Efficacy and challenges of a culturally relevant intervention to improve attitudes to aging

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Abstract

Objectives: Attitudes to aging have been linked with important health outcomes. It is unclear whether interventions to improve attitudes to aging are effective across cultural contexts. This study investigated the efficacy of an intervention among women of either Australian or Chinese backgrounds.

Methods: Among 96 women who provided baseline measures, 86 attended a single, 90-min group session on either healthy aging or healthy diet. Measures of three domains of attitudes to aging were collected at baseline, then immediately and 8 weeks after the intervention.

Results: The intervention improved attitudes in the psychological growth domain, but not the physical change or psychosocial loss domains. Cultural identification did not moderate intervention efficacy.

Discussion: The findings suggest that brief, culturally inclusive interventions may be partially effective at improving attitudes to aging. Furthermore, research is needed to investigate if the intervention would be more effective when baseline attitudes to aging are less positive.

Introduction

Attitudes to aging can be defined as the way individuals evaluate their own aging experiences.[1] A large body of research has demonstrated associations between attitudes to one's own aging and physical and mental health and well-being.[2–4] For example, Levy et al.[4] found that individuals with more positive self-perceptions of aging, measured from as early as midlife, lived up to 7.5 years longer, compared with those with less positive self-perceptions of aging. Bryant et al.[2] found that more positive attitudes to aging were associated with better self-reported physical and mental health, as well as lower levels of depression and anxiety. Moreover, Han[3] found that among older adults experiencing chronic illnesses, those with more positive self-perceptions of aging tend to have lower levels of depression, compared with those with more negative self-perceptions of aging. Promoting positive attitudes to aging could thus complement policies that aim to promote healthy aging, which is a high priority in many nations, including Australia[5] and the United States.[6]

Given the powerful role of attitudes to aging, a number of researchers have investigated whether it is possible to improve attitudes to aging through targeted interventions. As well as being influenced by individual-level factors, such as an individual's physical health, level of depression and personality traits, attitudes to aging are also shaped by social factors, such as age stereotypes.[7–9] Age stereotypes refer to how older adults are viewed within a society and are likely to differ from culture to culture.[10,11] Moreover,

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cultural age stereotypes has also been found to interact with socioeconomic factors to shape attitudes toward older adults, which might in turn shape one's attitudes toward one's own aging process.[11] For example, Luo et al.[11] compared Chinese and American college students' attitudes toward older adults using the Fraboni Scale of Ageism, which measured three aspects of ageism, namely, the level of expressed aversion of older adults, the level of avoidance of older adults and the level of discrimination against older adults.[12] It was found that Chinese college students had more negative attitudes toward older adults, compared with their American counterparts.[11] Qualitative findings from focus group interviews conducted by Luo et al.[11] suggested that the perceived stress of caregiving of aging parents, within the context of familial obligations shaped by a collectivistic culture coupled with lack of support from an extended family structure given China's One-Child Policy, might have contributed to Chinese college students' perceiving older adults as a burden, compared with American college students. The relatively negative attitudes toward older adults expressed by Chinese college students could thus be understood to be influenced by both cultural stereotypes, of older adults as elders whom one should respect and take care of, and socioeconomic factors that contribute to the financial pressure of taking care of older family members.[11] Luo et al.'s[11] female Chinese interviewees also explained that the intense competition for both jobs and marriage partners that favor those with youthful looks contributed to their anxiety about the aging process. In contrast, the American female interviewees did not express as much anxiety about aging compared with their Chinese counterparts.[11]

Given the influence of age stereotypes on attitudes toward older adults,[11] which could in turn be internalized to influence one's attitudes toward one's own aging process,[9] interventions to improve attitudes to aging typically involve challenging negative age stereotypes and providing education about healthy aging during face-to-face interventions of various session frequencies and durations.[13–15] For instance, Wolff et al.[15] conducted a study with German participants aged 65 and above, who were randomized into three conditions. The intervention included a component that aimed to improve views on aging by providing evidence-based information on the association between positive views on aging, health and health behaviors, as well as correcting misconceptions about negative age stereotypes.[15] It also involved teaching participants a technique based on cognitive behavioral therapy principles,[15] and developed by Hautzinger,[16] that was used to replace negative automatic thoughts about aging with neutral or positive ones.[15] A single 3-h session resulted in participants becoming more future-orientated, and more likely to view late adulthood as a period in life when they would still have time to enjoy the benefits of engaging in health behaviors.[15] Bardach et al.[13] reported

similar improvements in expectations of aging after just a single 30-min session exposing college students and middle-aged adults to narratives and photographs depicting positive role models of aging, demonstrating the efficacy of even very brief interventions at improving attitudes to aging.

Despite these encouraging results, the findings of previous intervention studies are limited in their generalizability across cultural contexts, as most of the participants in these interventions were Caucasian. This is important given findings suggesting that age stereotypes differ from culture to culture.[10,11,17] For example, Lockenhoff et al.[10] found that although college students from 26 cultures viewed biological changes associated with aging similarly, cultures that value self-expression, such as American and Australian cultures, compared with Chinese culture,[18] expressed more positive views on aging regarding learning of new information and life satisfaction. Moreover, in a cross-sectional study of attitudes to aging and expectations of filial piety, Laidlaw, Wang, Coelho, and Power found that older Chinese adults living in Beijing had more negative attitudes to aging in the physical change and psychosocial loss domains of the Attitudes to Aging Questionnaire (AAQ)[1] compared with locally born Scots and Chinese immigrants to Scotland.[17] The efficacy of interventions to improve attitudes to aging might thus differ among individuals who identify with different cultures.

One exception to interventions being conducted only among Caucasian participants was the work of Bardach et al.,[13] which included participants of different ethnicities (Caucasian, African American and Hispanic). However, cultural identity was not explored as a potential moderator of intervention effectiveness in this study. In addition, as the authors acknowledged, there was a lack of racial heterogeneity among the role models featured in the intervention. This is important given that the more dissimilar a role model is from an individual, the less the individual is to identify with and model the role model's behavior.[19]

A better understanding of the effectiveness of interventions with culturally relevant content could therefore contribute to improving physical and mental health among midlife and older adults in a culturally inclusive manner. Such culturally inclusive applications and understanding of intervention efficacy among diverse individuals are especially important given trends in both population aging and cross-cultural migration that many developed countries such as the United States and Australia are experiencing.[5,6,20,21]

This study

The primary aim of this study was to investigate if an intervention featuring culturally relevant role models would be effective in improving attitudes to aging of midlife women

who broadly identified with either Australian or Chinese cultures. Chinese participants were included in the study because of the sizable, and growing, number of Chinese migrants in countries such as Australia and the United States.[20,21] The secondary aim of the study was to investigate if cultural identification would moderate intervention efficacy. First, we hypothesized that participants who identified most with Australian culture compared with Chinese culture would demonstrate more positive pre-intervention attitudes to aging in the domains of physical change, psychosocial loss and psychological growth. Second, we hypothesized that participants who attended the intervention group session, compared with the control group session, would demonstrate significantly greater improvement in post-intervention attitudes to aging in the three domains of physical change, psychosocial loss and psychological growth. Third, in order to determine if the intervention would be more effective for participants who identified with one culture over the other culture, we investigated if there were moderating effects of cultural identification on intervention efficacy. As socioeconomic status and depression are known to be associated with attitudes to aging,[2,8] they were also measured and included as control variables in this study.

Methods

This study was part of a larger project investigating whether an intervention to improve attitudes to aging would increase the physical activity levels of midlife Australian Caucasian and Chinese women aged 45–60 years. Each participant attended a single group session that either focused on promoting positive attitudes to aging (intervention group) or on the components and benefits of a healthy diet (control group). This study received approval from the Human Research Ethics Committees of the University of Melbourne, Australia, with an Ethics ID of 1442049, and approval from the Royal Women's Hospital, Melbourne, Australia, with a Project No. of 16/02.

Participants

Women were eligible to participate if they were between the ages of 45 and 60 years, wanted to increase their physical activity levels and were proficient in either English or Chinese. Participants were recruited through a number of means, namely: activities such as health talks organized at two community centers, recruitment emails that included an introduction to the project to potential participants among staff members at the Royal Women's Hopsital, Melbourne, Australia, recruitment advertisements published in two local Chinese publications that invited women to participate in a project aimed at increasing physical activity levels and promoting healthy aging, and snowballing.

Measures

All measures were available in both English and Chinese, and participants were provided with questionnaires in the language of their preference. For measures of attitudes to aging and level of depression, for which existing Chinese translations were available, the first author (S.J.S.) discussed and refined the measures with their authors, so that the Chinese measures would be as close in meaning and scale interpretation as the English versions of the measures. For both the AAQ and Center for Epidemiologic Studies Depression Scale (CES-D), the existing Chinese versions that we received had response scales that were different from the corresponding response scales of the English measures, and so the Chinese response scales were refined. Moreover, three items on the Chinese AAQ were also refined. For the Chinese CES-D, besides the response scale, the instructions to participants and the phrasing of three items were refined, and the sequence of the items adjusted so that the positions of the items are the same for the English and Chinese versions. The measures of cultural identification and socio-economic status were translated into Chinese by the the first author (S.J.S.), and a bilingual researcher not connected with the project helped with the back-translation process.

Attitudes to aging. Participants' attitudes to their own aging were measured with the AAQ developed by Laidlaw et al.[1] The AAQ consists of 24 items measuring attitudes to aging in the three domains of physical change (e.g. "It is important to take exercise at any age."), psychosocial loss (e.g. "Old age is a time of loneliness.") and psychological growth (e.g. "Wisdom comes with age."). The physical change domain captures how an individual views the overall experience of aging, including physical decline during the aging process, and the level of importance they attach to regular physical activity for health maintenance, while the psychosocial loss domain refers to how they view possible losses in social connections and the corresponding emotional adjustments that might occur during the aging process. Psychological growth refers to the extent to which they might perceive aging as an experience that brings with it growth, development and pleasant things to look forward to Laidlaw et al.[1] Participants indicated their responses to each item on a Likert-type scale ranging from 1 (Strongly disagree/Not at all true) to 5 (Strongly agree/Extremely true). Participants' total scores for each of the three domains were then calculated, with higher scores for the physical change and psychological growth domains indicating more positive attitudes to aging in each of these domains, and higher scores on the psychosocial loss domain indicating more negative attitudes to aging in this domain.[1] Among the 24 items of the AAQ, 17 items directly measure how participants view their own aging process (e.g. "As I get older, I find it more difficult to make

new friends.," while seven items measure participants' general attitudes toward aging (e.g. "Old age is a time of loneliness.").[1] Although participants' responses to seven items on the AAQ measure their general attitudes toward aging, which could differ from how they view their own aging process, participants' general attitudes toward aging could still be internalized to influence how they come to view their own aging process.[9] Moreover, the AAQ has good cross-cultural validity[1] and good validity among midlife women aged 40–60.[22] Cronbach's alphas for the physical change, psychosocial loss and psychological growth domains for this study were .75, .78 and .66, respectively.

Cultural identification. Participants indicated their cultural identification by responding to the following question: "What culture do you most belong to?" and selecting among the options "Australian," "Chinese" or "Other (please specify)." This item was adapted from the item used to measure cultural identification in a study conducted by Hong et al.[23]

Socioeconomic status. Participants indicated their financial status by choosing among four options, "Insufficient to meet needs," "Just enough to meet needs," "Sufficient to meet needs" and "More than enough to meet needs," and this was taken as an indication of their socioeconomic status.[2]

Depression. Participants' symptoms of depression were assessed with the CES-D, which consists of 20 items. Participants indicated their responses on a Likert-type scale ranging from 1 ("Rarely or none of the time") to 3 ("Most or all of the time"). Higher summed scores reflect higher levels of depression. The CES-D has demonstrated internal reliability among sample populations in different countries, including China, with Cronbach's αs above .80.[24,25] CES-D scores were included in the study as a covariate of attitudes to aging in the psychosocial loss domain, as CES-D scores were significantly correlated with AAQ scores in the psychosocial loss domain in this study.

Procedure

Before commencing participation, S.J.S. informed participants that, as part of the project, they would be attending a group session consisting of a presentation and discussion on the topic of either healthy aging or healthy diet. All participants then provided written informed consent to participate in the study before attending a one-to-one physiotherapist session that was approximately 30 min in duration. In this session, the physiotherapist assessed each participant's health conditions and intention to increase physical activity, and discussed their fitness goals and action plans to increase physical activity in the 8 weeks

following the group session. Participants also completed a baseline questionnaire that included items relating to participants' demographic information, cultural identification and psychosocial variables such as attitudes to aging and depressive symptoms. A number of additional variables (e.g. relating to self-efficacy) were also measured as part of a broader study, but not reported in this article.

Approximately 1 week after the physiotherapist session, participants attended a group session approximately 90 min long. Participants signed up for whichever group session best suited their schedules. Prior to each session, the contents for each consecutive pair of group sessions were then randomized to either the intervention or the control condition. The topic of the group session (i.e. healthy aging or healthy diet) was only revealed to participants when they arrived for the group session.

Among the 100 participants who provided consent to participate in the project, three were ineligible to continue in the project following the physiotherapist session because of health issues or lack of intention to increase physical activity. Of the remaining 97 participants, one did not provide baseline measures. Thus, there were 96 participants who were eligible to continue with the study following the physiotherapist session and who also provided baseline measures. Among these 96 participants, 86 attended a group session, while 10 (five from the intervention group and five from the control group) were absent due to reasons that included being ill on the day of the session, being busy and feeling that the project was not a good fit for specific fitness goals (refer to Figure 1 for the flow diagram, based on the suggestions of the CONSORT Group,[26] for details on the recruitment and retention of participants).

Following the group session, participants completed a questionnaire that included all items on the baseline questionnaire except those measuring demographic information and cultural identification. At the end of the 8 weeks, a final questionnaire that was identical to the one completed after the group session was posted to participants, and participants completed the questionnaire and returned it to the researchers by post or email.

Intervention and control sessions

The intervention to improve attitudes to aging was a 90-minute group session conducted by the third author (C.B.). The intervention included a presentation on evidence-based research on healthy aging,[15] with definitions of healthy aging and an emphasis on how individuals value physical health and independent functioning regardless of the cultures they belong to.[27–29] The presentation also highlighted how individuals with positive attitudes to aging tend to do more physical activity, which in turn reduces the risks of diseases. Drawing on the work of Bardach et al.,[13] participants were then shown six online video clips of
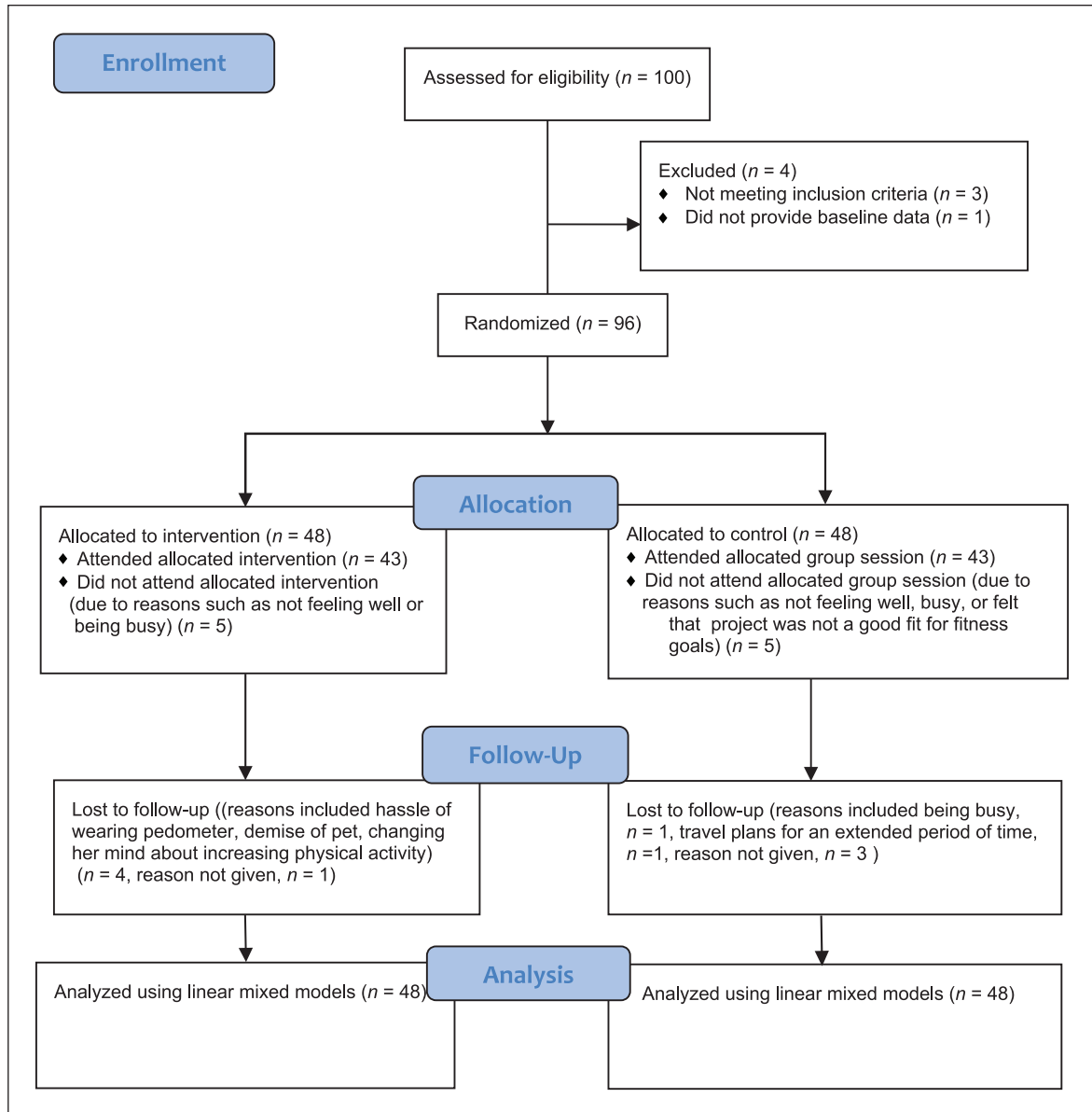
Figure 1. Flow diagram illustrating recruitment and study follow-up.

around 2 min each, selected to introduce female role models who demonstrated positive attitudes to aging. The first two clips aimed to encourage positive attitudes to aging in the domain of physical change by recommending participation in regular physical activity for health maintenance, and also featured role models who engaged in physical activities. The third and fourth clips aimed to encourage positive attitudes to aging in the domain of psychosocial loss by featuring role models who remained socially active through volunteering during late adulthood. The fifth and sixth clips aimed to encourage positive attitudes to aging in the domain of psychological growth by highlighting that wisdom grows with age as demonstrated by the role models featured, who gave advice on facing problems in life positively, and forgiving others to achieve happiness. The

first, fourth and fifth clips featured Chinese role models, while the second, third and sixth clips featured Caucasian role models, so that role models featured were culturally relevant to both Caucasian and Chinese participants. Throughout the group session, discussion was encouraged, and participants were invited to share their views regarding the presentation contents, what their personal definition of healthy aging was and whether they would emulate the role models featured in the video clips.

The control group session was a 90-minute session on healthy diet that was also conducted by the C.B. The control session included a presentation on definitions of a healthy diet, and research-based information on how a healthy diet reduces risks of diseases.[30–32] Participants then viewed six online video clips with duration of around

1–6 min each. The first two clips were regarding the will-power to adopt a healthy diet and featured a talk given by a Caucasian psychologist and an interview with a Chinese woman. The third and fourth clips were regarding finding time to prepare healthy meals and featured a recipe demonstration by a Caucasian woman and an interview with a Chinese woman, respectively. The last two clips were suggestions for affordable healthy meals and featured a recipe demonstration by a Caucasian woman and a talk given by a Chinese woman, respectively. During the group session, participants were also invited to give their opinions on the presentation contents and the video clips.

A total of 17 group sessions were conducted, of which seven (four intervention; three control) included only Caucasian participants, five (three intervention; two control) included only Chinese participants and five (two intervention; three control) included both Caucasian and Chinese participants. S.J.S. provided interpretation, when needed, to facilitate the intervention and control group sessions. For group sessions that were attended only by Caucasian participants, or group sessions with a majority of Caucasian participants and one Chinese participant who was proficient in English, some changes to the content was made. Specifically, the intervention video clip in Mandarin for the psychosocial loss domain was replaced with a video clip in English featuring a 95-year-old Caucasian woman who remained socially active through volunteering, and three control video clips that were either in Cantonese or Mandarin were replaced with three video clips in English featuring a talk on the mind-set to adopt to facilitate healthy eating and two recipe demonstrations, respectively.

Data analysis

SPSS version 24 was used to conduct three sets of linear mixed model analyses. Linear mixed model analyses were adopted as this approach provides unbiased estimates of missing data and accounts for the correlation among repeated measures.[33] A backward stepwise penalized likelihood strategy was adopted, with all variables included in the initial model, following which variables were removed one by one by comparing Schwartz's Bayesian Criterion (Bayesian information criterion (BIC)) values of the more complex and the more refined models. The final model was decided upon when removal of additional variables did not reduce the BIC value of the more refined model by at least two points.[34]

Two dummy variables were created to capture change in AAQ scores between baseline and post-group session (TD1), and change in AAQ scores between baseline and post 8-week follow-up (TD2). The main effects of cultural identification (Australian and Chinese), condition (intervention and control), TD1, TD2, socioeconomic status (insufficient or just enough to meet needs, and sufficient or more than enough to meet needs), relationship status (with partner and without partner), employment status (employed and not employed), education background (12 years of education or less, and more than 12 years of education) and age, as well as interaction effects of condition by TD1, condition by TD2, condition by TD1 by cultural identification, and condition by TD2 by cultural identification on the respective trajectories of AAQ physical change, psychosocial loss and psychological growth scores over three time points were investigated. Random effects of the intercept, TD1 and TD2 were included in the analyses for all three domains, and random effects of CES-D scores as a time-varying covariate were included in the analyses for the psychosocial loss domain. Covariance models used for the random and repeated effects were identity and first-order autoregressive, respectively.

Results

Participant characteristics

Participants were 96 women with ages ranging from 46 to 60 years ($M = 53.89$, $SD = 3.84$) from Melbourne, Australia. The majority of participants were married, employed, reported having sufficient financial resources to meet needs and had a university education (refer to Table 1). Place of birth for our Caucasian participants included Australia (42 participants), the United Kingdom (5), Ireland (3) and Chile (1), and place of birth for our Chinese participants included China (24), Hong Kong (6), Taiwan (5), Malaysia (5), Singapore (2) and Vietnam (1). Information on place of birth was missing for two Caucasian participants.

Among the 53 Caucasian participants, 46 indicated that they most belonged to Australian culture, two indicated that they most belonged to British culture and three indicated that they belonged at least partly to a non-British European culture. Given that British culture is similar to Australian culture,[10] participants who indicated they most belonged to British culture were grouped together with participants who indicated they most belonged to Australian culture. Among the 43 Chinese participants, 37 indicated that they most belonged to Chinese culture, three indicated that they most belonged to Australian culture and three indicated that they belonged to both Australian and Chinese cultures. As we were interested in comparing Australian versus Chinese cultural identification, those participants who indicated that they belonged to both Australian and Chinese cultures, or to a non-British European culture, were coded as missing for the variable cultural identification. Among our Chinese participants who provided data on number of years lived in Australia ($n = 37$), the mean number of years lived in Australia was 18.16 ($SD = 10.83$), with a range of 1–40 years.

Table 1. Demographic characteristics of participants by condition.

Demographic characteristic	Total (N = 96)	Intervention	Control
Relationship status			
Married	64	32	32
Living with partner	8	4	4
Divorced	9	4	5
Widowed	4	2	2
Single	11	6	5
Employment status			
Employed	75	39	36
Home duties	12	5	7
Retired	5	2	3
Unemployed or other	4	2	2
Socioeconomic status			
Insufficient financial resources	4	1	3
Just enough	20	11	9
Sufficient	62	30	32
More than enough	10	6	4
Education			
High school	9	5	4
TAFE or trade training	26	11	15
University education	61	32	29

TAFE: Technical and Further Education.
TAFE refers to vocational courses in Australia that are provided after high school.

Table 2. Descriptive statistics for AAQ, CES-D scores and difference between personal ideal age and chronological age by condition.

	Baseline			Post-group session			Post 8-week follow-up		
	Total	Intervention	Control	Total	Intervention	Control	Total	Intervention	Control
Physical change	25.75	25.16	26.33	27.16	27.56	26.77	26.76	26.95	26.56
	(5.34; range 14–40)	(5.48)	(5.18)	(5.53)	(5.66)	(5.44)	(5.47)	(5.87)	(5.09)
Psychosocial loss	15.55	15.92	15.19	14.35	13.53	15.16	14.23	14.05	14.41
	(4.82; range 8–30)	(4.80)	(4.85)	(4.24)	(3.91)	(4.45)	(4.40)	(4.01)	(4.83)
Psychological growth	28.09	26.79	29.40	28.91	28.79	29.02	28.16	27.31	29.05
	(4.29; range 18-39)	(4.30)	(3.92)	(4.33)	(4.35)	(4.37)	(4.52)	(4.89)	(3.97)
CES-D	10.90	11.98	9.79	8.87	8.97	8.78	8.24	7.76	8.72
	(9.39; range 0–54)	(10.77)	(7.70)	(7.79)	(9.23)	(6.13)	(8.16)	(9.15)	(7.10)

AAQ: Attitudes to Aging Questionnaire; CES-D: Center for Epidemiologic Studies Depression Scale.
Standard deviations and range are indicated in parentheses.

Baseline group differences

T-tests were conducted to investigate if there were baseline differences in attitudes to aging as a function of condition. It was revealed that while there were no significant differences between intervention and control condition participants' baseline AAQ scores in the physical change ($t = 1.08$, $p = .28$) and psychosocial loss ($t = -.74$, $p = .46$) domains, control condition participants' AAQ scores ($M = 29.40$, $SD = 3.92$) were found to be significantly higher ($t = 3.10$, $p = .003$) than intervention condition participants' scores ($M = 26.79$, $SD = 4.30$) at baseline for the psychological growth domain (refer to Table 2 for scores).

In order to test the first hypothesis that participants with Australian cultural identification, compared with Chinese cultural identification, would have more positive attitudes to aging at baseline, *t*-tests were conducted on baseline attitudes to aging in each of the three domains. These showed that, at baseline, there was no significant difference in the physical change domain between participants with Australian, compared with Chinese, cultural identification ($t = .88$, $p = .38$). There was also no significant difference as a function of cultural identification in the psychosocial loss domain ($t = .65$, $p = .52$), nor the psychological growth domain ($t = 1.21$, $p = .23$).

Intervention efficacy and moderating effects of cultural identification

In order to test the second hypothesis that participants who attended the intervention group session would demonstrate significantly greater improvement in attitudes to aging, and the research question of whether cultural identification moderated intervention efficacy, the interaction effects of condition by TD1 (change in scores between baseline and post-group session), condition by TD2 (change in scores between baseline and post 8-week follow-up), condition by TD1 by cultural identification and condition by TD2 by cultural identification were examined for the three AAQ domains.

Psychological growth domain. A significant main effect of TD1 was found ($t=-2.13$, $p=.04$, 95% confidence interval (CI)$=(-2.82, -.10)$), showing that, on average, participants' AAQ scores increased from baseline ($M=28.17$, $SD=4.24$) to post-group session ($M=28.91$, $SD=4.33$). In addition, a significant interaction effect of condition by TD1 was found ($t=2.48$, $p=.02$, 95% CI$=(.49, 4.39)$). After the group session, intervention condition participants' AAQ scores improved by two points while control condition participants' scores decreased by .38 points, and this difference in change of AAQ scores was significant. Taken together, the findings of the significant main effect of TD1 and significant interaction effect of condition by TD1 suggest that attending the intervention group session contributed significantly to improving attitudes in the psychological growth domain. The effect size was .06, which is considered very small (Cohen, 1988). There were no significant interaction effects of condition by TD2 ($p=.35$), condition by TD1 by cultural identification ($p=.92$) or condition by TD2 by cultural identification ($p=.58$).

In addition to the significant condition by TD1 interaction effect, there was an unexpected finding of a significant main effect of socioeconomic status ($t=-3.16$, $p=.002$, 95% CI$=(-5.09, -1.16)$). A t-test conducted on baseline AAQ scores further revealed that participants who had insufficient or just enough financial resources to meet needs had significantly lower scores ($M=26.42$, $SD=4.14$) than participants who had sufficient or more than enough financial resources to meet needs ($M=28.65$, $SD=4.23$).

Physical change domain. There were no significant interaction effects of condition by TD1 ($p=.21$), or condition by TD2 ($p=.36$), indicating that the change in attitudes to aging within the physical change domain did not differ significantly between intervention and control condition participants across each set of time points. The interaction effect of condition by TD1 by cultural identification ($p=.89$) and condition by TD2 by cultural identification ($p=.93$) were also non-significant, indicating that cultural

identification was not a moderator of intervention efficacy. However, there was a significant cultural identification by TD1 interaction effect ($t=-2.04$, $p=.04$, 95% CI$=(-4.06, -.06)$). For this, mean AAQ scores at baseline and after the group session indicated that, regardless of intervention or control condition, participants who identified most with Australian, compared with Chinese, culture had an increase in scores that was 2.17 points greater in the physical change domain.

Psychosocial loss domain. Again, there was no significant interaction effect of condition by TD1 ($p=.70$), and no significant interaction effect of condition by TD2 ($p=.63$). In addition, there were no significant interaction effects for condition by TD1 by cultural identification ($p=.11$) and condition by TD2 by cultural identification ($p=.11$). Please refer to Table 3 for the findings from the linear mixed model analyses pertaining to the psychological growth, physical change and psychosocial loss domains.

Discussion

The primary aims of our study were to investigate if an intervention featuring culturally relevant role models would improve attitudes to aging among participants of differing cultural identification, and whether the cultural identification of participants would moderate intervention efficacy. Contrary to our predictions, there were no baseline differences in attitudes between participants who identified most with Australian, compared with Chinese culture. However, the significant interaction effect of condition by time in the psychological growth domain lent partial support to the hypothesis that participants in the intervention condition would show greater improvement in attitudes to aging post-intervention. There were no significant condition by time interaction effects for the physical change and psychosocial loss domains, suggesting a lack of intervention efficacy in the physical change and psychosocial loss domains. In addition, we found that there were no significant interaction effects of condition by time by cultural identification for any of the three domains, indicating that cultural identification was not a moderator of intervention efficacy in this study. The significant main effect of socioeconomic status found for the psychological growth domain indicated that socioeconomic status was a significant predictor of baseline attitudes to aging in the psychological growth domain.

The partial support for the second hypothesis indicated that the intervention was effective in improving attitudes to aging in the psychological growth domain immediately after the group session, though the improvement was not maintained at 8-week follow-up. This finding demonstrated that an intervention with culturally relevant role models of aging was successful in increasing expectations of continuing growth, development and pleasant aspects of

Table 3. Fixed and random effects of final linear mixed model for psychological growth, physical change and psychosocial loss domains.

	Psychological growth			Physical change			Psychosocial loss		
	b	SE_b	95% CI	b	SE_b	95% CI	b	SE_b	95% CI
Fixed effects									
Baseline AAQ score	28.03	1.31	25.43, 30.63	25.60	1.57	22.48, 28.71	12.78	1.20	10.42, 15.15
Condition	−.75	1.82	−4.36, 2.86	.23	2.17	−4.06, 4.53	−.19	1.76	−3.67, 3.28
CI	2.53	1.67	−.78, 5.83	5.78	1.99	1.83, 9.72	−1.54	1.56	−4.63, 1.54
SES	−3.13	.99	−5.09, −1.16	−3.30	1.28	−5.85, −.75	NA	NA	NA
Education	2.71	1.35	.02, 5.40	4.26	1.76	.76, 7.76	NA	NA	NA
TD1	−1.46	.69	−2.82, −.10	−.84	.78	−2.38, .70	.63	.64	−.64, 1.91
TD2	−.21	.87	−1.94, 1.52	−.89	.98	−2.83, 1.06	.55	.84	−1.10, 2.21
Condition × CI	.10	2.41	−4.66, 4.86	−2.73	2.86	−8.39, 2.92	3.88	2.32	−.70, 8.46
Condition × TD1	2.44	.99	.49, 4.39	1.42	1.12	−.79, 3.64	−.35	.91	−2.16, 1.45
Condition × TD2	1.29	1.39	−1.28, 3.64	1.29	1.39	−1.47, 4.05	.58	1.19	−1.77, 2.93
CI × TD1	−.70	.89	−2.46, 1.06	−2.06	1.01	−4.06, .06	1.36	.83	−.28, 2.99
CI × TD2	−.22	1.14	−2.48, 2.05	−.93	1.28	−3.47, 1.62	.97	1.10	−1.19, 3.13
Condition × CI × TD1	1.23	1.29	−2.42, 2.67	−.20	1.46	−3.09, 2.69	−1.94	1.19	−4.30, .43
Condition × CI × TD2	−.93	1.65	−4.21, 2.35	−.16	1.85	−3.82, 3.51	−2.54	1.58	.04, .14
Random effects									
Repeated measures AR1 diagonal	13.52	2.57	9.32, 19.62	21.24	4.17	14.46, 31.20	11.61	2.16	8.06, 16.72
Repeated measures AR1 rho	.78	.05	.66, .87	.85	.04	.74, .92	.74	.06	.60, .83
Intercept + TD1 + TD2	1.28	.54	.44, 2.86	2.05	.79	.96, 4.38	NA	NA	NA
Intercept + ces-d + TD1 + TD2	NA	NA	NA	NA	NA	NA	.07	.02	.96, 4.38

CI: confidence interval; AAQ: Attitudes to Aging Questionnaire; CES-D: Center for Epidemiologic Studies Depression Scale; SES: socioeconomic status; SE: standard error.
NA indicates that a fixed or random effect was not investigated in the final linear mixed model of a domain based on outcomes of the backward stepwise penalized likelihood strategy. ces-d represents CES-D scores.

life during the aging process among midlife women of two different cultural identifications. Positive attitudes in the psychological growth domain are important in facilitating healthy aging as positive views on aging among older adults that orientate them toward the future have been found to predict higher levels of physical activity.[15] Moreover, the efficacy of our intervention in the psychological growth domain extends the findings of Wolff et al.[15] and Bardach et al.,[13] on the efficacy of single session intervention sessions, by demonstrating that interventions aiming to improve how individuals view their own aging experiences can also be designed so that they are applicable even if participants are of different cultural identifications. Demonstration of intervention efficacy in improving attitudes to aging in a culturally inclusive manner among participants of different cultural identifications suggests that community-based programs conducted in multi-cultural countries, such as the United States and Australia, might be able to reach a wider number of intended recipients to encourage healthy aging in a culturally inclusive manner.

Nevertheless, it should be noted that despite the efficacy of the intervention in improving attitudes in the psychological growth domain immediately after the intervention session, this improvement was not maintained to the same extent after 8 weeks. At 8-week follow-up, although intervention condition participants' mean AAQ score in the psychological growth domain was still higher than the corresponding score at baseline, the improvement of .52 points was smaller than the improvement of two points from baseline to immediately after the intervention session, indicating that the effect of the intervention could not be fully maintained over 8 weeks. Control condition participants' mean AAQ score increased by .03 points from immediately after the group session to 8-week follow-up, though their mean AAQ score at 8-week follow-up was still lower than their corresponding baseline score. Thus, although there was still an improvement for intervention condition participants' mean AAQ score in the psychological growth domain from baseline to 8-week follow-up, and a reduction of the corresponding scores for control condition participants, the differences in magnitude of change were not large enough at 8-week follow-up for a significant condition by TD2 interaction effect. It is possible that the positive role models introduced in the intervention video clips might have acted as positive primes that brought into salience positive age stereotypes that had been internalized by intervention condition participants over the years,[35] contributing to an improvement of attitudes in the psychological growth domain

immediately after the intervention session. However, over the duration of 8 weeks, intervention condition participants might have come into contact with many negative age stereotypes present in their daily lives,[10,11] which could have acted as primes of negative age stereotypes that had been internalized by intervention condition participants, contributing to a lower mean AAQ score in the psychological growth domain compared with their score immediately after the intervention. Future studies that aim to improve attitudes to aging could thus consider having more than one intervention session, so that subsequent sessions can reinforce the improvement obtained after the first session,[36] to sustain the efficacy of interventions over longer periods of time.

Moreover, despite the short-term effect of the intervention on the psychological growth domain, there was no evidence for an effect of the intervention in the physical change and psychosocial loss domains. One potential explanation for this might come from the fact that baseline attitudes to aging for our intervention condition participants were already fairly positive in these two domains, compared with the psychological growth domain, and thus less amenable to change. Indeed, participants in the intervention condition had more positive attitudes in these two domains compared with the Chinese older adults residing in Beijing who participated in Laidlaw et al.'s[17] study. For example, the mean baseline psychosocial loss domain score for our intervention condition participants was 15.92, which was lower than the latter's score of 25.22, indicative of more positive attitudes in this domain. In comparison, our intervention condition participants' mean baseline AAQ score in the psychological growth domain of 26.79 was more similar to the corresponding mean AAQ score of Laidlaw et al.'s Chinese participants residing in Beijing, which was 26.30.[17] The positive baseline attitudes to aging of our participants in these two domains might not be surprising as we had advertised our study as an opportunity to increase physical activity levels, and specified that the study included a group activity. Thus, it is possible that women who chose to participate in our study might already view their aging experiences more positively in these two domains at baseline, compared with women who did not respond to our recruitment drive. Future intervention studies could consider recruiting only participants with low baseline AAQ scores to investigate intervention efficacy among these individuals.

The lack of a significant difference in baseline attitudes to aging in all three domains between participants of Australian, compared with Chinese, cultural identification is in contrast to other work that has shown differences in attitudes to aging among individuals of different cultures.[10,11,17] One explanation for this is that the Chinese participants of our study, who had been residing in Australia, on average, for close to two decades, might have assimilated Australian age stereotypes along with Chinese age stereotypes. This fits with the argument derived from

the Stereotype Embodiment Theory,[9] that age stereotypes are internalized over the lifespan to shape one's attitudes to aging. The lack of a significant difference in baseline attitudes also provides a possible explanation for the lack of a significant moderation effect of cultural identification indicated by our non-significant condition by TD1 by cultural identification interaction effects. Future work is therefore now needed to determine whether cultural identification might moderate intervention efficacy in groups of less culturally assimilated participants.

Strengths and limitations of study

One limitation of our study that is suggested by the positive baseline attitudes in the physical change and psychosocial loss domains is the issue of a self-selection bias. Women who chose to participate in this study might tend to already have relatively positive attitudes to aging at baseline that motivated them to take part in this study, compared with those who did not respond to our recruitment drive. We faced significant challenges trying to recruit midlife women who had less positive attitudes to aging compared with those who participated in our study. This possible self-selection bias among participants could have contributed to ceiling effects in AAQ scores. More importantly, the issue of self-selection biases highlights a major challenge of health promotion studies, namely, to provide interventions to individuals who need them the most.[37]

Another limitation of our study is the investigation of the role of culture in shaping attitudes to aging within a dichotomous framework. This dichotomous framework might be limited in capturing the complexity of cultural identification, for example, when individuals have been exposed to different cultures and developed multicultural identities[38] and thus might be insufficient as a measure for participants who identify with both Australian and Chinese cultures to the same extent. The lack of baseline differences in attitudes to aging as a function of cultural identification thus highlights a need to move away from dichotomous frameworks of cultural identification, and toward more nuanced frameworks, for future studies of the role of culture in interventions for attitudes to aging.

A third limitation of our study was that the participants were not randomized on an individual basis. This was in order to allow participants the choice of attending the session that most conveniently fitted their schedules. Although session topics were randomly allocated to each group session, there is a possibility that participants with certain characteristics (e.g. work or family commitments) might tend to choose certain session timings, and these participant characteristics might then be potential confounds of this study's findings. Future studies could thus aim to investigate intervention efficacy with randomized controlled trials.

To our knowledge, this is the first intervention on attitudes to aging featuring culturally relevant role models for

participants of different cultural identifications, and which investigated cultural identification as a moderator of intervention efficacy. Conducting such interventions that aim to be culturally relevant has the potential to promote healthy aging in a culturally inclusive manner. In addition, our intervention group session content was theoretically informed in its design, and included elements of past interventions which featured positive role models and provided evidence-based information on the association between positive attitudes to aging, health and health behaviors.[13,15]

Our finding of intervention efficacy in the psychological growth domain suggests that, within a relatively short time frame of 90 minutes, it might be easier to significantly improve attitudes to aging in the psychological growth domain using positive role models, than to significantly change participants' attitudes in the physical change and psychosocial loss domains. Nevertheless, given the significantly higher baseline AAQ scores of control condition participants in the psychological growth domain, future studies would need to investigate if culturally relevant interventions could still demonstrate efficacy in the absence of differences in baseline AAQ scores. Moreover, given differences in how men and women perceive aging within Australian culture[39] and Chinese culture,[40] this study's findings cannot be generalized to men of the same age range, and future intervention studies would need to be conducted on male participants for evidence of intervention efficacy on midlife men. Although there was a lack of intervention efficacy in the other two domains, it is hoped that our study highlights some of the challenges involved in participant recruitment and the implementation of interventions among individuals who might be influenced by more than one culture, and that future studies can address these challenges.

Conclusion

Culturally relevant interventions to improve attitudes to aging are gaining increasing importance in the context of global trends of population aging and increasingly multicultural communities. This study contributed to this relatively under-researched area and found that a brief intervention was effective in changing attitudes to psychological growth, but not attitudes to physical change and psychosocial loss. By providing evidence of some success in intervention efficacy, and highlighting the challenges faced in intervention implementation and bringing interventions to those who need them the most, this study provides a foundation for future studies to improve on culturally inclusive interventions for attitudes to aging.

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