Complementary Therapies in Medicine 26 (2016) 98–107

Contents lists available at ScienceDirect

Complementary Therapies in Medicine

journal homepage: www.elsevierhealth.com/journals/ctim

A randomized controlled trial of two simple mind-body programs, Kirtan Kriya meditation and music listening, for adults with subjective cognitive decline: Feasibility and acceptability

Kim E. Innes[a,b,*], Terry Kit Selfe[a,b], Dharma Singh Khalsa[c], Sahiti Kandati[a]

[a] Department of Epidemiology, West Virginia University School of Public Health, Morgantown, WV, United States
[b] Center for the Study of Complementary and Alternative Therapies, University of Virginia Health System, Charlottesville, VA, United States
[c] Department of Internal Medicine and Integrative Medicine, University of New Mexico School of Medicine, Albuquerque, NM and the Alzheimer's Research and Prevention Foundation, Tucson, AZ, United States

ARTICLE INFO

Article history:
Received 10 December 2015
Received in revised form 1 March 2016
Accepted 2 March 2016
Available online 5 March 2016

Keywords:
Meditation
Music
Subjective cognitive decline
Memory
Alzheimer's disease

ABSTRACT

Purpose of the study: In this randomized controlled trial (RCT), we assessed the feasibility and acceptability of two simple home-based relaxation programs in adults experiencing subjective cognitive decline, a strong predictor of Alzheimer's disease.
Design and methods: Sixty participants were randomized to a beginner Kirtan Kriya meditation (KK) program or a music listening (ML) program. Participants were asked to practice 12 min daily for the first 12 weeks, then as often as they liked for the following 3 months. Participants underwent assessments at baseline, 12 weeks, and 6 months to evaluate changes in key outcomes. Feasibility and acceptability were evaluated by measuring recruitment and retention rates, assessment visit attendance, practice adherence, and treatment expectancy; exit questionnaires completed at 12 weeks and 6 months provided additional data regarding participant experience with the study, perceived barriers to and facilitators of practice, reasons for drop-out, and views regarding the assigned intervention.
Results: Fifty-three participants (88%) completed the 6 month study. Adherence in both groups was excellent, with participants completing 93% (91% KK, 94% ML) of sessions on average in the first 12 weeks, and 71% (68% KK, 74% ML) during the 3 month, practice-optional, follow-up period. At week 12, over 80% of participants indicated they were likely to continue practicing following study completion. Responses to both structured and open-ended exit questionnaire items also suggested high satisfaction with both programs.
Conclusions: Findings of this RCT of a beginner meditation practice and a simple ML program suggest that both programs were well accepted and the practices are feasible in adults with early memory loss.

1. Introduction

Alzheimer's disease (AD), the most common form of dementia, is a progressive brain disorder resulting in a loss of memory, reasoning, language skills, and the ability to care for one's self.[1] AD is the sixth leading cause of death in the US, affecting 5.3 million Americans at an estimated cost of $226 billion, figures that are expected to increase dramatically in the coming years.[2,3] AD generally develops slowly, typically preceded years earlier by perceived and/or objective cognitive decline, offering a potential window for therapeutic intervention. First defined in the late 1990's and now widely recognized, mild cognitive impairment (MCI) is considered a transition phase between healthy cognitive aging and dementia.[4,5] Risk of progression to AD in those with MCI is very high, with an estimated 5–15% of those with MCI converting to AD each year.[4–6] More recently, subjective cognitive decline (SCD) has been prospectively associated with accelerated decline in cognitive function,[7,8] an up to a 4.5 fold increased risk for progression to MCI[9,10] and up to a 6.5 fold or more increased risk for AD[11,12] after adjustment for age, depression, APOE4 status, and other potential confounders. The annual conversion rate from SCD to MCI or dementia in otherwise healthy individuals has been estimated to be 7–10%.[13,14] While cognitive performance is in the normal range in those with SCD,[15] a number of population-based studies have shown significant decrements in cognitive performance in adults with SCD relative to those without memory complaints.[16–18] SCD has also been characterized by neuropathological changes linked to the development

* Corresponding author at: Dept of Epidemiology, WVU School of Public Health, PO Box 9190, Morgantown, WV 26506, United States.
E-mail address: KInnes@hsc.wvu.edu (K.E. Innes).

http://dx.doi.org/10.1016/j.ctim.2016.03.002
0965-2299/

and progression of AD, including increased levels of cerebrospinal fluid markers of AD,[19] elevated amyloid-β deposition,[20] reductions in hippocampal and grey matter volume,[18,21] and increased white matter lesions.[22,23] Notably, progression from SCD to MCI has recently been shown to carry up to a 20–60 fold increased risk for the development of AD dementia,[11] highlighting the importance of identifying interventions which may delay or halt cognitive decline in those with SCD.

While a number of modifiable risk factors have been linked to both SCD and incident AD,[24,25] effective therapies for preventing AD or for slowing cognitive decline remain elusive.[26] To date, there are no approved treatments for early memory loss.[15,27,28] Given the high prevalence of chronic stress,[29–31] sleep disturbance,[15,32] and mood impairment [32–36] in those with SCD and the deleterious impact of these factors on multiple indices of health and neurocognitive function,[37–45] interventions that specifically address these risk factors may hold promise for not only enhancing health and well-being, but for slowing and possibly preventing cognitive decline in those at risk for AD. Of particular interest in this regard are relaxation strategies, including music listening and meditation. There is mounting evidence that both meditation and simple music therapy may improve neurophysiologic profiles, reduce stress and depression, enhance well-being, and possibly improve cognitive performance in a range of populations,[46–52] including those with and at risk for cognitive impairment.[44,53–57] However, despite the apparent therapeutic potential of these approaches for those with early memory loss, rigorous research remains sparse, and no studies have yet investigated the feasibility of these relaxation strategies for this population. In this paper, we use a mixed methods approach to examine the feasibility and acceptability of a parallel arm randomized controlled trial (RCT) of two simple relaxation programs, meditation and music listening, for adults with early memory loss.

This investigation expands on work from two previous pilot trials, including an 8-week non-randomized controlled trial of Kirtan Kriya meditation (KK) vs. music listening (Mozart violin concertos) in 20 adults with varying degrees of memory impairment (N = 15 KK, 5 music listening); findings of this preliminary study suggested improvement in cognitive function in both groups.[58] Similarly, our earlier 8 week pilot study of a 12 min KK program in caregiver-AD patient dyads[59] also suggested potential cognitive benefits of KK for those with memory loss. While findings of these studies were encouraging, small sample sizes, heterogeneous study populations, non-randomized design, and/or other factors related to study design and implementation limit conclusions. Specifically targeting older adults with early memory loss, the current 6 month RCT was designed to address these concerns, and to expand the scope of research to include multiple factors of relevance to AD risk.

2. Methods

2.1. Study participants: participant recruitment, characteristics, screening, and enrollment

The study was approved by the West Virginia University Institutional Review Board. Independently living adults aged ≥50 years with MCI or SCD were recruited using flyers and brochures posted in community, health care, and workplace settings, as well as in retirement and other senior communities. Study advertisements were also disseminated via the intranet and university listservs. To be eligible for the study, participants had to have a physician diagnosis of MCI, or meet five essential SCD criteria outlined in recent expert reviews[15,60] and indicate concern about memory problems, shown in recent prospective studies to predict accelerated cognitive decline[8] and progression to AD.[14] Major eligibility criteria are outlined in Table 1. Following a preliminary telephone interview, during which eligibility criteria and study requirements were explained, potential participants provided written informed consent and underwent a full screening and baseline assessment at the WVU Health Research Center. Our target recruitment number of 60 participants were enrolled on a rolling basis beginning in July, 2013. Upon completion of the 12 week program, and again at 3 months post intervention (6 months), participants returned for follow-up assessments (see below). Study participation and assessments were scheduled to minimize overlap with major holidays in order to assure a more representative participant profile.

2.2. Assessments

The primary objective of this pilot RCT was to explore the effects of two simple 12 week relaxation programs, Kirtan Kriya Meditation (KK) and music listening (ML) on key indices of memory and cognitive performance, stress, sleep, mood, and well-being in older adults with SCD. All cognitive and psychosocial outcomes were measured using well-established instruments widely used in this population. An additional core goal was to evaluate study feasibility and acceptability, which we assessed as follows. We tracked the number of potential participants screened and enrolled, along with the number of participants completing all assessment visits; we determined participant adherence to the program based on their treatment logs; and finally, we evaluated information collected from participants upon study completion regarding acceptability of the program (see below).

After providing written informed consent, participants completed the baseline assessment; information collected included that on: demographics and lifestyle factors, body mass index, reproductive and medical history, including current medications and supplements. In addition, data regarding efficacy outcomes were collected at baseline, 12 weeks, and again at 3 months post intervention. To permit assessment of possible changes in markers of inflammation, cellular aging, and epigenetic profiles, blood draws were performed at baseline and 12 weeks, and the samples processed and stored at −80° for future assay. To minimize discomfort, blood samples were collected using butterfly needles and performed by phlebotomists experienced with pediatric, geriatric, and/or cancer patients. To assess *expectation of benefit,* participants completed the 6-item Credibility/Expectancy Questionnaire (CEQ)[61,62] following their first intervention practice session.

In addition, participants completed daily home practice logs, recording the practice time and, if desired, comments regarding the daily session; practice logs were collected at the follow-up assessment visits. Finally, at 12 weeks and 3 months post-intervention, participants were asked to complete an exit questionnaire adapted from that used in our previous studies.[63–66] This survey included both structured and open-ended questions regarding the participants' experiences with the study staff, perceived benefits and problems with the interventions, reasons for leaving the study early or not adhering to the study protocol, and other concerns. Specific questions regarding perceived measurement burden were included. Comments and suggestions regarding the participant's experience with the study were also solicited. In addition, participants were encouraged to report any adverse events directly to the study personnel and were specifically queried regarding potential concerns at each follow-up assessment and during routine telephone check-ins.

2.3. Randomization and treatment allocation

Following collection of baseline data, eligible participants were randomized to the KK or ML group in a 1:1 ratio, based on an alloca-

Table 1
Major eligibility criteria.

Major Inclusion Criteria	Major Exclusion Criteria
Adults at least 50 years old with (a) MCI or (b) SCD, defined as: a) Physician confirmed diagnosis of mild cognitive impairment (MCI) at least 6 weeks ago and current exam within the past 12 months b) Subjective cognitive decline (SCD) meeting the following criteria[a]: 1) presence of subjective cognitive deficits within the past 6 months; 2) frequency of memory problems at least 1x/wk; 3) able to give an example in which memory/cognitive problems occur in everyday life; 4) belief that one's cognitive capacities have declined in comparison with 5 or 10 years previously; and 5) absence of overt cognitive deficits or dementia diagnosis 6) Concerns regarding memory problems	Practiced meditation or other relaxation technique within the past year Recently (within the last 6 weeks) changed dosage of cholinesterase inhibitors (e.g., donepezil (Aricept), galantamine (Razadyne), rivastigmine (Exelon)) or psychotropic medication (e.g., anti-psychotics, tricyclics, SSRIs, MAOIs, anti-panic or anti-anxiety agents) History of psychotic or schizophrenic episodes, major neurologic diagnosis (Parkinson's, stroke, brain injury, epilepsy) or other condition that might impair cognition or confound assessments (e.g., cardiovascular event within the past 6 months (myocardial infarction, unstable angina, hospitalization for congestive heart failure, bypass surgery or angioplasty (coronary or carotid), TIA) History of chemotherapy treatment within the past 10 years
For those with MCI, a study buddy willing to attend all assessment visits; For those with SCD and concerned about their ability to fully understand consent or complete questionnaires, study buddy willing to attend baseline visit and other assessments if needed	Recent (within the last 3 months) serious physical trauma or diagnosis of serious chronic health condition requiring medical treatment and monitoring (e.g., uncontrolled hypertension, serious endocrine or pulmonary disorder, renal disease, active cancer treatment)
Willing and able to complete the intervention and all assessments	Not English-speaking
Willing to avoid new treatments other than the assigned intervention	Participant in another intervention study within the past 30 days

[a] Based on Abdulrab et al.[60] Reisberg et al.[15] and Jessen et al.[14].

tion sequence generated by the study statistician using a randomly varying block randomization method to ensure equal distribution between treatment groups.[67] The statistician, who had no contact with the participants, prepared sequentially numbered, sealed opaque envelopes containing the group assignment. Following consent and assessments, the consenting team member, who had no advance knowledge of the treatment allocation schedule, gave the next envelope in sequence to the participant to open to determine training assignment.

2.4. Interventions

Immediately following randomization, participants received 30–45 min of training in the relaxation technique to which they were randomized. In addition, each participant received a program CD and a quick, illustrated reference guide, along with a portable CD player, for home use. The onsite trainer, a team member trained and experienced in teaching a variety of relaxation techniques and familiar with both programs, presented the instructions for each program (described below), introduced the various tracks on the CD, familiarized participants with the operation of the CD player, and explained the use of the practice log; the participant then used the CD to perform their first practice session and record it on the log sheet. The trainer provided any guidance required for the participant to become proficient. The trainer also contacted each participant by phone within the first week of the intervention to address any potential concerns and provide additional instruction as needed, and remained available thereafter to clarify any additional issues that arose in the course of the intervention.

2.4.1. Kirtan Kriya (KK) meditation program

The KK program, including training procedures and materials, was based on those developed and successfully implemented in our pilot study. Incorporating song (chanting) with visualization and mudras (specialized hand and finger movements), KK is a multifaceted, multisensory exercise that appears to engage several areas of the brain implicated in cognitive decline, yet is simple to learn and practice.[58,68] As per Kundalini yoga meditation specifications[68] and supported by earlier pilot research in adults with memory loss,[58,59] KK practice requires only 12 min per day, rendering it likely to be feasible and acceptable to a broad range of older adults. Specifically, the meditation includes a repeated Kirtan or song (singing repetition of the 'Sa-Ta-Na-Ma' mantra), a mudra or physical/motor component (touching each fingertip to the thumb in sequence with the chant), and a visualization component (imagining the sound energy coming in through the top of the head and out between the eyebrows in an 'L'). The meditation CD contained a user-friendly introduction to the Kirtan Kriya meditation technique along with detailed instructions and meditation tracks. Three of the tracks contained the 12-minute guided meditation: two of the tracks featured a female voice, one with ocean sounds in the background, the other without; the final guided track was led by a male. Participants were instructed to follow one of the guided tracks at least once a week to reinforce the in-person training. Two additional tracks provided only the timing cues needed for the participants to conduct the meditation session without guidance, one track with, and the other without, the background ocean sounds. Participants were instructed to meditate while sitting comfortably, eyes closed, for 12 min a day, every day for 12 weeks (for a total of 84 sessions) and to record each practice session daily on the home practice log.

2.4.2. Music listening (ML) program

As with the KK group, ML participants received a program CD and instruction sheet, along with a portable CD player, to facilitate practice. Rather than restricting the music choices to two Mozart violin concertos as in previous pilot research in memory-impaired adults,[58] we constructed our ML program to include a broader selection of relaxing classical compositions that would both provide variety and be more likely to appeal to a diverse sample of older adults. To help ensure that the KK and ML interventions were comparable in dose, each music selection on the ML program CD was, like each track on KK CD, 12 min in length. Specifically, the ML program CD contained 12 min of relaxing instrumental music from each of 6 composers, including: Bach, Beethoven, Debussy, Mozart, Pachelbel, and Vivaldi. Participants randomized to the ML group were instructed to sit comfortably with eyes closed, and listen to the composer of their choice for 12 min daily, every day for 12 weeks and to record each session on the daily practice log. Participants were asked to try each composer at least once during the study, but were otherwise left to choose for themselves which musical selections they wanted to listen to on a daily basis.

2.5. Analysis

Data analysis was performed using IBM SPSS for Windows, Version 20. Baseline differences between the two intervention groups and between dropouts (defined as any participants who

did not complete the final assessment) and non-dropouts were assessed using chi square (for categorical variables), student independent samples t tests (for continuous variables with a normal distribution), or Mann-Whitney U tests (for ordinal or continuous variables with evidence of skewing); a p value of $\geq$0.1 was used for determining baseline differences. Acceptability and feasibility of the two interventions and of the study overall were evaluated by assessing the following: recruitment and enrollment rates; treatment expectancies (using a 6 item treatment expectancy questionnaire); retention at 12 weeks and 6 months; adherence, defined as completion of practice sessions during both the 12 week active intervention period; and the 3 month follow-up; and participant responses on exit questionnaires. Potential differences between treatment groups were analyzed using chi-square (attrition), one-way ANOVA (adherence, treatment expectancies), and Mann Whitney U tests (exit questionnaire items using ordinal scales). To assess the potential associations between treatment expectancy scores, practice adherence, likelihood of continued practice, and change in specific outcomes, bivariate and age-adjusted correlations were performed using Kendall's tau-b. Responses to open-ended questions on the exit questionnaires were transcribed, coded, and categorized into themes for descriptive analysis using word/topic repetition.[69]

3. Results

One hundred and seventy-four individuals contacted research personnel for information regarding the study, of these, 105 did not meet eligibility criteria, and 9 declined participation. A total of 60 eligible adults, all with SCD, were enrolled in the study. As illustrated in Table 2, enrolled participants ranged in age from 50 to 84 years old (X = 60.6, SE = 1.0). Participants were predominantly female (85%) and non-Hispanic white (93%). Most were college-educated (58%), employed at least part-time (73%), and married or living with a partner (65%). Average baseline scores on the Memory Functioning Questionnaire (MFQ) were comparable to those of adults with MCI in previously published studies,[70] and substantially lower than those reported in community-based samples,[71] suggesting we were capturing an at risk population. Likewise, 42% of participants scored 88 s or above in their baseline Trail-making test part B TMT-B, a cut-off shown to predict subsequent cognitive decline and dementia in a recent study of memory clinic patients with MCI.[72] Participants reported experiencing memory problems for a mean of approximately 3 years (X = 35.4 $\pm$ 4.2 months). Prevalence of additional AD risk factors was also high, including obesity (48%), dyslipidemia (58%), hypertension (32%), and diabetes (15%), with 94% of participants reporting at least one, and 66% reporting 2 or more metabolic/vascular risk factors for AD. In addition, consistent with previous observational studies of this population,[15,29–36] symptoms of stress, mood disturbance, and sleep impairment were elevated, and quality of life (QOL) was diminished in this sample, with mean scores comparable to those reported in adults with a range of serious chronic conditions.[73–85]

As indicated in Table 2, number of years of education averaged slightly higher in the KK than the ML group, and rates of obesity appeared lower, although overall BMI did not differ between groups. Otherwise, participants in the two groups did not differ significantly in demographics, lifestyle factors, medical history, or in baseline measures of cognition, mood, sleep, stress, well-being, or QOL (Table 2), suggesting the randomization was successful overall.

As detailed in Table 3, participant attrition rates were low, with 92% of participants (55/60) completing the 12 week program, and 88% (53/60) completing the full 6 month study. Reasons for dropout included: time constraints (N = 2), family emergency (N = 1), and unknown/lost to follow-up (N = 4). Participants completing the study were similar to those not completing the study in demographics, lifestyle factors, BMI, health history, and number of AD risk factors, and did not differ on baseline measures of cognitive function, mood, stress, sleep, or well-being (p's $\geq$ 0.3). Adherence in both groups was excellent, with participants completing an average of 93% of the 84 possible sessions in the first 12 weeks (mean sessions/week = 6.5 $\pm$ 0.2). Adherence to home practice continued to be strong during the 3 month, practice-optional follow-up period, with participants completing an average of 71% of sessions (mean sessions/week = 5.0 $\pm$ 0.4). There were no between group differences in either retention or adherence at any time point (p's $\geq$ 0.4, Table 3). We found no significant correlations between adherence and any measure of cognitive function, suggesting that degree of cognitive impairment did not affect compliance. No adverse events were reported by any participants.

Completion rate of questionnaires during assessment was also excellent, with no missing data on any instruments. Likewise, all participants completing the initial 12 week and/or 6 month follow-up submitted homework logs. With respect to blood collection, due to our 2 stick maximum, nurse-phlebotomists were unable to collect blood samples on 6 participants at baseline, and an additional 3 participants at week 12. There were no differences between participants with and without successful blood draws with respect to treatment assignment, demographics, lifestyle characteristics, BMI, or other factors. All samples drawn were successfully processed and transferred to storage to await assay.

Likewise, as indicated in Table 4, there were no significant between group differences in any domain of treatment expectancy (p's $\geq$ 0.2). Expectations at baseline regarding both interventions were positive overall, with means ranging (on a scale of 1–9) from 6.6 $\pm$ 0.2 ('At this point, how much do you really feel that the course will help you to improve your functioning?') to 7.1 $\pm$ 0.3 ('At this point, how logical does the course offered to you seem?'). However, despite overall positive treatment expectancies, scores were not significantly correlated with change over time at any time point in major outcomes of interest.

Responses to both structured and open-ended exit questionnaire items also suggested high satisfaction with both programs, and with the study overall. As indicated in Table 5, of the 51 participants who completed exit surveys following completion of the initial 12 week program, over 80% (87% KK, 79% ML) indicated that they were likely or very likely to continue practicing following the end of the study. While the percentage had dropped to 57% in the KK group by the end of the 6 month study, 4 additional KK participants (17%) stated they would continue if they learned of cognitive benefits with KK.

Exit questionnaire comments regarding the two programs were also overall very positive (Table 6). In describing their experiences with their respective practices, 52% of participants (74% KK, 30% ML) indicated that they found the programs relaxing, calming, peaceful, and/or uplifting, and 50% (26% KK, 67% ML) mentioned that they enjoyed taking the quiet time each day to relax and/or tune out. Over 60% of participants (87% KK, 32% ML) mentioned specific benefits they felt they derived from their relaxation practice, including: new skills for achieving calm and focus in times of stress (25%); improved memory and/or sleep (17%); learning to be still, centered, and slow down mentally (15%); improved awareness, energy/alertness, clarity and/or focus (13%); and overall improvement in quality of life (13%). A third of participants (27% KK, 37% ML) noted that they found the practice pleasant and enjoyable, and a third (17% KK, 44% ML) specifically mentioned that they liked the CD choices/experiencing the different tracks. Seventeen percent of participants (26% KK, 7% ML) also indicated that they found the practice easy to do and/or enjoyed the flexibility of the program.

In response to an open-ended query regarding their least favored aspects of their assigned relaxation program, the most

common response was difficulty finding time or being too tired (54%), followed by the repetitive nature of the practice (28%). A few participants expressed concern over perceived lack of progress (8%), program equipment/format (14%), length of the program (8%), or need for privacy (4%). While several participants expressed concern regarding the prospect of a blood draw during the telephone prescreen, only one cited this as a concern in the exit questionnaire (see below). Twenty-two percent of participants (13% KK, 29% ML) stated they could think of no negatives.

Likewise, participants' perceptions of the study procedures and personnel were very positive overall. In response to the Likert scale item regarding assessment length ('fine, a bit too long, too long), more than 80% of participants indicated the duration to be "fine" (Table 5) despite the fairly demanding 1.5–2 h baseline assessment

Table 2
Participant characteristics: Pilot feasibility RCT of a 12 week Kirtan Kriya meditation (KK) vs. a 12 week music listening (ML) program in 60 adults with subjective cognitive decline.

	Overall (N = 60)		KK (N = 30)		ML (N = 30)		P
	N	%	N	%	N	%	
Demographic characteristics							
Age (range 50–84 years)							0.92
50–59 years	30	50.00%	15	50.00%	15	50.00%	
60–69 years	21	35.00%	10	33.33%	11	36.67%	
70+ years	9	15.00%	5	16.67%	4	13.33%	
Mean ± SE	60.58 ± 1.01		60.93 ± 1.56		60.23 ± 1.32		0.73
Gender							0.71
Female	51	85.00%	26	90.00%	25	96.67%	
Male	9	15.00%	4	10.00%	5	3.33%	
Race/Ethnicity							
Non-Hispanic White	56	93.33%	27	10.00%	29	23.33%	0.25
Minority	4	6.67%	3	13.33%	1	36.67%	
Education							0.12
12 years or less	10	16.67%	3	10.00%	7	23.33%	
Some post-high school education	15	25.00%	4	13.33%	11	36.67%	
4 years of college or more	35	58.33%	23	76.67%	12	40.00%	
Mean ± SE	15.43 ± 0.29		16.17 ± 0.37		14.70 ± 1.33		0.01
Employment status							0.65
Employed full time	39	65.00%	20	66.67%	19	63.33%	
Employed part time	5	8.33%	3	10.00%	2	6.67%	
Retired/Homemaker	14	23.33%	6	20.00%	8	26.67%	
Other	2	3.33%	1	3.33%	1	3.33%	
Marital status							0.55
Married/co-habiting	39	65.00%	19	63.33%	20	66.67%	
Divorced	15	25.00%	7	23.33%	8	26.67%	
Widowed/separated	2	3.33%	2	6.67%	0	0.00%	
Single, never married	4	6.67%	2	6.67%	2	6.67%	
Lifestyle and health-related factors							
Smoking status							0.78
Never smoked	38	63.33%	19	63.33%	19	63.33%	
Former smoker	19	31.67%	10	33.33%	9	30.00%	
Current smoker	3	5.00%	1	3.33%	2	6.67%	
Caffeine consumption							
Mean ounces consumed/day. Mean ± SE	21.92 ± 4.15		22.34 ± 7.07		21.51 ± 3.19		0.85
Physical activity							
No physical activity	15	25.00%	8	26.67%	7	23.33%	0.95
Exercise, minutes/week. Mean ± SE	111.64 ± 14.61		107.89 ± 15.89		115.78 ± 24.82		0.44
Exercise, times/week. Mean ± SE	2.79 ± 0.29		3.02 ± 0.41		2.57 ± 0.41		0.78
Body mass index (BMI)							0.06
Normal BMI (<25)	15	25.00%	7	23.33%	8	26.67%	
Overweight (BMI 25–29)	16	26.67%	12	40.00%	4	13.33%	
Obese (BMI ≥ 30)	29	48.33%	11	36.67%	18	60.00%	
Mean ± SE	29.94 ± 0.94		29.17 ± 1.16		31.33 ± 1.34		0.23
History of diagnosed							
Diabetes	9	15.00%	4	13.33%	5	16.67%	0.72
Hypertension	19	31.67%	8	26.67%	11	36.67%	0.41
High cholesterol	35	58.33%	19	63.33%	16	53.33%	0.43
Depression	23	38.33%	13	43.33%	10	33.33%	0.43
Anxiety	17	28.33%	9	30.00%	8	26.67%	0.77
Number of cardiometabolic Alzheimer's disease risk factors[a] Mean ± SE	1.83 ± 0.16		1.77 ± 0.23		1.90 ± 0.22		0.68
Number major Alzheimer's disease risk factors, including history of affective disorder. Mean ± SE	2.42 ± 0.18		2.37 ± 0.27		2.47 ± 0.25		0.79
History of hormone replacement therapy[b]	19	37.25%	8	30.77%	11	44.00%	0.61
Cognition. Mood, Sleep, and QOL: Mean ± SE							
Memory and Cognitive Functioning:							
Memory Functioning Questionnaire total	246.13 ± 7.11		241.83 ± 9.92		253.43 ± 10.07		0.31

Table 2 (*Continued*)

	Overall (N = 60)		KK (N = 30)		ML (N = 30)		P
	N	%	N	%	N	%	
	50.38 ± 1.26		50.57 ± 1.74		50.20 ± 1.83		0.89
Digit symbol substitution test							
Trail-making test (TMT)							
TMT-A	34.20 ± 1.22		33.76 ± 1.08		34.63 ± 2.18		0.73
TMT-B	86.90 ± 4.74		85.54 ± 7.14		90.59 ± 7.64		0.53
Months experiencing memory problems	35.42 ± 4.15		36.30 ± 7.08		34.18 ± 4.47		0.80
Mood (POMS total score)	28.67 ± 4.07		36.03 ± 5.69		21.36 ± 5.96		0.10
Perceived stress (PSS)	16.35 ± 0.88		17.37 ± 1.16		15.33 ± 1.32		0.25
Sleep quality (PSQI)	9.00 ± 0.38		9.38 ± 0.50		8.68 ± 0.60		0.33
Health-related quality of life (SF-36)							
Mental health composite score	67.41 ± 2.36		65.74 ± 3.18		69.07 ± 3.52		0.48
Physical health composite score	68.54 ± 2.62		69.00 ± 3.64		68.08 ± 3.81		0.86

Abbreviations: MFQ = Memory Functioning Questionaire; mo = month; QOL = quality of life; POMS = Profile of mood states; PSQI = Pittsburgh sleep quality index; PSS = Perceived Stress Scale; SE = Standard Error.

[a] Including diabetes, hypertension, high cholesterol, obesity, cardiovascular disease.

[b] Percentages calculated in women only.

Table 3
Retention and adherence: Pilot feasibility RCT of a 12 week Kirtan Kriya meditation (KK) vs. a 12 week music listening (ML) program in 60 adults with subjective cognitive decline.

	Overall (N = 60)	KK (N = 30)	ML (N = 30)	P
	N (%)/Mean ± SE	N (%)/Mean ± SE	N (%)/Mean ± SE	
Retention (number of participants remaining in study)				
At 12 weeks	55 (91.7%)	27 (90.0%)	28 (93.3%)	0.72
At 6 months (3 months post-intervention)	53 (88.3%)	26 (86.7%)	27 (90.0%)	0.39
Adherence				
At 12 weeks				
Total number of sessions completed (of 84). Mean ± SE (%)	77.78 ± 2.11 (92.86%)	76.78 ± 3.19 (91.41%)	78.75 ± 2.82 (93.97%)	0.64
Average number of sessions completed/week	6.48 ± 0.18	6.40 ± 0.27	6.56 ± 0.23	0.64
At 6 months				
Total number of sessions completed (of 84). Mean ± SE (%)	59.44 ± 4.42 (70.71%)	56.92 ± 6.35 (67.76%)	61.79 ± 6.24 (73.56%)	0.59
Average number of sessions completed/week	4.95 ± 0.37	4.74 ± 0.53	5.15 ± 0.52	0.59

Abbreviations: SE = Standard Error.

Table 4
Baseline treatment expectancies in 60 adults with subjective cognitive decline, stratified by treatment assignment (12 week Kirtan Kriya meditation (KK) vs. a 12 week music listening (ML) program).

	Total (N = 60)	KK (N = 30)	ML (N = 30)	P
	Mean ± SE	Mean ± SE	Mean ± SE	
Thoughts about relaxation practices				
1. At this point, how logical does the course offered to you seem?[a]	7.12 ± 0.25	7.10 ± 0.40	7.13 ± 0.30	0.95
2. At this point how successfully do you think this course will be in raising the quality of your functioning?[a]	6.68 ± 0.22	6.67 ± 0.33	6.68 ± 0.29	0.97
3. How confident would you be in recommending this course to a friend who experiences similar problems?[a]	7.02 ± 0.21	7.07 ± 0.35	6.97 ± 0.25	0.82
4. By the end of the course, how much improvement in your functioning do you *think* will occur (in percent) ?[b]	53.42 ± 3.27	51.67 ± 4.53	55.17 ± 4.79	0.60
Feelings about relaxation practices				
1. At this point, how much do you really *feel* that the course will help you to improve your functioning?[a]	6.58 ± 0.24	6.93 ± 0.32	6.23 ± 0.35	0.16
2. By the end of the course, how much improvement in your functioning do you *feel* will occur (in percent) ?[b]	52.75 ± 3.46	53.89 ± 4.67	51.67 ± 5.19	0.76

SE = Standard Error.

[a] Scale of 1–9, with 1 = lowest and 9 = highest.

[b] Scale of 0–100%.

visit. Only one participant indicated s/he found the assessment burdensome, citing difficulties with a blood draw. None indicated concerns regarding the study personnel or other procedures, with 36% making specific, positive statements regarding the staff in response to open-ended questions about their study experience.

4. Discussion

Collectively, these findings strongly support the feasibility and acceptability of an RCT of two simple relaxation therapies for older adults with SCD. Recruitment for this study was robust, with the target enrollment goal achieved within 12 months of initiating study advertisements. Of those contacting research personnel about the study, 40% indicated they were eligible during the preliminary telephone interview, and of these, 87% enrolled in the study, completed the baseline assessment and were randomized to treatment. Baseline characteristics of the KK and ML groups were similar, indicating randomization was successful. Retention and adherence were also excellent and were similar between groups. Exit questionnaire responses indicated overall high satisfaction with both programs and with the overall study procedures and personnel. In addition, treatment expectation scores did not differ between groups, suggesting that recruitment strategies were successful in minimizing treatment expectancy bias.

Table 5
Responses to selected exit questionnaire items (Visits 2, 3) overall and by group (Kirtan Kriya meditation (KK) and music listening).

	Total		KK Meditation		Music Listening		P
	N	%	N	%	N	%	
How likely are you to continue? (Visit 2)							
Very likely	20	39.22%	8	34.78%	12	42.86%	0.35
Likely	22	43.14%	12	52.17%	10	35.71%	
Unlikely	5	9.80%	2	8.70%	3	10.71%	
Very unlikely	2	3.92%	0	0.00%	2	7.14%	
Undecided	2	3.92%	1	4.35%	1	3.57%	
Total	51		23		28		
How likely are you to continue? (Visit 3)							0.26
Very likely	15	30.00%	8	34.78%	7	25.93%	
Likely	19	38.00%	5	21.74%	14	51.85%	
Unlikely	10	20.00%	8	34.78%	2	7.41%	
Very unlikely	6	12.00%	2	8.70%	4	14.81%	
Undecided	0	0.00%	0	0.00%	0	0.00%	
Total	50		23		27		
Assessment Length (Visit 2)							0.11
Fine	41	80.39%	20	86.96%	21	75.00%	
A bit too long	7	13.73%	3	13.04%	4	14.29%	
Too long	3	5.88%	0	0.00%	3	10.71%	
Total	51		23		28		
Assessment Length (Visit 3)							0.35
Fine	40	85.11%	18	81.82%	22	88.00%	
A bit too long	7	14.89%	4	18.18%	3	12.00%	
Too long	0	0.00%	0	0.00%	0	0.00%	
Total	47		22		25		

Our success in recruitment and the high participant retention and adherence observed in this study may have been facilitated by several factors. These include the simple, non-invasive home-based practices which were relatively easy to perform, allowed flexibility of scheduling, and were short enough in duration to permit daily performance with minimal inconvenience. Additional likely contributing factors include: the current lack of effective therapies for MCI or AD, or for the SCD typically preceding these conditions[28,86]; the general fear surrounding AD,[86–88] and related, the stigma associated with a diagnosis of cognitive impairment,[86,89] which can in turn, lead to social isolation, loss of employment and other adverse effects on one's social, psychological, and economic status.[89,90] The latter may help explain why those with evident and persistent symptoms often delay seeking medical care and testing.[89,91] Indeed, several participants in our trial specifically expressed concerns about maintaining confidentiality, including from their employers. That participants were not required to undergo diagnostic cognitive testing in order to participate in this trial, as SCD is not a medical diagnosis, likely encouraged those experiencing memory concerns (but not yet diagnosed with a memory disorder) to enroll. In addition, this trial offered access to therapies of possible benefit to those with early memory loss, which may have encouraged both study participation and adherence. Notably, in this study, participation in practice was high even during the practice-optional, post-intervention phase of the study. Offering both KK and ML group participants access to the non-assigned intervention may also have aided in recruitment for this RCT, as well as enhanced participant satisfaction and retention. Upon completion of the study, a number of participants in both groups expressed their appreciation of this incentive, indicating, e.g., that they looked forward to 'experiencing both practices' and to 'learning about another relaxation program'.

Participant feedback also underscored the importance of ensuring access to a phlebotomist experienced in blood collection from geriatric, pediatric, and/or cancer patients in trials involving blood draws in older adults. When the study phlebotomist entered the room to perform the blood draw, many participants queried her directly regarding her qualifications, and expressed relief that she had extensive experience drawing blood from potentially difficult populations. We also reminded concerned participants about our 'two stick maximum' policy, which appeared to alleviate much of their anxiety. All participants allowed the phlebotomist to proceed with the blood draw, and several voiced appreciation for our use of butterfly needles.

Qualitative comments indicated that the KK meditation, and especially, the consistent incorporation of the visualization component, was challenging for some participants to master initially. As indicated by both written comments and informal feedback from participants, careful instruction and periodic 'check-ins' can be helpful in ensuring participant mastery of and boosting confidence in their practice. Providing consistent feedback during the study and offering information after study completion on measured benefits may also be instrumental in encouraging continued practice, especially given that those with SCD are concerned about their condition and eager to find ways to improve.

4.1. Strengths and limitations

Strengths of this study include: use of multiple measures of feasibility and acceptability; the incorporation of both quantitative and qualitative data; the rigorous, randomized study design; concealment of treatment allocation prior to randomization; blinding of assessors; and recruitment of participants from community-based settings. The two practice interventions were well accepted, are low cost and relatively easy to learn, require minimal time to perform, and could be easily replicated in other settings and venues.

However, while findings from this study strongly support the feasibility and acceptability of an RCT of two simple relaxation programs in adults with early memory loss, this trial has several limitations. Our study sample size was relatively small, and our study population was restricted to those with SCD, limiting generalizability to other populations with memory loss. While we measured cognitive functioning, we did not perform diagnostic cognitive testing in our sample; it is thus possible that participants included some individuals with undiagnosed MCI. Our study sample was also relatively young and well-educated and thus

Table 6
Comments in response to open-ended exit questionnaire items (Visits 2, 3) regarding their practice and the study overall; findings are presented both overall and by group (Kirtan Kriya (KK) meditation and music listening).

	Total		KK Meditation		Music Listening	
	N	%	N	%	N	%
Participant Perceptions Regarding:	51		23		28	
Relaxation Practice Overall						
Relaxing, calming, peaceful, uplifting	25	52.08%	17	73.91%	8	29.63%
Taking quiet time for oneself to relax, tune out	24	50.00%	6	26.09%	18	66.67%
Learning to calm, focus, breathe in times of stress	6	12.50%	5	21.74%	1	3.70%
Learning to be still, centered, to slow down mentally, not dwell on difficulties	7	14.58%	4	17.39%	3	11.11%
Learning about practice and mind-body connection	6	12.50%	6	26.09%	0	0.00%
Experienced benefits						
Perceived overall improvements/benefit	6	12.50%	6	26.09%	0	0.00%
Help achieve calm, get through stressful periods	8	16.67%	5	21.74%	3	11.11%
Improved memory	3	6.25%	2	8.70%	1	3.70%
Improved sleep	5	10.42%	2	8.70%	3	11.11%
Improved clarity, focus	4	8.33%	4	17.39%	0	0.00%
M ore alert, refreshed, aware	2	4.17%	2	8.70%	0	0.00%
Emotional release	1	2.08%	0	0.00%	1	3.70%
Like CD choices, experiencing different tracks	16	33.33%	4	17.39%	12	44.44%
Generally loved practice; found it enjoyable, pleasant	16	33.33%	6	26.09%	10	37.04%
Simple, easy to do, flexible	8	16.67%	6	26.09%	2	7.41%
Improved organization, discipline, commitment	4	8.33%	3	13.04%	1	3.70%
Study participation and staff	51		23		28	
Staff wonderful, helpful, kind, knowledgeable, respectful, professional, attentive	18	36.00%	10	43.48%	8	28.57%
Glad to be part of study that consider important	6	12.00%	4	17.39%	2	7.14%
Barriers to Homework	51		23		28	
Work, other obligations, out of town/hospital	13	26.00%	8	34.78%	5	17.86%
Sick, overwhelmed, tired	6	12.00%	4	17.39%	2	7.14%
Forgot	5	10.00%	4	17.39%	1	3.57%
Lack of privacy	3	6.00%	3	13.04%	0	0.00%
Other	4	8.00%	0	0.00%	4	14.29%
No comments	15	30.00%	4	17.39%	11	39.29%
Least Favored Aspects of Relaxation Practice	51		23		28	
Repetitive, boring	14	28.00%	4	17.39%	10	35.71%
Finding time; scheduling; too tired	27	54.00%	16	69.57%	11	39.29%
Delivery issues (equipment; mode; certain tracks)	7	14.00%	7	30.43%	0	0.00%
Lack of needed privacy	2	4.00%	2	8.70%	0	0.00%
Concern re lack of benefit/progress	4	8.00%	4	17.39%	0	0.00%
Sessions too long	5	10.00%	1	4.35%	4	14.29%
Sessions too short	1	2.00%	0	0.00%	1	3.57%
Completing daily logs	2	4.00%	0	0.00%	2	7.14%
No negatives	10	20.00%	2	8.70%	8	28.57%

may not represent well those at highest risk of cognitive decline. However, as noted above, participants' MFQ scores were comparable to those of populations with MCI, and prevalence of several AD risk factors was high in our study sample. This was a single-site trial of motivated volunteers from the community; findings may thus not be readily translatable to clinical or other populations. However, our success in recruiting and enrolling participants with SCD, coupled with the excellent retention and adherence rates observed suggest that pre-clinical memory loss may represent an ideal target for therapeutic intervention in adults at risk for AD. In addition, while both interventions were presented to prospective participants as potentially helpful relaxation programs, blinded treatment administration was not possible in this study, potentially biasing expectations of participants. However, as indicated above, adherence and retention were comparable in the two groups, and between group expectancy scores were similar and unrelated to outcomes. Finally, although we found little evidence of difficulty in performing the KK practice, either in participant comments on homework logs or exit questionnaires, or during periodic check-ins, and no evidence that concerns regarding KK performance were related to cognitive status in this sample of older adults with SCD, it is possible, given the multi-modal nature of KK, that more severely impaired patients could find this practice challenging to master, potentially affecting benefits for and reducing generalizability to this population.

5. Conclusions

Findings from our recently completed RCT of two relaxation programs for older adults with SCD suggest that both programs were well accepted by this population and that study procedures are feasible in adults with early memory loss.

Conflict of interest

KE Innes, TK Selfe, and S Kandati have no conflicts of interest to declare; DS Khalsa is the Medical Director for the APRF.

Funding

This work was supported by the National Institutes of Health [1-K01-AT004108 and NIGMS U54GM104942 to K.I.]; the Alzheimer's Research and Prevention FoundationVirginia University(ARPF) and West (Faculty Incentive Award). The funding sources had no involvement in the design or implementation of the study; in the collection, analysis or interpretation of data; or in the decision to submit the article for publication.

References

1. Gauthier S. Should we encourage the use of high-dose vitamin E in persons with memory complaints as a preventive strategy against Alzheimer's disease? *J Psychiatry Neurosci*. 2000;25(4).

2. Wilson RS, Leurgans SE, Boyle PA, Bennett DA. Cognitive decline in prodromal Alzheimer disease and mild cognitive impairment. *Arch. Neurol.* 2011;68(3):351–356.
3. Alzheimer's Association. Alzheimer's disease facts and figures. *Alzheimers Dement*. 2015;11(3):332–384.
4. Petersen RC, Negash S. Mild cognitive impairment: an overview. *CNS Spectr*. 2008;13(1):45–53.
5. DeCarli C. Mild cognitive impairment: prevalence, prognosis, aetiology, and treatment. *Lancet Neurol*. 2003;2(1):15–21.
6. Mitchell AJ, Shiri-Feshki M. Rate of progression of mild cognitive impairment to dementia–meta-analysis of 41 robust inception cohort studies. *Acta Psychiatr. Scand*. 2009;119(4):252–265.
7. Dik MG, Jonker C, Comijs HC, et al. Memory complaints and APOE-epsilon4 accelerate cognitive decline in cognitively normal elderly. *Neurology*. 2001;57(12):2217–2222.
8. Kopparaa Alexander, Wagnera M, Langec C, et al. Cognitive performance before and after the onset of subjective cognitive decline in old age. *Alzheimer's Dement.: Diagn. Assess. Dis. Monit*. 2015;1(2):194–205.
9. Donovan NJ, Amariglio RE, Zoller AS, et al. Subjective cognitive concerns and neuropsychiatric predictors of progression to the early clinical stages of Alzheimer disease. *Am. J. Geriatr. Psychiatry*. 2014.
10. Reisberg B, Shulman MB, Torossian C, Leng L, Zhu W. Outcome over seven years of healthy adults with and without subjective cognitive impairment. *Alzheimers Dement*. 2010;6(1):11–24.
11. Jessen F, Wiese B, Bachmann C, et al. Prediction of dementia by subjective memory impairment: effects of severity and temporal association with cognitive impairment. *Arch. Gen. Psychiatry*. 2010;67(4):414–422.
12. Abner EL, Kryscio RJ, Caban-Holt AM, Schmitt FA. Baseline subjective memory complaints associate with increased risk of incident dementia: the PREADVISE trial. *J. Prev. Alzheimers Dis*. 2015;2(1):11–16.
13. Gauthier S, Reisberg B, Zaudig M, et al. Mild cognitive impairment. *Lancet*. 2006;367(9518):1262–1270.
14. Jessen F, Wolfsgruber Steffen, Wiese B, et al. AD dementia risk in late MCI, in early MCI, and in subjective memory impairment. *Alzheimer's Dement*. 2014;10(1):76–83.
15. Reisberg B, Prichep L, Mosconi L, et al. The pre-mild cognitive impairment, subjective cognitive impairment stage of Alzheimer's disease. *Alzheimers Dement*. 2008;4(1 Suppl. 1):S98–S108.
16. Schmand B, Jonker C, Geerlings MI, Lindeboom J. Subjective memory complaints in the elderly: depressive symptoms and future dementia. *Br. J. Psychiatry*. 1997;171:373–376.
17. Dufouil C, Fuhrer R, Alperovitch A. Subjective cognitive complaints and cognitive decline: consequence or predictor? The epidemiology of vascular aging study. *J. Am. Geriatr. Soc*. 2005;53(4):616–621.
18. Schultz SA, Oh JM, Koscik Rebecca L, et al. Subjective memory complaints, cortical thinning, and cognitive dysfunction in middle-age adults at risk of AD. *Alzheimer's Dement.: Diagn. Assess. Dis. Monit*. 2015;1(1):33–40.
19. Visser PJ, Verhey F, Knol DL, et al. Prevalence and prognostic value of CSF markers of Alzheimer's disease pathology in patients with subjective cognitive impairment or mild cognitive impairment in the DESCRIPA study: a prospective cohort study. *Lancet Neurol*. 2009;8(7):619–627.
20. Amariglio RE, Becker JA, Carmasin J, et al. Subjective cognitive complaints and amyloid burden in cognitively normal older individuals. *Neuropsychologia*. 2012;50(12):2880–2886.
21. Saykin AJ, Wishart HA, Rabin LA, et al. Older adults with cognitive complaints show brain atrophy similar to that of amnestic MCI. *Neurology*. 2006;67(5):834–842.
22. Minett TSC, Dean JL, Firbank M, English P, O'Brien JT. Subjective memory complaints, white-matter lesions, depressive symptoms, and cognition in elderly patients. *Am. J. Geriatr. Psychiatry*. 2005;13(8):665–671.
23. de Groot JC, de Leeuw FE, Oudkerk M, Hofman A, Jolles J, Breteler MM. Cerebral white matter lesions and subjective cognitive dysfunction: the Rotterdam Scan Study. *Neurology*. 2001;56(11):1539–1545.
24. Chen ST, Siddarth P, Ercoli LM, Merrill DA, Torres-Gil F, Small GW. Modifiable risk factors for Alzheimer disease and subjective memory impairment across age groups. *PLoS One*. 2014;9(6).
25. Yaffe K, Hoang TD, Byers AL, Barnes DE, Friedl KE. Lifestyle and health-related risk factors and risk of cognitive aging among older veterans. *Alzheimer's Dement.: J. Alzheimer's Assoc*. 2014;10(Suppl. 3):S111–S121.
26. Apostolova LG, Thompson PM. Mapping progressive brain structural changes in early Alzheimer's disease and mild cognitive impairment. *Neuropsychologia*. 2006;46(6):1597–1612.
27. Caldwell CC, Yao J, Brinton RD. Targeting the prodromal stage of Alzheimer's disease: bioenergetic and mitochondrial opportunities. *Neurotherapeutics*. 2015;12(1):66–80.
28. Corey-Bloom J. Treatment trials in aging and mild cognitive impairment. *Curr. Top. Behav. Neurosci*. 2012;10:347–356.
29. Paradise MB, Glozier NS, Naismith SL, Davenport TA, Hickie IB. Subjective memory complaints, vascular risk factors and psychological distress in the middle-aged: a cross-sectional study. *BMC Psychiatry*. 2011:11–108, http://dx.doi.org/10.1186/1471-244x-11-108.
30. Elfgren C, Gustafson L, Vestberg S, Passant U. Subjective memory complaints, neuropsychological performance and psychiatric variables in memory clinic attendees: a 3-year follow-up study. *Arch. Gerontol. Geriatr.* 2010;51(3):E110–E114.
31. Hurt CS, Burns A, Brown RG, Barrowclough C. Why don't older adults with subjective memory complaints seek help? *Int J. Geriatr. Psychiatry*. 2012;27(4):394–400.
32. Clarnette RM, Almeida OP, Forstl H, Paton A, Martins RN. Clinical characteristics of individuals with subjective memory loss in Western Australia: results from a cross-sectional survey. *Int. J. Geriatr. Psychiatry*. 2001;16(2):168–174.
33. Schofield PW, Marder M, Dooneief G, Jacobs DM, Sano M, Stern Y. Association of subjective memory complaints with subsequent cognitive decline in community-dwelling elderly individuals with baseline cognitive impairment. *Am. J. Psychiatry*. 1997;154(5):609–615.
34. Reisberg B, Gauthier S. Current evidence for subjective cognitive impairment (SCI) as the pre-mild cognitive impairment (MCI) stage of subsequently manifest Alzheimer's disease. *Int. Psychogeriatr*. 2008;20(1):1–16.
35. Zandi T. Relationship between subjective memory complaints, objective memory performance, and depression among older adults. *Am. J. Alzheimers Dis*. 2004;19:353–360.
36. Montejo P, Montenegro M, Fernandez MA, Maestu F. Subjective memory complaints in the elderly: prevalence and influence of temporal orientation, depression and quality of life in a population-based study in the city of Madrid. *Aging Ment. Health*. 2011;15(1):85–96.
37. Palmer K, Berger AK, Monastero R, Winblad B, Backman L, Fratiglioni L. Predictors of progression from mild cognitive impairment to Alzheimer disease. [see comment]. *Neurology*. 2008;68(19):1596–1602.
38. Lee DR, Thomas AJ. Sleep in dementia and caregiving-assessment and treatment implications: a review. *Int. Psychogeriatr*. 2011;23(2):190–201.
39. McCurry SM, Logsdon RG, Teri L, Vitiello MV. Sleep disturbances in caregivers of persons with dementia: contributing factors and treatment implications. *Sleep Med. Rev*. 2007;11(2):143–153.
40. Beaulieu-Bonneau S, Hudon C. Sleep disturbances in older adults with mild cognitive impairment. *Int. Psychogeriatr*. 2009;21(4):654–666.
41. Winter Y, Korchounov A, Zhukova TV, Bertschi NE. Depression in elderly patients with Alzheimer dementia or vascular dementia and its influence on their quality of life. *J. Neurosci. Rural Pract*. 2011;2(1):27–32.
42. Verdelho A, Madureira S, Moleiro C, et al. Depressive symptoms predict cognitive decline and dementia in older people independently of cerebral white matter changes: the LADIS study. *J. Neurol. Neurosurg. Psychiatry*. 2013;84(11):1250–1254.
43. Panza F, D'Introno A, Colacicco AM, et al. Temporal relationship between depressive symptoms and cognitive impairment: the Italian longitudinal study on aging. *J. Alzheimers Dis*. 2009;17(4):899–911.
44. Innes K, Selfe T. Meditation as a therapeutic intervention for adults at risk for Alzheimer's disease: potential benefits and underlying mechanisms: a mini review. *Front. Psychiatry*. 2014;5(40):1–9.
45. Peavy GM, Salmon DP, Jacobson MW, et al. Effects of chronic stress on memory decline in cognitively normal and mildly impaired older adults. *Am. J. Psychiatry*. 2009;166(12):1384–1391.
46. Innes KE, Bourguignon C, Taylor AG. Risk indices associated with the insulin resistance syndrome, cardiovascular disease, and possible protection with yoga: a systematic review. *J. Am. Board Fam. Pract*. 2005;18(6):491–519.
47. Bonadonna R. Meditation's impact on chronic illness. *Holist. Nurs. Pract*. 2003;17(6):309–319.
48. Schneider RH, Walton KG, Salerno JW, Nidich SI. Cardiovascular disease prevention and health promotion with the transcendental meditation program and Maharishi consciousness-based health care. *Ethn. Dis*. 2006;16(3 Suppl 4) [S4-15-26].
49. Innes KE, Selfe TK, Vishnu A. Mind-body therapies for menopausal symptoms: a systematic review. *Maturitas*. 2010;66(2):135–149.
50. Selfe TK, Innes KE. Mind-body therapies and osteoarthritis of the knee. *Curr. Rheumatol. Rev*. 2009;5(4):204–211.
51. Bowers TA, Wetsel MA. Utilization of music therapy in palliative and hospice care: an integrative review. *J. Hosp. Palliat. Nurs*. 2014;16(4):231–239.
52. Kamioka H, Tsutani K, Yamada M, et al. Effectiveness of music therapy: a summary of systematic reviews based on randomized controlled trials of music interventions. *Patient Prefer Adher*. 2014;8:727–754.
53. Sarkamo T, Tervaniemi M, Laitinen S, et al. Cognitive, emotional, and social benefits of regular musical activities in early dementia: randomized controlled study. *Gerontologist*. 2014;54(4):634–650.
54. Raglio A, Bellelli G, Mazzola P, et al. Music, music therapy and dementia: a review of literature and the recommendations of the Italian Psychogeriatric Association. *Maturitas*. 2012;72(4):305–310.
55. Wall M, Duffy A. The effects of music therapy for older people with dementia. *Br. J. Nurs*. 2010;19(2):108–113.
56. Guetin S, Charras K, Berard A, et al. An overview of the use of music therapy in the context of Alzheimer's disease: a report of a French expert group. *Dementia (London)*. 2013;12(5):619–634.
57. Ueda T, Suzukamo Y, Sato M, Izumi S. Effects of music therapy on behavioral and psychological symptoms of dementia: a systematic review and meta-analysis. *Ageing Res. Rev*. 2013;12(2):628–641.
58. Newberg AB, Wintering N, Khalsa DS, Roggenkamp H, Waldman MR. Meditation effects on cognitive function and cerebral blood flow In subjects with memory loss: a preliminary study. *J. Alzheimers Dis*. 2010;20(2):517–526.
59. Innes KE, Selfe TK. The effects of a gentle yoga program on sleep, mood, and blood pressure in older women with restless legs syndrome (RLS): a preliminary randomized controlled trial. *Evid. Based Complement. Altern. Med*. 2012;2012:294058.

60. Abdulrab K, Heun R. Subjective Memory Impairment: a review of its definitions indicates the need for a comprehensive set of standardised and validated criteria. *Eur. Psychiatry*. 2008;23(5):321–330.
61. Devilly GJ, Borkovec TD. Psychometric properties of the credibility/expectancy questionnaire. *J. Behav. Ther. Exp. Psychiatry*. 2000;31(2):73–86.
62. Smeets RJ, Beelen S, Goossens ME, Schouten EG, Knottnerus JA, Vlaeyen JW. Treatment expectancy and credibility are associated with the outcome of both physical and cognitive-behavioral treatment in chronic low back pain. *Clin. J. Pain*. 2008;24(4):305–315.
63. Innes KE, Selfe TK, Brown C, Rose K, Thompson-Heisterman A. The effects of meditation on perceived stress and related indices of psychological status and sympathetic activation in persons with Alzheimer's disease and their caregivers: a pilot study. *Evid. Based Complement. Altern. Med*. 2012:9 [Article ID 927509].
64. Innes KE, Selfe TK. The effects of a gentle yoga program on sleep, mood, and blood pressure in older women with restless legs syndrome (RLS): a preliminary randomized controlled trial. *Evid. Based Complement. Altern. Med*. 2012, http://dx.doi.org/10.1155/2012/294058 [Article ID 294058].
65. Innes KE, Selfe TK, Alexander GK, Taylor AG. A new educational film control for use in studies of active mind-body therapies: acceptability and feasibility. *J. Altern. Complement. Med*. 2011;17(5):453–458.
66. DiBenedetto M, Innes K, Taylor A, et al. Effect of a gentle Iyengar yoga program on gait in the elderly: an exploratory study. *Arch. Phys. Med. Rehabil*. 2005;86(9):1830–1837.
67. Vickers AJ. How to randomize. *J. Soc. Integr. Oncol*. 2006;4(4):194–198.
68. Khalsa DS, Newberg A. Kirtan Kriya meditation: a promising technique for enhancing cognition in memory-Impaired older adults. In: Hartman-Stein PE, Rue AL, eds. *Enhancing Cognitive Fitness in Adults: A Guide to the Use and Development of Community-Based Programs*. New York: Springer; 2011:419–431.
69. Ryan G.W., Bernard H.R., Techniques to Identify Themes, 2003, 15 (85). 10.1177/1525822X02239569.
70. Rapp S, Brenes G, Marsh AP. Memory enhancement training for older adults with mild cognitive impairment: a preliminary study. *Aging Ment. Health*. 2002;6(1):5–11.
71. Zelinski EM, Gilewski MJ, Anthonybergstone CR. Memory functioning questionnaire—concurrent validity with memory performance and self-reported memory failures. *Psychol. Aging*. 1990;5(3):388–399.
72. Eckerstrom C, Olsson E, Klasson N, et al. Multimodal prediction of dementia with up to 10 years follow up: the Gothenburg MCI study. *J. Alzheimers Dis*. 2015;44(1):205–214.
73. Hays RD, Morales LS. The RAND-36 measure of health-related quality of life. *Ann. Med*. 2001;33(5):350–357.
74. McHorney CA, Ware Jr JE, Raczek AE. The MOS 36-item short-form health survey (SF-36): II: psychometric and clinical tests of validity in measuring physical and mental health constructs. *Med. Care*. 1993;31(3):247–263.
75. LeBlanc M, Merette C, Savard J, Ivers H, Baillargeon L, Morin CM. Incidence and risk factors of insomnia in a population-based sample. *Sleep*. 2009;32(8):1027–1037.
76. Hayashino Y, Yamazaki S, Takegami M, Nakayama T, Sokejima S, Fukuhara S. Association between number of comorbid conditions, depression, and sleep quality using the Pittsburgh Sleep Quality Index: results from a population-based survey. *Sleep Med*. 2010;11(4):366–371.
77. Illa L, Brickman A, Saint-Jean G, et al. Sexual risk behaviors in late middle age and older HIV seropositive adults. *AIDS Behav*. 2008;12(6):935–942.
78. Stanton AL, Snider PR. Coping with a breast cancer diagnosis: a prospective study. *Health Psychol*. 1993;12(1):16–23.
79. Deimling GT, Wagner LJ, Bowman KF, Sterns S, Kercher K, Kahana B. Coping among older-adult, long-term cancer survivors. *Psychooncology*. 2006;15(2):143–159.
80. Cimprich B. Pretreatment symptom distress in women newly diagnosed with breast cancer. *Cancer Nurs*. 1999;22(3):185––194 [quiz 195].
81. Sullivan MJ, Wood L, Terry J, et al. The Support, Education, and Research in Chronic Heart Failure Study (SEARCH): a mindfulness-based psychoeducational intervention improves depression and clinical symptoms in patients with chronic heart failure. *Am. Heart J*. 2009;157(1):84–90.
82. Conn VS, Taylor SG, Wiman P. Anxiety, depression, quality of life, and self-care among survivors of myocardial infarction. *Issues Ment. Health Nurs*. 1991;12(4):321–331.
83. Brummett BH, Barefoot JC, Siegler IC, et al. Characteristics of socially isolated patients with coronary artery disease who are at elevated risk for mortality. *Psychosom. Med*. 2001;63(2):267–272.
84. Wu SM, Amtmann D. Psychometric evaluation of the perceived stress scale in multiple sclerosis. *ISRN Rehabil*. 2013;2013(6):1–9 [Article ID 60835].
85. Golden-Kreutz DM, Browne MW, Frierson GM, Andersen BL. Assessing stress in cancer patients—a second-order factor analysis model for the perceived stress scale. *Assessment*. 2004;11(3):216–223.
86. Fox C, Lafortune L, Boustani M, Brayne C. The pros and cons of early diagnosis in dementia. *Br. J. Gen. Pract*. 2013;63(612):e510–e512.
87. Draper B, Peisah C, Snowdon J, Brodaty H. Early dementia diagnosis and the risk of suicide and euthanasia. *Alzheimers Dement*. 2010;6(1):75–82.
88. Corner L, Bond J. Being at risk of dementia: fears and anxieties of older adults. *J. Aging Stud*. 2004;18(2):143–155.
89. Garand L, Lingler JH, Conner KO, Dew MA. Diagnostic labels, stigma, and participation in research related to dementia and mild cognitive impairment. *Res. Gerontol. Nurs*. 2009;2(2):112–121.
90. Maki Y, Yamaguchi H. Early detection of dementia in the community under a community-based integrated care system. *Geriatr Gerontol Int*. 2014;14(Suppl. 2):2–10.
91. Bradford A, Kunik ME, Schulz P, Williams SP, Singh H. Missed and delayed diagnosis of dementia in primary care: prevalence and contributing factors. *Alzheimer Dis. Assoc. Disord*. 2009;23(4):306–314.