn and use study technology, able to hear and understand instructions, and willing to accept randomization scheme and agree to follow the study protocol. Exclusion criteria were cognitive impairment limiting ability to give consent or follow the protocol ( $\leq 30$  on the Modified Telephone Interview for Cognitive Status [mTICS]),<sup>20</sup> significant acute medical illness that

would decrease the likelihood of study completion (self-report), significant untreated depression as assessed by CESD-5 > 32 and interview (at the principal investigator's discretion, stable participants under the current care of a mental health professional could be enrolled in the study), and current daily meditation practice ( $\geq 5$  min/day daily for at least 30 days in the previous 6 months; past practice was not exclusionary but was recorded). Broad inclusion criteria were used to aid in recruitment. To maximize the generalizability and public health relevance of the study, exclusion criteria were minimized and based primarily on screening out participants with an underlying illness that could limit the benefit of the intervention, confound outcomes, or increase the likelihood of dropout.

### Study Procedures

Older adults with depression symptoms were recruited throughout the North Bay Area primarily through (1) the IONS community network; (2) online listservs and research opportunities postings; (3) fliers posted at older-adult community locations; and (4) outreach to older-adult housing and social groups.

Following participant inquiries, the research assistant (RA) conducted a phone screening to describe the study, inclusion/exclusion criteria, and risks and benefits of participation, and to answer any questions. The scripted screening confirmed eligibility and included the mTICS and CESD-5 first. If the participant was not eligible based on these scores, the RA provided resources for mental health care if the volunteer did not have a primary mental health provider.

Participants were mailed questionnaires to complete (approximately 30 minutes) the day before the retreat. They were asked to bring the questionnaire packet to the retreat with them. Onsite, participants completed a 2-minute voice recording and a 5-minute RR interval collection.

All participants were at the IONS EarthRise Retreat Center for 2 days, where they had organic meals prepared for them and had full access to the grounds and facilities. Participants randomized to the iRest condition received the meditation training during their 2-day stay, whereas Vacation participants did not.

iRest is a behavioral treatment based on the Yoga Nidra meditation technique. The iRest protocol consists of 10 components: (1) inner resource; (2) intention; (3) heartfelt desire; (4) body sensing/body scan; (5) breath awareness; (6) awareness of physical sensations; (7) sensing emotions, thoughts, and beliefs; (8) witnessing; (9) felt sense of joy; and (10) integration and actions taught through experience-based guided meditations and dialogue. The program was taught by iRest teachers with advanced training and experience teaching in large groups. Day 1 included morning (3

hours) and afternoon (4 hours) sessions and an evening session (1 hour). Day 2 included morning and afternoon sessions (3 hours each).

Vacation participants enjoyed the retreat center grounds activities, which include a meditation hut, hot tub, guest kitchen, walking labyrinth, hiking, garden, library, WiFi and computer access, bookstore, and gift shop. Two movies were also shown on the second day.

The following measures were collected onsite immediately after the retreat: mindfulness, resilience, pain, mood, stress, sleep quality, voice measures, and RR interval data.

After the 2 days, all participants received an iPod installed with iMINDr, a custom software application that administered and tracked their home practice adherence for 6 weeks (iRest, guided meditations; Vacation, favorite music).<sup>17</sup> iMINDr collects all actions performed (date, time, action [start, stop, pause, volume change]) and track listened to (i.e., which guided meditation and which music genre [alternative, blues, classical, country, etc.]). Example iRest meditations are "Experiencing Yourself as Sensation," "Peeling Away Tension," and "The Practice of Gratitude." All participants were asked to listen to their tracks for at least 20 minutes per day for 6 weeks. Participants were trained on iMINDr with verbal and graphical instruction. Adherence was defined by the number of home-practice days (frequency) and mean practice time (duration). Participants were given RA and principal investigator phone numbers for assistance with the iPod if needed. Also, the RA initiated contact with each participant weekly to ensure they did not have any questions or need help with the technology.

Adherence is especially important in mind-body medicine trials because home practice is frequently prescribed although seldom objectively measured.<sup>21</sup> Relying on self-report adherence is problematic because self-report data are rarely reported<sup>22-24</sup> and easily altered.<sup>25</sup> We have used iMINDr in other studies, including with stressed older adults.<sup>17,26-28</sup>

Measures were also collected approximately 6 weeks after the workshop. In addition, participants completed the Client Satisfaction Questionnaire (CSQ), an 8-item questionnaire used to assess satisfaction with the intervention.<sup>29</sup>

### Measures

The following measures were chosen for their reliability, validity, and relevance to the specific aims. Some measures were chosen because they can be repeated within a short time frame (i.e., before and after a 2-day retreat), even though they measure similar constructs as other measures. The Credibility and Expectancy Questionnaire was administered to determine whether expectancy was associated with improvements observed from the interventions.<sup>30</sup>

### ***Specific Aim 1: Evaluate Feasibility and Acceptability of 2-Day iRest Retreat for Older Adults***

- **Recruitment:** Enrollment rate and completion rate were recorded.
- **Participant satisfaction:** The CSQ consists of 8 items with a 4-point Likert scale response set.<sup>29</sup> The overall score results from summing the items (2 are reverse scored), with a range from 8–32; higher scores indicate higher satisfaction.
- **Objective adherence:** Number of home-practice days (frequency) and mean practice time (duration) were measured with iMINDr installed on a study iPod.

### ***Specific Aim 2: Assess Changes in Depression Symptoms of iRest Participants Compared to Vacation Control***

- **Depression:** The CESD 5-item version was used for the screening. The CESD full version was used as the primary outcome.<sup>31</sup> The Positive and Negative Affect Schedule–10<sup>32</sup> was also used to evaluate mood, as it can be administered within a short time frame.

### ***Specific Aim 3: Assess Changes in Depression-Related Outcomes of iRest Participants Compared to Vacation Control***

- **Sleep quality:** The Pittsburgh Sleep Quality Index<sup>33</sup> was administered because mind-body therapies improve sleep function<sup>34</sup> and may mediate stress effects on cognition.<sup>35</sup>
- **Pain:** Pain Numerical Rating Scale<sup>36</sup> and Brief Pain Inventory, a 9-item pain scale that results in a pain severity and interference measure.<sup>37</sup>
- **Perceived stress:** Perceived Stress Scale.<sup>38</sup>
- **Resilience:** Brief Resilience Scale.<sup>39,40</sup>
- **Spirituality:** Spiritual Involvement and Beliefs Scale.<sup>41</sup>
- **Mindfulness:** Five-Factor Mindfulness Questionnaire<sup>42</sup> and Applied Mindfulness Process Scale.<sup>43</sup>
- **Voice stress analysis:** calculated using the Beyond Verbal emotion analytics application performing interface (Beyond Verbal Communication, LTD), resulting in three measures (temper, valence, and arousal [range 0–100 for each]). Temper reflects a speaker's temperament or emotional state, ranging from gloomy or depressive at the low end, to

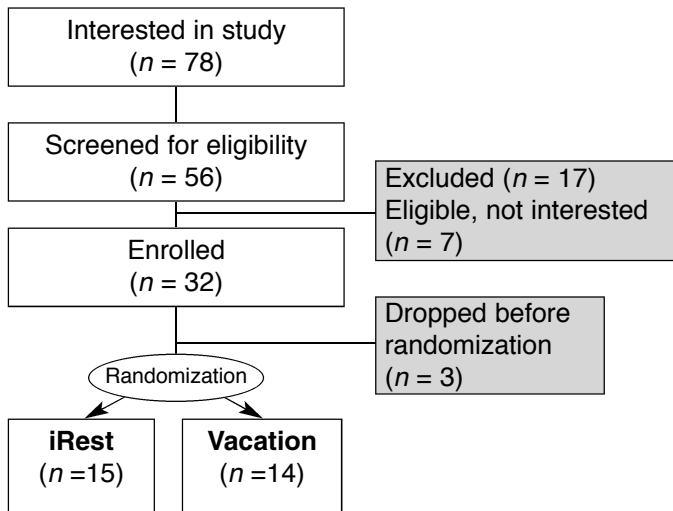
embrative and friendly in the mid-range, and confrontational or aggressive at the high end of the scale. Valence is an output that measures the speaker's level of negativity at the lower end of the scale to positive attitude at the higher end. Arousal is an output that measures a speaker's degree of energy, ranging from tranquil, bored, or sleepy at the lower end of the scale to excited and highly energetic at the higher end.

- **Heart rate and heart rate variability (HRV):** R-wave intervals, where R is the peak of a QRS complex (heartbeat), were measured using an iPhone application (Camera Heart Rate Variability v 4.6.5 by Alessandra Saviotti). RR intervals were imported into Kubios HRV (v 3.0.2, University of Kuopio, Finland) for heart rate and the HRV measure of the ratio of low frequency (0.04–0.15 Hz) to high frequency (0.15–0.40 Hz). HRV analysis parameters included a 100-s window width, 50% window overlap, autoregressive spectrum model order of 16 with no factorization, and interpolation rate of 4 Hz. The mean data length was  $285.9 \pm 32.8$  s. Based on the guidelines for HRV standards of measurement, physiological interpretation, and clinical use by the Task Force of The European Society of Cardiology and The North American Society of Pacing and Electrophysiology, a minimum of 5 minutes of data are needed to calculate very low-frequency and time domain measures other than heart rate, so these parameters were not calculated.<sup>44</sup>

### **Statistical Analysis**

Feasibility and acceptability were evaluated in a descriptive fashion. Recruitment rates and dropouts are described and noted for future studies. The CSQ total score was qualitatively reviewed. Means and standard deviations are reported for each measure. Preliminary effects of iRest were evaluated with a repeated-measures analysis of variance conducted with each measure as the dependent variable, group assignment as the independent variable, and visit number as the repeated-measures variable. Because this was a pilot study and not powered to detect group differences, within-group comparisons of pre and post scores were also evaluated for the primary outcome. The participants and RAs collecting the data were blinded to assignment at the baseline measure. The analysis was conducted using blinded methods. As with most mind-body trials, the participants were not blinded to their assignment after randomization.

**Figure 1.** Recruitment Diagram



**Results**

Recruitment of the targeted 30 participants proceeded easily (Figure 1). There were 15 iRest participants and 14 Vacation participants. Participants were generally college-educated, Caucasian females in a relationship, with a mean age of 66 (Table 1). Participants were well-matched on important demographics. We received numerous inquiries from interested participants and instituted a waitlist because the study reached capacity before we could remove the advertisement. The enrollment rate from the 78 telephone calls we received was 39%. Completion rate for those randomized was 97%. A total of eight participants decided not to participate in the study prior to the retreat due to family emergency, medical issues, transportation difficulties, and scheduling conflicts. Thus, eight participants from the waitlist were recruited to participate before randomization. Of the 30 randomized participants, all attended the retreat weekend except for one participant who became ill the morning of the event and could not attend. We found recruitment and enrollment feasible and the completion rate higher than that seen in other mind-body medicine trials.<sup>27</sup>

Despite numerous discussions during the consenting and screening activities about the randomization, approximately four participants total expressed disappointment with their randomization (i.e., participants in the iRest arm wanted to be in the Vacation arm and vice versa). Also, multiple participants in the Vacation arm felt uncomfortable with the unstructured format of the 2 days. Each participant received a list of Vacation activities they could engage in at the retreat center; however, this was not acceptable to all Vacation participants. Several Vacation participants commented that they would have preferred coordinated group activities and a more structured environment.

**Table 1.** Participant Demographics

| Factor                    | Level                      | iRest<br>(n = 15) | Vacation<br>(n = 14) | p<br>Value |
|---------------------------|----------------------------|-------------------|----------------------|------------|
| Mean age (SD), y          |                            | 65.7 (5.9)        | 64.8 (6.7)           | 0.71       |
| Female (%)                |                            | 80                | 71                   | 0.59       |
| Mean BMI (SD)             |                            | 29.52<br>(11.50)  | 27.08<br>(6.99)      | 0.53       |
| Race (%)                  | Caucasian                  | 93                | 93                   | 0.37       |
|                           | African American           | 7                 | 0                    |            |
|                           | Asian/<br>Pacific Islander | 0                 | 7                    |            |
| Diabetes diagnosis (%)    |                            | 13                | 14                   | 0.94       |
| Psychiatric diagnosis (%) |                            | 67                | 57                   | 0.60       |
| Use alcohol (%)           |                            | 67                | 79                   | 0.47       |
| Income (%)                | \$0–<br>59,999             | 50                | 36                   | 0.61       |
|                           | \$60,000–<br>\$89,999      | 36                | 36                   |            |
|                           | ≥ \$90,000                 | 14                | 29                   |            |
| In a relationship (%)     |                            | 66                | 71                   | 0.87       |
| Mean education (SD), y    |                            | 18.40<br>(2.41)   | 17.36<br>(2.06)      | 0.22       |
| CESD                      |                            | 25.9 (9.4)        | 22.6 (6.8)           | 0.30       |

Notes: For categorical variables, statistic is from chi-square test; for continuous variables, statistic is from analysis of variance (ANOVA); SD = standard deviation.

iRest satisfaction after the workshop was  $27.73 \pm 5.99$  and  $23.14 \pm 3.03$  after the 6-week practice period. With a high score of 32, the post-workshop score is in the highest quartile, and post 6 weeks is in the highest tertile. This result reflects positive participant satisfaction with the intervention and study activities.

The two groups were also well-matched on credibility and expectancy for the iRest and Vacation conditions (all *p* values > 0.46; Table 2). Over all participants, the iRest condition was rated with higher credibility ( $6.9 \pm 1.26$ ;  $t(27) = 3.31$ ,  $p = 0.003$ ) and expectancy ( $5.59 \pm 1.77$ ;  $t(27) = 4.40$ ,  $p = 0.0002$ ) than the Vacation condition (credibility  $5.80 \pm 1.78$ ; expectancy  $4.13 \pm 2.22$ ). The iRest and Vacation participants had similar total days and minutes practiced. Although the total days practiced trended toward significant difference, with the iRest group practicing more days, the total minutes over the 6-week practice period were the same between groups.

There was no group difference on depression symptoms as measured by the CESD-20 scale with the repeated-

**Table 2.** Credibility and Expectancy for iRest and Vacation Interventions

| Factor                  | iRest<br>(n = 15)      | Vacation<br>(n = 14) | p<br>Value |
|-------------------------|------------------------|----------------------|------------|
| iRest credibility       | 6.88 (1.52)            | 6.98 (0.98)          | 0.85       |
| Vacation credibility    | 6.00 (1.75)            | 5.60 (1.85)          | 0.56       |
| iRest expectancy        | 5.61 (1.86)            | 5.57 (1.75)          | 0.96       |
| Vacation expectancy     | 4.44 (1.96)            | 3.81 (2.48)          | 0.46       |
| Total days practiced    | 34.75<br>(8.84)        | 26.07<br>(12.88)     | 0.06       |
| Total minutes practiced | 1,039.50<br>(1,065.58) | 1,164.8<br>(861.24)  | 0.74       |

measures model ( $F(26) = 1.68, p = 0.21$ ). The iRest group had significant within-group CESD differences, whereas the Vacation group did not (iRest  $t(13) = 2.85, p = 0.007$ ; Vacation  $t(13) = 1.34, p = 0.10$ ). The iRest group had a mean 7.6-point drop in their CESD scores, which reflects clinically meaningful change.

Means, standard deviations, and change scores for all measures are listed in Table 3. Among the depression-related outcomes, sleep impairment was significantly decreased in the iRest group compared to the Vacation group and pain severity trended toward significant improvement. There were no group differences in voice parameters, heart rate, or HRV (Table 3).

## Discussion

We successfully conducted a pilot RCT in older adults with depression symptoms. Recruitment and enrollment exceed-

ed our expectations in terms of overwhelming positive response for the study. Participant satisfaction with the iRest intervention was also positive. Our two groups were well-matched on demographics, credibility and expectancy, and objective adherence in home practice. The comparison group used in this study was a stringent control for the iRest arm. The participants did not receive their randomization assignment until after their baseline activities at the retreat center. Thus, the participants in both arms were present at the retreat center at the same time and were split up after randomization. The participants shared rooms with other participants who were in the same randomization group. Participants were asked not to communicate with members of the other group about their study activities during the 2 days, including at community meals.

Participants in the iRest condition reported overall satisfaction with the meditation trainings, and the majority expressed that the intervention far exceeded their expectations. A small number of participants expressed that they experienced a rebound effect post-retreat. (Once these individuals became settled into their daily routines at home, they felt more severe symptoms of depression due to the contrast with their improved mood during the retreat. These individuals found relief of these symptoms after continuing the home practice and working through the exercises.) This was not reflected in our measures done immediately after the retreat and at 6 weeks. Perhaps future studies could include a more frequent ecological momentary assessment to evaluate more frequent variations.<sup>45</sup>

It is important to note that the meditation training

**Table 3.** Outcomes Assessed: Mean (SD) Depression-Related Measures and Biomarkers

| Depression-Related Measure          | iRest (n = 15) |                           |                       | Vacation (n = 14) |                           |                       | F Statistic, p Value |
|-------------------------------------|----------------|---------------------------|-----------------------|-------------------|---------------------------|-----------------------|----------------------|
|                                     | Before Retreat | Immediately After Retreat | 6 Weeks After Retreat | Before Retreat    | Immediately After Retreat | 6 Weeks After Retreat |                      |
| Depression                          | 25.9 (9.4)     | —                         | 18.7 (8.9)            | 22.6 (6.8)        | —                         | 19.0 (11.3)           | 1.73, 0.20           |
| Negative mood                       | 11.50 (4.01)   | 9.00 (2.83)               | 10.43 (3.86)          | 10.29 (3.77)      | 8.79 (2.55)               | 11.00 (5.82)          | 0.76, 0.48           |
| Positive mood                       | 14.43 (3.65)   | 16.73 (3.99)              | 18.29 (3.83)          | 16.36 (3.69)      | 17.21 (3.75)              | 17.21 (4.93)          | 1.29, 0.28           |
| Pain intensity                      | 2.71 (1.94)    | 2.74 (1.31)               | 2.41 (1.74)           | 2.87 (2.29)       | 2.16 (1.61)               | 3.37 (2.95)           | 1.75, 0.18           |
| Pain severity                       | 2.80 (1.77)    | 3.17 (1.35)               | 2.68 (1.92)           | 2.25 (0.96)       | 2.27 (1.25)               | 3.34 (2.58)           | 2.79, 0.07           |
| Sleep impairment                    | 10.00 (3.26)   | —                         | 7.77 (3.68)           | 8.21 (2.72)       | —                         | 7.62 (3.50)           | 4.15, 0.05           |
| Perceived stress                    | 20.47 (7.06)   | 18.27 (6.19)              | 14.43 (8.72)          | 19.93 (5.09)      | 17.46 (6.36)              | 18.85 (7.19)          | 1.71, 0.19           |
| Resilience                          | 2.79 (0.82)    | 3.08 (0.91)               | 2.96 (0.21)           | 3.20 (0.73)       | 3.38 (0.69)               | 2.86 (0.21)           | 1.26, 0.29           |
| Applied mindfulness                 | 33.07 (6.89)   | 36.20 (12.43)             | 39.93 (9.92)          | 28.93 (12.90)     | 34.86 (10.26)             | 35.36 (12.07)         | 0.17, 0.84           |
| Mindfulness                         | 3.09 (0.72)    | —                         | 3.54 (0.73)           | 3.16 (0.53)       | —                         | 3.51 (0.63)           | 0.33, 0.57           |
| Spirituality                        | 68.07 (4.70)   | —                         | 88.07 (21.38)         | 66.79 (5.45)      | —                         | 89.31 (15.57)         | 0.14, 0.72           |
| <b>Biomarker</b>                    |                |                           |                       |                   |                           |                       |                      |
| Voice                               |                |                           |                       |                   |                           |                       |                      |
| Temper                              | 30.14 (7.34)   | 29.82 (4.74)              | —                     | 29.65 (6.54)      | 29.54 (5.53)              | —                     | 0.10, 0.76           |
| Valence                             | 82.04 (9.98)   | 86.17 (8.16)              | —                     | 85.66 (7.21)      | 83.97 (7.85)              | —                     | 1.42, 0.24           |
| Arousal                             | 49.41 (28.99)  | 41.21 (22.44)             | —                     | 46.77 (34.85)     | 45.36 (25.88)             | —                     | 0.73, 0.40           |
| Heart rate                          | 74.09 (12.02)  | 75.48 (11.15)             | —                     | 77.66 (10.85)     | 78.76 (13.66)             | —                     | 0.03, 0.86           |
| Heart rate variability <sup>a</sup> | 2.16 (4.06)    | 1.70 (1.33)               | —                     | 2.48 (3.50)       | 2.94 (2.24)               | —                     | 0.001, 0.96          |

Notes: F statistics and p values for repeated-measures models; SD = standard deviation.

<sup>a</sup>Ratio of low frequency to high frequency.

took place in the form of group exercises for a total of 14 hours over the weekend. During weekly check-ins with the RA, participants discussed how a sense of connection to others who are having similar experiences made them feel less alone. Eleven participants took it upon themselves to establish similar support after the retreat by meeting in groups weekly to discuss their experience over the duration of the study. This was independently led by participants and not facilitated or affiliated with iRest or IONS staff.

All participants in the iRest condition reported to the RA that at some point during their home training they had a difficult experience to which the iRest program helped them “respond” as opposed to “react.” This finding demonstrates that the topics covered in the iRest program are practical and can be implemented in daily life.

We found positive preliminary effects for depression, but only through within-group analysis and not in the repeated-measures model. The decrease in depression scores after 6 weeks in the iRest group was clinically meaningful, representing a 22% reduction in depression symptoms. In fact, the resulting score was lower than a clinical cutoff for major depressive disorder of 25 and clinically relevant depression optimal cutoff of 22 shown in another elderly population.<sup>46</sup> These preliminary results are promising for iRest as an intervention to improve depression symptoms in older adults.

Sleep impairment was significantly improved compared to the control group in the repeated-measures model despite the study not being powered to detect such results. iRest is known to improve sleep quality, as shown in other pilot studies. When compared to the Dreampad Pillow intervention and meditation or to sleep hygiene control groups, an iRest group reported greatest total sleep time.<sup>47</sup> In a study delivering iRest to women with sexual trauma, the program was found to decrease body tension and improve overall quality of sleep.<sup>16,48</sup> Pain severity improved in our study as well, trending toward significance. Other iRest studies have also found improvements in pain. Combat veterans with traumatic brain injury reported that iRest reduced pain intensity and improved activity limitations.<sup>49</sup> In addition, a study evaluating alternative medicine for veterans found that the iRest program reduced pain-related interference in daily activities.<sup>48</sup> There were no significant group differences on the voice, heart rate, or HRV measures in our study, although we demonstrated that these objective measures could be feasibly collected and analyzed for a larger study powered to detect differences in these measures.

### Limitations

A number of limitations to this study should be considered. This study was a pilot study and was not powered to discover definitive differences between groups. Thus, the results of

effect on depression and depression-related symptoms should be considered with this in mind. Our population was primarily Caucasian women, which despite this being a pilot, precludes the generalizability of the results. These demographics, however, are aligned with other complementary and alternative medicine studies and use in the United States.<sup>50</sup> iRest has feasibly been applied to a wide variety of populations including college students,<sup>14</sup> combat veterans,<sup>15,48</sup> and multiple sclerosis and cancer patients.<sup>12</sup> Despite numerous randomization discussions during the consenting and screening activities, approximately four participants expressed disappointment with their randomization (i.e., participants in the iRest arm wanted to be in the Vacation arm and vice versa). Also, multiple participants in the Vacation arm felt uncomfortable with the unstructured format of the 2 days. Each participant received a list of Vacation activities in which they could engage at the retreat center, but this was not acceptable to all Vacation participants. Several Vacation participants commented that they would have preferred coordinated group activities and a more structured environment. In hindsight, we should have anticipated such a response from participants who were already experiencing depression symptoms pre-retreat. Future studies should consider either having the groups attend the retreat at different times (although this would negate control matching of the weather, time of year, and nutrition) or include group activities that are not meditation or yoga related (which would add an additional social/group support element to the control).

### Future Directions

Future directions in this line of research should include lessons learned from this study:

1. Have a larger subject number based on power calculations generated from this or other pilot studies.
2. Have groups attend retreats at different times.
3. Have more activities for the time and attention control.
4. Add ecological momentary assessment to evaluate more frequent fluctuations in mood.
5. Incorporate a more easily implemented home practice objective adherence measure that does not require mailing out iPods.
6. Include additional support for the participants after the 6-week study for longer term follow-up of measures and home practice.

Future research will build upon this pilot study to evaluate true effects on depression and related symptoms in older adults with depression.

In conclusion, we found the iRest intervention for older adults with depression symptoms to be feasible and acceptable. Preliminary results demonstrate some improvement in depression symptoms in older adults compared to a time-, attention-, and environment-controlled comparison group.

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### Conflict-of-Interest Statement

The authors have no financial relationships with entities that could be perceived to influence the content of the submitted work; no patents, copyrights, or royalties relevant to the submitted work; and no other relationships or activities that could have influenced the content of the submitted work.

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