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An adapted mindfulness-based stress reduction program for elders in a continuing care retirement community: quantitative and qualitative results from a pilot randomized controlled trial.

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Abstract

The purpose of this study was to test the feasibility and effectiveness of an adapted 8-week mindfulness-based stress reduction (MBSR) program for elders in a continuing care community. This mixed-methods study used both quantitative and qualitative measures. A randomized wait-list control design was used for the quantitative aspect of the study. Thirty-nine elderly were randomized to MBSR (n=20) or a wait-list control group (n=19); mean age 82 years. Both groups completed pre-post measures of health related quality of life, acceptance and psychological flexibility, facets of mindfulness, self-compassion, and psychological distress. A subset of MBSR participants completed qualitative interviews. MBSR participants showed significantly greater improvement in acceptance and psychological flexibility and in role limitations due to physical health. In the qualitative interviews, MBSR participants reported increased awareness, less judgment and greater self-compassion. Study results demonstrate the feasibility and potential effectiveness of an adapted MBSR program in promoting mind-body health for elders.

Introduction

Given the aging population of North America and the constellation of medical, psychological, and social stressors associated with older age, there is a need for interventions that can support healthy aging by reducing stress, enhancing psychological well-being, and improving health-related quality of life (Wolff, Starfield, & Anderson, 2002; Krein, Heisler, Piette, Butchart, & Kerr, 2007). In 2009, those aged 65 or older numbered 39.6 million and represented 13% of the population (US Census Bureau, Census 2010). In contrast by 2030 there will be about 72.1 million elders (65 or older). The fastest growing segment of the elderly population is those 80 and over; their growth rate is twice that of those 65 -80 years and almost 4-times that for the total population (US Census Bureau, Census 2010). Although adults aged 80 and over are the fastest growing segment of the elderly population, they are underrepresented in clinical research (Zulman, Sussman, Chen, Cigolle, Blaum, & Hayward, 2011), making studies of adults in their 80s a high priority.

Mindfulness meditation is a form of meditation that can improve psychological symptoms, such as anxiety and depression, and health-related quality of life (Goyal et al, 2014; Sedlmeier et al, 2012). Relatively few clinical trials, however, have tested the potential benefits of mindfulness meditation practices on mind-body health and wellness in aging (Creswell et al, 2012; Gard, Hölzel, & Lazar, 2014; Morone, Lynch, Greco, Tindle, & Weiner 2008).

In 1979, Jon Kabat-Zinn brought mindfulness into mainstream healthcare in the form of the Mindfulness-Based Stress Reduction (MBSR). MBSR is designed to help people deal more effectively with stress, pain and illness and to participate actively in their own healing and well-being. The MBSR program centers on the practice of mindfulness meditation, which involves the

cultivation of an open, curious, and nonjudgmental awareness of present moment experience (Kabat-Zinn, 1990). The MBSR curriculum includes training in mindfulness meditation through different formal practices, including body scan meditation, sitting meditation, mindful yoga, mindful walking and eating, as well as mindful communication practices. The program also includes didactic information on stress physiology and healthy ways to respond versus react to stress. Research on MBSR in various patient populations has shown beneficial effects including reductions in anxiety, depression and pain, and improvements in health-related quality of life, immune functioning, brain functioning, and cognitive functioning (Bohlmeijer, Prenger, Taal, & Cuijpers, 2010; Hoffman, Sawyer, Witt, Oh 2010; Chiesa, Calati, & Serreti, 2011; Davidson et al, 2003; Grossman, Niemann, Schmidt, & Walach, 2004; Reibel, Greeson, Brainard, & Rosenzweig 2001; Fang et al., 2010; Grossman, Tiefenthaler-Gilmer, Raysz, Kesper, 2007; Carlson, Speca, Faris, & Patel, 2007; Holzel et al, 2011). Since the development of MBSR, mindfulness training has been offered beyond the healthcare environment and expanded into other settings including educational institutions, prisons, the military, and corporate settings (Frank, Reibel, Broderick, Cantrell, & Metz, 2013; Davidson et al., 2003; Samuelson, Carmody, Kabat-Zinn, & Bratt 2007).

While many of the demonstrated benefits of MBSR have implications for healthy aging, to date there have been few published studies examining the effects of MBSR specifically with the elderly, particularly those in the 80 years and over age group. A few studies that have looked at mindfulness training for elderly individuals demonstrated significant increases in physical health perceptions, reductions in blood pressure, and improved depressive symptoms (Creswell et al., 2012; Ernst et al., 2008; Palta et al., 2012). However, in most of these studies the mean age of the populations have been 75 years or younger. There is other non-research evidence of the

feasibility and potential benefits of mindfulness programs for elderly. For instance Lucia McBee has described in detail her work on "Mindfulness-Based Elder Care" which combined mindfulness meditation with aromatherapy, guided imagery, as well as massage with both residents of a nursing home as well as with caregivers (McBee 2008). The Mindfulness-Based Elder Care led to reduction in agitation and behavioral problems among nursing home residents (Lantz, Buchalter and McBee 1997).

In this mixed methods study, we report on a randomized controlled trial (RCT) that tested the feasibility and initial effectiveness of an MBSR program specifically adapted for elderly residents (mean age of 82 years) living in a continuing care retirement community (CCRC). We hypothesized that the adapted 8 week MBSR program, compared to a wait-list control group, would reduce symptoms of psychological distress as well as enhance core qualities of mindfulness and improve health related quality of life.

Methods

Participants

Participants included a convenience sample of 39 residents living in a CCRC. The mean age was 82 years old ± 7.2 (age range 63 – 94 years). Participants were predominantly female (n = 32), and all were Caucasian. The study group was highly educated, with 20% having more than 20 years of education, 36% with a graduate degree and 28% with a college degree. All participants provided a written informed consent that was approved by the Thomas Jefferson University Institutional Review Board.

Procedures

Recruitment and data collection occurred between August 2011 and March 2012. The study was performed at a CCRC that includes Independent Living, Personal Care and Skilled Nursing units. Anyone in Independent Living was eligible as long as they had a Mini-Mental Status Exam score ≥24, with no significant medical or psychological disorders that would prevent them from being able to participate in the study. After an initial workshop presented at the facility, 50 subjects were recruited from the Independent Living arm of the CCRC. Subjects met individually with a researcher who consented them into the study, conducted cognitive testing and gave them baseline research questionnaires (see Measures) which were collected within 3-weeks before the start date of the program. The researcher who performed the study assessments and collected data was blind to group assignment. After baseline assessment, subjects were randomized 1:1 into the 8-week MBSR program (n=20) or a wait-list control (n=19). Subject identification numbers linked to a concealed group assignment were randomly selected from a pool of 41 possible numbers (Altman & Blanchard, 1999). Block randomization was used to ensure equal allocation after every two participants were assigned. A different researcher who was not directly involved in the study assessments or data collection maintained the group assignment scheme, and once given the study identification numbers, called each participant to inform them of their group status. Subjects completed the same questionnaires within 3-weeks of finishing the MBSR program. A wait-list control group completed pre and post measures at the same times as the MBSR group. The wait-list control group was offered MBSR after they completed post-questionnaires.

Those in the MBSR group met weekly for two hour sessions guided by a certified MBSR teacher, using the MBSR curriculum as developed by Jon Kabat-Zinn (1990) with some adaptations (see below). During each group session, the instructor led participants in guided

mindfulness meditation exercises, mindful yoga, and group discussions with the intent to foster mindful awareness of one's moment-to-moment experience. In between sessions participants were asked to practice daily using a CD of guided meditations. Attendance was taken at each session. The control group did not receive any intervention, other than usual care, during this period.

Adaptations to the MBSR program

The standard MBSR program is an 8 week program that meets once a week for 2 and a half hours, and includes a full day of practice between the 6th and 7th weeks. Participants are asked to practice at home for 45 minutes a day, listening to guided meditations. Adaptations were made to this standard MBSR program in order to make it more accessible to the elderly population. The adapted program was an 8-week program meeting once a week for 2 hours, without a full day retreat. Home practice was for 25 to 30 minutes daily. The sequence of practices was the same as the standard MBSR program including the body scan awareness practice, sitting meditation with awareness of breath, mindful yoga, mindful walking, and loving-kindness meditation (Kabat-Zinn, 1990). However the yoga practice was adapted to chair yoga instead of floor yoga. With mindful walking participants had the option of walking close to a wall or to hold on to the backs of chairs in case they needed additional support. Each home practice was put on a separate CD so participants could more easily manage the technology required with playing the CD. In a pilot study we learned that this population can have difficulty listening to specific tracks on a CD with multiple practices. The binder contents were also written in large print for better visibility.

Outcome Measures and Data Analysis

The primary outcome in this pilot RCT of an adapted MBSR program was feasibility and acceptability in a continuing care community setting. Feasibility was defined by MBSR class attendance, which was recorded by the teacher. Acceptability was defined by program adherence, measured as the rate of completion of daily home practice logs indicating how many minutes participants practiced meditation each day during the 8-week course. Secondary outcomes included five pre-post quantitative measures relevant to healthy aging, as follows: (1) the 36-item Short-Form Health Survey (SF-36), which measures eight aspects of health related quality of life (Physical Functioning, Role limitations due to Physical health problems, Bodily Pain, General Health Perception, Vitality, Social Functioning, Role limitations due to Emotional problems, and Mental Health) that are summarized in two composite scales reflecting mental and physical health (Mental Component Summary and Physical Component Summary; McHorney, Ware, & Raczek, 1993); (2) the Acceptance and Action Questionnaire II (AAQ II) which measures psychological flexibility as a function of accepting unpleasant emotions and engaging in valued activities (Bond et al., 2011); (3) the Five Facet Mindfulness questionnaire (FFMQ) which measures five core mindfulness skills (Observing, Describing, Non-Judging of inner experience, Non-Reacting to inner experience, and Acting with Awareness; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006); (4) the Self Compassion Scale (SCS) which measures six aspects of self-compassion across three dimensions (Self-Kindness vs. Self-Judgment; Common Humanity vs. Isolation; Mindfulness vs. Over-identification; Neff, 2003); and (5) the

Brief Symptom Inventory-18 (BSI-18) which measures three dimensions of psychological

distress (anxiety, depression, somatization; Derogatis, 2000).

All statistics were performed using IBM SPSS version 22 (Armonk, NY). Variables were

screened for distributional assumptions prior to analysis. All continuous outcome variables

approximated a normal distribution with skewness and kurtosis less than 2.0.[1] Primary analyses

of between-group effects were tested using mixed-effects models with a first-order

autoregressive covariance structure to account for dependency of observations in a repeated

measures design   (Singer & Willett, 2003). Group assignment was treated as a fixed effect and

outcome variables were treated as random effects that could vary within-person and across time.

Restricted maximum likelihood estimation (REML) allowed all subjects to be included in the

models, even those with partially missing data. Therefore, mixed-effects models were consistent

with Intent-to-Treat (ITT) principles without requiring imputation, such as last observation

carried forward (LOCF), which can bias parameter estimates (Enders, 2010). Significant Group

x Time interaction effects indicated the effectiveness of MBSR, compared to a wait-list control

group. Paired *t*-tests were used to test hypotheses about within-group changes in pre and post

intervention scores among the MBSR and control groups separately. Independent samples *t*-tests

were used to test for differences between-groups in study variables at baseline. Statistical

significance for all parameter estimates was set at $z = 1.96$, $\alpha = .05$, two-tailed. Effect sizes were

calculated using Cohen's *d* and *eta*^{2} (Cohen, 1988).

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[1] There were only five outliers (>3SD) across pre and post measurement of 27 dependent variables: one post-MBSR score on the AAQ-II, one pre- and one post-MBSR score on the BSI-DEP scale, and two post-MBSR scores on the SF-36 Role-Emotional scale. Mixed effects models for these variables were run with the outliers – all of which were plausible values – and again after Winsorization. Results remained unchanged.

Qualitative research was conducted through semi-structured interviews with a subset of participants (n=10) who completed the MBSR program and volunteered to be interviewed. These interviews were conducted by an anthropologist trained in mindfulness, using methods of mindful inquiry as a way to understand from the participants' own first-person perspective how they experienced mindfulness training and its effects. Mindful inquiry, which is used in the MBSR context to help participants explore their subjective experience in the moment to make more conscious meanings for further exploration (McCown, Reibel, & Micozzi, 2011), has been recognized and adapted as a valid qualitative interview tool (Bentz & Shapiro1998). The interviews which lasted about a half hour were conducted in person, recorded, and then transcribed. Interviews were then thematically analyzed and discussed among the co-investigators (Braun & Clarke 2006).

Results

Preliminary Analyses

The MBSR and wait-list control groups did not significantly differ on any measured demographic characteristics at baseline (see Table 1). Compared to previously published psychometric data, the study sample scored relatively low on psychological distress (Derogatis, 2000), and within the normal range on mindfulness skills (Baer, Smith, Lykins, Button, Krietemeyer, Sauer, Walsh, et al., 2008), self-compassion (Raes, Pommier, Neff, & Van Gucht, 2011), psychological flexibility (Bond et al., 2011), and health-related quality of life for older age (McHorney, Ware, & Raczek, 1993). The two groups did not differ on outcome measures at baseline, except for the Acting with Awareness scale of the FFMQ (MBSR group = 28.80, Waitlist group = 24.05, t = 2.25, p=.029), the Self-Kindness scale of the SCS (MBSR group =

2.64, Waitlist group = 3.37, t = -2.25, p=.030), and the General Health Perception scale of the

SF-36 (MBSR group = 70.21, Waitlist group = 55.65, t = 2.46, p=.018).

Feasibility and Acceptability

The drop-out rate for the MBSR group was comparable to other MBSR programs (20%;

4 out of 20). Two people did not start the program because of medical illness. After the program

started, one person dropped out due to the death of her spouse and another because of a language

barrier, as English was a second language and she could not easily understand the teaching. Of

the 16 MBSR participants who completed the program, 12 attended all 8 classes and 4 attended 7

classes. MBSR participants also had a high level of compliance with home practice. On average

they practiced 5 times per week for 24 minutes per session, listening to guided meditations on

compact discs over the course of the 8-week program.

Quantitative Findings

As shown in Table 2, significant Group x Time interactions were found for only two

dependent variables: Psychological Flexibility (AAQ-II) and Role Limitations - Physical (SF36-

RP). In both cases, the MBSR group improved significantly more than the waitlist control

group. There was a medium size effect on Psychological Flexibility and a large effect on Role

Limitations – Physical. Planned contrasts showed additional improvements within the MBSR

group only for: Observing (Pre = 26.38, Post = 29.09, t = -2.57, p=.015), Psychological

Flexibility (Pre = 51.70, Post = 56.04, t = 3.10, p<.005), Common Humanity (Pre = 2.85, Post =

3.41, t = -3.19, p=.003), Vitality (Pre = 52.11, Post = 59.70, t = -2.57, p=.019), Role Limitations

- Emotional (Pre = 73.688, Post = 91.02, t = -2.15, p=.039), and the SF-36 Mental Component

Summary (Pre = 53.18, Post = 56.62, t = -2.53, p=.017). Planned contrasts also showed the

following significant improvements in the control group only: Acting with Awareness (Pre =

24.05, Post = 26.85, t = -2.74, p=.01), Anxiety (Pre = 3.26, Post = 2.01, t = 2.49, p=.018), and

Psychological distress (Pre = 9.79, Post = 7.56, t = 2.87, p=.007).

Qualitative Findings

As some mindfulness researchers have argued (Grossman & Van Dam, 2011), a purely

quantitative approach to understanding the effects of mindfulness training is limited and

interview approaches may add greater insight into psychological mechanisms and characteristics

associated with mindfulness than a self-report mindfulness scale alone (Grossman 2008). A

number of themes emerged when the qualitative interviews (n=10) were analyzed in this study.

These themes were shared by all the participants interviewed and included: increased present

moment awareness, less judgment and greater self-compassion, and increased well-being. These

themes were also echoed by other participants in conversations during classes and after class

with the instructor.

Interviewees reported that after mindfulness training they were more able to pay

attention, sustain attention, and bring their minds back when it wandered. Overall, they were

more able to be present and the increased present moment awareness allowed them to experience

their lives more fully. One participant shared a specific experience that illustrates this:

"I am much more focused. I went to a concert recently and I felt like I was a totally

different person. And I really followed the concert along, what she was singing, how she

was singing, how the set was. And that really pleased me. Before I would have just

thought about other things. Before I used to jip myself of these experiences, experiences that I used to look forward to and paid good money for but missed [the experience] because my mind wasn't there. But now I was able to follow along and enjoy everything about it."

This theme of being able to show up for one's present moment experience emerged again and again in the interviews. Interviewees shared how they were more able to enjoy the little things in life. As one person said "the early morning coffee and newspaper became much more enjoyable."

Some participants made a connection between paying attention to the present moment and less ruminating and less worrying. As one person said:

"That there's even something to pay attention to, is new. Before when I was walking I would have so many things going through my mind, over and over. And now I think when you're paying attention and you are aware of something like walking …my thoughts are not going around and around in my mind."

Another person said:

"Now after the program, when I start to run the scenarios of how this might be, how this might go, I usually stop and pay attention to my breathing, because I don't want to think about that, it's a waste of energy, it really is. So now I can stop any scenarios or fantasies or worries or anything like that. I didn't have this before."

Participants mentioned how this ability to cut through ruminating thoughts or worry by being in the present, paying attention to sensations whether they were walking or following their

breath, helped them feel calmer and less stressed about the future. Many said that they had learned through the program to worry less about the future:

"This [not being so worried and anxious about the future] is a shift, for me. It's a new shift."

"I've always been an Olympic class worrier. Now I worry less about the future."

One participant shared poignantly:

"I have problems in my family and my husband is blind and it's not easy. I use this walker; he holds on and he's bigger than I am and sometimes he pushes down and then I can't do it. At times like that I can stop and take a deep breath – or a few. It's a big help."

Participants shared that they were pleased to have these tools to help them reduce stress. They shared that the formal practices were "relaxing and calming," and "helpful in dealing with pain;" and the informal practices of being mindful of whatever they were doing whether it was walking or waiting in line or eating, of pausing to take a deep breath or two, helped them even more.

Another theme that emerged from the qualitative interviews was that participants reported greater self-compassion and kindness. They said they were less judgmental of themselves and more kind and compassionate to themselves. While this is not reflected in the quantitative measure of self-compassion, which may have been limited by scale instructions that queried for acts of self-compassion "in difficult times", from their own perspective, participants felt that something had shifted that was beneficial for them. Below are direct quotes from a few of the interviews:

"I know something important I learned from this course – not to be judgmental."

"These practices have given me more self-forgiveness."

"I've always been very self-judgmental. I'm learning to judge myself less."

"I am not so critical of myself, even when I make mistakes."

"I'm more aware of my inner critic. I try to be less judgmental of myself."

They reported not only being less judging of themselves but also more tolerant of other people and less judgmental in general:

"I don't get as upset with other people – because I am not judging them as much."

And more patient: "I'm more patient, more tolerant and I don't tune out as fast as I used to."

"I came in with an inquiring skeptical mind – so I was willing to do it and I must say I noticed some differences in my ability to be more patient. I found waiting on slow moving lines here easier to tolerate. My dear wife is less cognizant of time than I am. I had a career in broadcasting pretty much, so I knew if I was late it didn't happen. So I'm not late. And I had to forgive…she's the way she is, I'm the way I am and that's okay- this business of 'that's okay' has been good."

In addition to being more present, less judging, more self-compassionate, and more patient, participants reported increased well-being with mindfulness training. In the interviews they reported having more energy and vitality. In the words of one of the participants, "after I do a practice I feel more energized." This is reflected in the quantitative measure which showed within-group improvement in vitality. Participants who were interviewed said that the practices

helped them sleep better. One participant elaborated that, "When I have trouble sleeping, I use the body-scan and it helps me fall asleep again." Others mentioned that the practices helped them deal with physical pain. As one participant said, "When I feel discomfort or pain my body, doing a practice, like the body scan, that really helps me. Another thing that helps is taking a few relaxing breaths."

While the number of participants interviewed was not large, those who were interviewed found MBSR training to be a positive experience. They all said that the group experience was meaningful and that they personally found great benefit in the form **of** increased awareness, less judgment and greater self-compassion.

Discussion

The purpose of this pilot study was to determine the feasibility and initial effectiveness of an 8-week MBSR program adapted for elders living in a continuing care community. Results indicate that MBSR is indeed feasible even for a much older population than previously reported in the **research** literature on meditation training for elderly. There was high compliance in the study with elders randomized to MBSR attending nearly all classes and adhering to home meditation practice throughout the course.

This study also presents quantitative data on one of the oldest populations to date receiving an adapted MBSR program. Using a randomized, waitlist control design, MBSR significantly improved acceptance and psychological flexibility and role limitations due to physical health. The larger reduction in AAQ-II scores for MBSR group participants implies that mindfulness meditation training engenders less avoidance and greater acceptance of

challenging life experiences. The larger reduction in role limitations due to physical health

problems suggests that MBSR training improved this aspect of health-related quality of life for

these elders, such that they could more easily engage in daily life without impediments due to

physical distress. Effect sizes of MBSR were large for psychological flexibility and role

limitations due to physical health problems, and small for most other scales.

Contrary to our hypothesis, the predominance of quantitative outcome variables did not

differ significantly between the MBSR group and the waitlist control.   The fact that we did not

observe statistically significant results across most outcome variables in this relatively healthy,

non-clinical sample is consistent with prior meta-analyses that found the effects of MBSR are

moderated by clinical status or baseline symptom severity, such that persons with low levels of

distress may not experience large changes in symptom reduction (de Vibe et al., 2012; Hofmann,

Sawyer, Witt, & Oh 2010).

Several additional outcome variables changed significantly within the MBSR group only.

Specifically, the MBSR group reported improvements in mindful observing, common humanity,

vitality, role limitations due to emotional problems, and overall mental health. These MBSR-

specific changes suggest that mindfulness meditation training may promote a number of positive

outcomes that are related to healthy aging.

Prior studies of MBSR for older adults have reported mixed findings on psychological,

physical, and quality of life outcomes. For example, a small, non-randomized study showed the

feasibility of MBSR in nursing home residents in Germany (Ernst et al., 2008). Nine out of 15

course participants completed the course (60%) and showed a significant increase in the SF-12

physical health score. In our study, 80% of participants completed the study, and those assigned

to MBSR had excellent attendance. While we did not see a significant increase in the SF-36

physical health summary score, MBSR participants did have a significant improvement in

vitality and role limitations due to physical health problems.

Another pilot study with a randomized controlled study design (n=20; mean age = 73)

demonstrated the feasibility of an adapted mindfulness program for African American elderly in

low income senior housing facility (Palta et al, 2012). The adapted program called

ELDERSHINE met once a week for 90 minutes. Results of that pilot study showed that

participants in the mindfulness group had a lower mean systolic and diastolic blood pressure

after the 8-week intervention. Another recent randomized wait-list control study of MBSR for

community dwelling older adults (n=200, mean age of 72 years) looked at the effects of age and

depressive symptom severity on changes in positive affect among those assigned to MBSR

(Gallegos et al, 2013). That study found MBSR improved positive affect for older adults with

lower depressive symptom severity. Another small randomized wait-list control study (n=40;

mean age 65 years) found that an 8-week MBSR program decreased subjective feelings of

loneliness and loneliness-related pro-inflammatory gene expression (Creswell et al, 2012). In our

study we did not see improvements in depression; however at baseline our population reported

low levels of depression, which may have caused a floor effect. We did not include a measure of

positive affect, but we did find a within-group improvement for the MBSR participants in the

mental component summary scale of the SF-36, indicating better overall psychological

functioning and well-being. Taken together, both non-randomized and randomized clinical trials

support the effectiveness of mindfulness meditation training for enhancing mental and physical

health among older adults, particularly among those with clinically significant symptoms of

distress at baseline.

It is interesting that several significant changes were observed only in the control group, particularly in Acting with Awareness, Anxiety, and Psychological Distress. One possible explanation is regression to the mean, as the wait-list group had significantly lower scores on Acting with Awareness at baseline, and they tended to have higher levels of Anxiety and Psychological Distress, as well (Table 2). At least one other study on MBSR for older adults found some significant changes in mental health in the untreated comparison group (Ernst et al. 2008).

The qualitative assessments added to the understanding of the potential benefits of the MBSR program. The participants reported perceived benefits including greater concentration, improved mood, less worry, and increased awareness of stressors. MBSR participants also reported increases in their feelings of kindness, compassion, and patience towards themselves and others. Such qualitative reports are consistent with themes found in prior MBSR studies in clinical populations (Mackenzie, Carlson, Munoz & Specal, 2007; Morone, Lynch, Greco, Tindle & Weiner, 2008). The results of this study demonstrate the value of using a mixed-methods approach, especially when quantitative measures may not totally reflect the participants' first-person or direct experience. Others have also argued for the need for a mixed-methods approach. For instance Grossman argues against a purely quantitative approach to understanding the effects of mindfulness (2008), partly because "the complexity of the process of mindfulness practice" (Grossman and Van Dam 2011), and partly because of methodological issues in measuring mindfulness. One methodological issue is that the understanding of questionnaire items may vary greatly between different groups (for example meditators vs. non-meditators) (Grossman and Van Dam 2011). Thus after 8-week post measures, the individual items in the mindfulness and compassion scales may mean something quite different to the MBSR group

compared to the control group. Additionally, to our knowledge the mindfulness and self-compassion scales have been not been previously tested in this age group. It is possible that these factors contribute to the differences found between the quantitative measures and the first-person subjective experiences of the participants shared during the qualitative interviews. According to their first-person experience the participants did find that the MBSR program led to improvements in both awareness and kindness.

Study limitations included a relatively small sample size (which was predominantly Caucasian, female and highly educated)**,** reliance on subjective self-reported outcomes, and a relatively healthy sample of elders. Given that the elders in this study were relatively healthy, it is possible that 'floor' and 'ceiling' effects might have made detecting significant changes in the survey battery difficult. In addition, numerous statistical tests were performed, which can be associated with increased type 1 error. Given the pilot nature of this trial on a newly adapted intervention for elders, we elected not to use an alpha correction in order to guard against type 2 error at this early stage. Taken together, these design and analysis issues could limit generalizability to less healthy and more demographically diverse populations of elders living in continuing care communities. Also, given that this was a pilot study testing feasibility, we did not include an active control group and thus did not control for time and attention. Nevertheless, given promising quantitative results on several validated survey scales and positive perceptions from qualitative interviews, additional study is warranted to further explore the potential value of this adapted MBSR program for elders.

Overall, this study demonstrates that the adapted MBSR program helps to improve some dimensions of psychological and physical well-being in elders in a CCRC setting. This study also indicates the potential need to augment quantitative data with qualitative interviews to more

fully evaluate participants' experience of the MBSR program in this setting. Future studies

would benefit from a larger and more diverse sample size. Overall, this pilot RCT supports the

adapted MBSR program as a promising intervention for elders in CCRCs.

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Table 1

Demographic Variables

	All Subjects	**MBSR Group**	**Control Group**
	(N=39)	**(N=20)**	**(N=19)**
Age			
Mean ± SD	82.0 ± 7.2	83.3 ± 5.3	80.6 ± 8.9
Gender			
Female	32	17	15
Male	7	3	4
Education (years)			
20+	8	3	5
18-19	14	7	7
15-16	11	7	4
12-14	6	3	3

Table 2

Changes in outcome variables for MBSR (n=20) and Waitlist control (n=19) groups.

Outcome	MBSR Group		Waitlist Control		Mixed Model ANOVA (Group X Time)			
	Pre	Post	Pre	Post	F	p	d	eta^2
Mindfulness (FFMQ) [a]								
Observing	26.38 (1.15)	29.09 (1.32)	27.53 (1.18)	28.01 (1.20)	2.64	0.115	-0.41	0.04
Describing	27.25 (1.40)	28.70 (1.52)	27.9 (1.44)	27.67 (1.45)	1.80	0.191	-0.26	0.02
Acting with Awareness	28.80 (1.47)	30.25 (1.65)	24.05 (1.51)	26.85 (1.53)	0.71	0.407	0.19	0.01
Non-judging	30.43 (1.43)	32.45 (1.59)	30.53 (1.47)	31.93 (1.48)	0.17	0.681	-0.09	0.00
Non-reacting	22.00 (0.97)	22.15 (1.10)	23.37 (0.99)	24.04 (1.01)	0.21	0.648	0.12	0.00
Psychological Flexibility (AAQ-II) [a]	51.70 (2.04)	56.04 (2.15)	52.84 (2.09)	52.35 (2.11)	6.47	**0.016**	0.42	0.17
Psychological Symptoms (BSI-18)								
Somatization	1.90 (0.52)	2.36 (0.56)	3.00 (0.53)	2.39 (0.54)	2.64	0.114	-0.46	0.05
Depression	2.55 (0.68)	1.97 (0.71)	3.53 (0.70)	3.20 (0.71)	0.23	0.637	0.03	0.00
Anxiety	2.20 (0.54)	1.80 (0.59)	3.26 (0.55)	2.01 (0.56)	1.34	0.256	-0.34	0.03
Global Severity Index	6.65 (1.32)	6.11 (1.38)	9.79 (1.36)	7.56 (1.37)	2.15	0.152	-0.28	0.02
Health-Related Quality of Life (SF-36) [a]								
Physical Functioning	55.41 (6.21)	59.16 (6.38)	53.42 (6.21)	51.76 (6.29)	1.39	0.248	-0.20	0.01
Role Limitations-Physical	46.05 (8.93)	63.89 (9.74)	48.68 (8.93)	36.16 (9.30)	5.39	**0.027**	-0.75	0.12
Bodily Pain	64.16 (4.78)	65.16 (5.24)	62.68 (4.78)	58.31 (4.94)	0.77	0.387	-0.25	0.01
General Health Perception	70.21 (4.18)	66.77 (4.56)	55.65 (4.18)	57.32 (4.31)	1.00	0.326	0.26	0.02
Vitality	52.11 (4.76)	59.70 (5.00)	48.16 (4.76)	47.49 (4.84)	3.95	0.056	-0.40	0.04
Social Functioning	84.21 (4.28)	88.59 (4.64)	77.63 (4.28)	79.07 (4.40)	0.34	0.565	-0.15	0.01
Role Limitations-Emotional	73.68 (7.43)	91.34 (8.15)	77.19 (7.43)	83.62 (7.75)	0.97	0.331	-0.31	0.02
Mental Health	76.42 (3.41)	79.02 (3.62)	76.84 (3.41)	75.69 (3.48)	1.27	0.269	-0.24	0.01
Physical Component Summary	39.30 (2.51)	39.83 (2.60)	36.92 (2.51)	34.99 (2.54)	1.76	0.194	-0.22	0.01
Mental Component Summary	53.18 (2.15)	56.62 (2.26)	52.80 (2.15)	53.86 (2.19)	1.67	0.207	-0.25	0.01
Self-Compassion (SCS) [a]								
Self-Kindness	2.64 (0.23)	2.80 (0.24)	3.37 (0.23)	3.36 (0.24)	1.16	0.290	-0.16	0.01
Common Humanity	2.85 (0.24)	3.41 (0.25)	3.42 (0.24)	3.66 (0.24)	1.83	0.186	-0.30	0.02
Mindfulness	3.02 (0.22)	3.05 (0.23)	3.55 (0.22)	3.72 (0.22)	0.42	0.520	0.14	0.01
Self-Judgment	2.40 (0.23)	2.58 (0.24)	2.61 (0.23)	2.45 (0.24)	2.22	0.146	-0.33	0.03
Isolation	2.05 (0.20)	2.13 (0.21)	2.09 (0.20)	2.37 (0.20)	0.68	0.416	0.22	0.01
Over-identification	2.41 (0.23)	2.27 (0.24)	2.33 (0.23)	2.38 (0.23)	0.74	0.396	0.19	0.01
Self-Compassion (total)	3.27 (0.18)	3.40 (0.18)	3.55 (0.18)	3.59 (0.19)	0.48	0.493	-0.11	0.00

Note: Pre and post scores from mixed effects models are shown as estimated marginal means (SE).

Statistics are shown for Group X Time effect, which tested the effectiveness of MBSR over time compared to the Waitlist control.

Cohen's d = difference in pre-post change for MBSR vs. Waitlist divided by pooled SD. Range: 0.20 = small, 0.50 = medium, 0.80 = large

[a]Higher scores on FFMQ, AAQ-II, SF-36, and all SCS subscales indicate better functioning.