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# Can a course on aging with a service-learning component change students' attitudes toward aging?

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**ABSTRACT**

Ageism can negatively affect everyday interactions with older adults, social policies, healthcare practices, and the physical and cognitive outcomes of aging. Reducing ageism among young adults can improve the lives of older adults and allow for optimal aging. The current study investigates whether a psychology course on aging with a service-learning component can reduce ageism in undergraduate students as measured by the Fraboni Scale of Ageism (FSA). The course is designed to build a comprehensive understanding of aging through in-depth examinations of the aging process and by tying the course objectives to the goals of liberal education. In the service-learning component, students participated in activities with retirement home residents and wrote a literature review on intergenerational interactions along with a reflection on their experience with the residents. Results showed an overall reduction in ageism measured by FSA as well as a significant reduction on each of the three FSA subscales (Antilocution, Discrimination, and Avoidance). This study demonstrates that this holistic approach of teaching aging along with intergenerational interaction can be an effective approach used to change undergraduate students' attitudes toward aging.

Ageism (Butler, 1969) exists and has been exerting its impacts in our society surreptitiously without evoking the same level of awareness and reactions as other 'isms' such as racism or sexism. Over generalized stereotypes associated with older adults may prevent us from seeing older adults as individuals and can potentially shape or alter how we think about aging, as well as how we age (e.g., Swift et al., 2017). Unlike the other 'isms,' which stem from stable social categories and do not change across the lifespan, ageist views can become self-directed once a person reaches a certain age. For young individuals, there is no immediate need to fend off these negative beliefs and attitudes as they are not directed at them and, as a result, makes it easier for them to sink into the young minds and impact their self-definitions (B. R. Levy, 2009). Research has revealed that the negative views on aging internalized early in life can negatively affect the cognitive and physical outcomes of aging (for a review, see B. R. Levy, 2009). In addition, ageism can also influence social policies and health-care practices involving older adults, the most rapid growing section of the population, and further compromise a wide range of outcomes associated with the aging process (e.g., Lamont et al., 2015; Swift & Chasteen, 2021). Therefore, it is imperative to reduce the degree of ageism that exists in our society to enhance the chance of optimal aging (e.g., S. R. Levy, 2018; McGuire et al., 2005). Making young adults aware of the existence of ageism can potentially be an effective first step in the overall effort of reducing ageism because it may decrease the amount of negative aging beliefs to be internalized and minimize their influences as the younger generation grows older. Additionally, some young people will later become policy makers or engage in various works associated with

older adults. Such awareness or reduction in ageist attitudes may lead them to treat older adults as individuals instead of just as 'older people' with overgeneralized, and often inaccurate, characteristics.

In recent years, a growing number of studies have been conducted to examine the effectiveness of interventions or programs aimed to increase the knowledge of aging and decrease negative attitudes toward older adults, the two key factors that can potentially influence the degree of ageism (for a review see, Chonody, 2015). Burnes and colleagues (Burnes et al., 2019) have conducted a meta-analysis on such intervention studies and reported that interventions involving aging-related education and intergenerational interactions are able to reduce negative attitudes toward aging and increase younger adults' comfort around older adults, along with an increase in knowledge about aging. The largest effects of these interventions on people's attitudes toward older adults are associated with programs involving both education and intergenerational interactions.

There are many different forms of education on aging and intergenerational interactions, ranging from brief exposures to age-related materials or older adults to in-depth learning of aging and extensive interactions with older adults. The most common form of education is to take a course on aging, whereas the intergenerational interactions take the form of service learning built in as part of the course requirement (Roodin et al., 2013). The amount of reduction in negative attitudes toward older adults also have been shown to vary depending on the amount of learning of aging or the length of the aging program/course (Chonody, 2015). For example, Stuart-Hamilton and Mahoney (2003) has reported that a brief exposure of aging-related information and discussion of the experience of being old cannot change people's avoidance and discriminatory feelings toward older adults but may prompt people to be more careful in selecting more socially appropriate words when talking about older adults. Similarly, studies find that having a module on aging in a lifespan development course may only reduce negative attitudes toward aging, whereas a semester long aging course can not only reduce negative attitudes but also increase positive attitudes toward aging (Snyder, 2005) and at the same time significantly increase the knowledge of aging (Angiullo et al., 1996; Dorfman et al., 2003).

How aging is taught to students can potentially vary widely, with some taught as a standard elective gerontology course (e.g., Funderburk et al., 2006) whereas others use an interdisciplinary approach with a team of experts from different disciplines teaching the course (e.g., Merz et al., 2018). There is evidence suggesting that curricular setup matters in the outcome measures. Jansen and Morse (2004) have compared two different setups of an aging course for nursing students and found that having the aging course taught earlier in an integrated and holistic curriculum is more effective in developing positive attitudes toward aging among nursing students than a standard course taught later in their nursing curriculum.

In addition, a large portion of the literature investigating the impacts of curricular intervention has focused on students who will go into the medical fields (e.g., Beling, 2003; Gonzales et al., 2010; Jansen & Morse, 2004; Leung et al., 2012). There are far fewer similar studies conducted among non-medical students who have taken a course on aging (e.g., Lytle et al., 2019; Merz et al., 2018). Given that ageism can potentially affect every individual (B. R. Levy, 2009), reducing ageism should be a task for all members of our society. Therefore, it is important to gather more data on the effectiveness of curricular interventions for non-medical students so we can expand our knowledge about the potential tools that we can use to fight ageism.

Similar to teaching of aging, intergenerational interactions or service-learning built within an aging course also vary widely in length, form, and depth in terms of how younger individuals interact with older adults. Regardless of the differences in format, largely positive outcomes have been reported in a variety of studies where students volunteer at places such as nursing homes (e.g., Angiullo et al., 1996; Beling, 2003; Dorfman et al., 2003), becoming e-mail-pals (Chase, 2010), making arts together (Chen & Walsh, 2009), watching and discussing documentary films (McCleary, 2014), playing games (Pacala et al., 1995), or engaging joint activities (Chua et al., 2013; Hannon & Gueldner, 2008).

To include a service-learning component in an existing course requires careful consideration to be both pedagogically sound and logistically feasible (For a review see, Roodin et al., 2013). Given that

there is a limited amount of instruction time in a given semester, the allocation of time for learning inside versus outside of the classroom has to be carefully balanced to accomplish the pedagogical goals. Some service-learning projects included may entail substantial alterations of the course requirements to accommodate the work done outside of the classroom (e.g., Dorfman et al., 2003). Although students typically report gains from the service-learning, many have complained about the workload and given instructors lower ratings for the course (Beling, 2003), which may make some instructors apprehensive to include it in their courses due to the implicit or even explicit pressure for getting good student evaluations for personnel reviews.

The goal of the current study is to examine whether taking an upper-level psychology class on aging can change students' attitudes toward older adults. Compared to other upper-level psychology classes in the same institution, a large four-year regional state university with over 25,000 students, this class is unique in the following ways. First, it forgoes the use of a standard textbook. Instead, the instructor selects a large number of research articles and a few book chapters covering fundamental age-related issues to better show the necessity of scientific thinking in understanding aging and make it easier to model critical thinking to the students. The Psychology Department where the study takes place offers approximately 27,300-level courses, one 100-level Introductory to Psychology, and 8 400-level courses (e.g., Advanced research methods, Capstone). There are only two other courses at the 300-level do not require the use of a standard textbook.

The second feature of this course is that it explicitly integrates the goals of liberal education defined by Cronon (1998) into the course objectives. Cronon in his article on liberal education 'Only Connect . . . ' envisions that a liberal education gives us the freedom and tools to help us reach our highest potentials. He also stressed that a liberal education makes us more aware our responsibilities to others as we are all connected in this world. Cronon's definition of a liberal education and its goal presents a perfect framework for specifying the need to understand aging and to create a culture that is age friendly. Thus, the lectures, assignments, and discussions throughout the course are developed intentionally to help students work toward the goals of a liberal education and exercise the skills that should be cultivated in a liberal education while learning about aging. Lastly, the course includes a carefully designed one-time service-learning project so the students can gain hands-on experience of working with older adults without compromising the amount of learning they received inside of the classroom. This study tests whether this approach of teaching an aging course can influence the students' attitudes toward older adults.

## Method

### *Participants*

Participants were students taking an upper-level psychology class on aging. 85% of the students of the total of 45 students were majoring in Psychology. Most of the students were juniors (37%) and seniors (40%). There were no freshmen in this class. 4% students enrolled to fulfil a major or program requirement. 32 students filled out both the pretest and posttest questionnaires. One participant was excluded from the analyses because of missing data on the posttest questionnaire. Nine students only took the pretest, and five students only took the posttest. Their responses were excluded from the analyses. The final sample has 29 female and 2 male students with an average age of 21.4 years old.

### *The aging course*

This aging course is one of the six courses in the General category required for psychology major (the students need to take at least one course in each of the six categories: biological, social context, developmental, cognitive, personality/clinical, and general). The main goal of this course is to provide a comprehensive picture of aging and help the students gain some fundamental understanding of the

aging process. Such understanding of aging may help foster a view of aging as an important part of human development and older adults as unique individuals rather than a homogenous group.

As most of students taking this course are juniors and seniors who will soon enter the next phase of their lives, it is a good time for them to reflect on their college education and their own development thus far. Although most of them are quite familiar with the term of liberal education by this time, very few of them have given much thought to the true meaning of having a liberal education. As the goals of liberal education laid out by Cronon (Cronon, 1998) fit in perfectly with the overarching objectives set for this course in terms of building an in-depth understanding of the aging process and using the knowledge to create an age-friendly world, they are carefully weaved into each component of the course from selecting topics and readings to designing assignments, in hopes that the students can develop stronger critical thinking skills that allow them to better understanding aging research.

To have the flexibility of selecting certain fundamental topics in aging and more opportunities to demonstrate what critical thinking/scientific inquiry is like in real life, the course is taught without using a standard textbook on aging. Research articles and book chapters are selected to cover each topic (see syllabus for readings in Appendix). The students are required to answer a set of reading questions for each reading. This exercise not only helps guide them through the readings but also allows students to see research 'in action' in terms of how to raise research questions, design experiments, collect data, evaluate evidence, and present alternative interpretations, while exercising their basic skills of reading and writing at the same time.

Another reason that readings from primary sources are used is to offer the students more exposures to scientific studies of aging. Negative views of aging are prevalent in our culture (e.g., B. R. Levy et al., 2014), and perhaps the best way to expel these views is to present evidence from well-designed empirical studies. The reading and discussion of these empirical studies throughout the entire semester create opportunities for the students to learn the processes of using scientific methods to address questions that we have about aging. These efforts force the students go beyond the surface and think critically about the materials, an important process of cultivating critical thinking.

The contents of the course focus on depth of understanding to nurture an enduring curiosity about aging and build students' basic skills of scientific inquiry. As follows, there are six broad topics included to provide a comprehensive view of aging from the psychological, social-cultural, and evolutionary perspectives (see Syllabus in Appendix for more details).

(1) Historical and cultural views of aging
(2) Biological aging, theories of aging including evolutionary theories of aging
(3) Self, personality, narrative identity, perceptions of aging and age stereotypes
(4) Cognitive aging, everyday competence and cognitive training, brain plasticity and adaptive ability
(5) Creativity in older adults and its role in successful aging
(6) Psychological conceptualization and research on wisdom and its acquisition

The lectures are used to provide basic information on each topic, explain critical concepts/research findings, and facilitate making connections across readings within and across topics. The discussions carried out throughout the course allow the students to apply what they have learned from readings and lectures to real life.

### *The service-learning component*

As suggested by the literature, intergenerational interactions can be effective in reducing negative attitudes toward aging (Burnes et al., 2019). From a pedagogical standpoint, it is important for the students to have hands-on experience interacting with the population whom they are learning about. Given these considerations, a service-learning component is added to the course project. The students are required to visit a local independent living center for at least one hour during the course. They will form 3–4 person groups first and visit the center as a group at a time that works for all group members.

Each group can design an activity to get the residents involved during their visit or join the activities already scheduled for the residents at the center. Sample activities designed by the students included building birdhouses, making a music playlist, painting, and playing games. The rest of the project involves writing a full-length paper with three sections: a review of research on intergenerational integration, a discussion of their experiences at the retirement home, and a proposal on how to implement the intergenerational integration they had experienced on a larger scale. The project as a whole is designed to allow the students to synthesize what they have learned from this class with their real-world experience interacting with older adults, exercising their ability to translate research into practice.

### Measurement

### Measure of attitudes toward aging

The Fraboni Scale of Ageism (FSA) is used to assess the changes in the students' attitude toward aging before and after taking this aging course. FSA was designed to assess both the affective and cognitive components associated with attitudes regarding old age (Fraboni et al., 1990). It has been shown to have good psychometric characteristics (Fraboni et al., 1990; Rupp et al., 2005). There are 29 items dividing into three subscales: Antilocution (10 items, e.g., *Many old people are stingy and hoard their money and possessions.*), Avoidance (10 items, e.g. *I don't like it when old people try to make conversation with me.)* and Discrimination (9 items, e.g., *It is best that old people live where they won't bother anyone.*). Although these three subscales may not entirely independent of each other (Fraboni et al., 1990), each of them taps into different forms of ageism. According to Fraboni et al. (1990), a high score on the Antilocution subscale indicates the person holds more negative beliefs about older adults that are 'fueled' by misconceptions and myths about older people. The other two subscales access more active forms of ageism, with 'Avoidance' representing behaviors or a preference to shun older adults and 'Discrimination' reflecting the strongest form of ageism; expressions of overt prejudice in advocating for age segregation or limiting older adults' rights and activities.

   Most items are negative statements about older adults, but there are 7 items present older adults in a positive light which are reverse scored before calculating the total score. Participants indicate whether they agree or disagree with each of the items on a 4-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). This scale yields a total FSA score as well as a score for each of the three subscales with a higher score indicating more negative attitudes toward older adults.

### Qualitative measures

To get the students' impressions of the course and the service-learning component of their project, we have looked at the following two things: 1) Selected items at the end of term student evaluations, a standard evaluation for all courses across the college, and 2) The themes reflected in the students' project paper regarding their experiences at the retirement living center.

### Procedure

Prior to the Fall semester of 2019, students enrolled in the Perspectives on Aging class were sent an e-mail inviting them to participate in this study on how college students think of old age. It was made clear that their participation was entirely voluntary, and their responses were anonymous. The FSA questionnaires were handed out at the end of the first class and the last class. The students were asked to make up a code so their pretest and posttest responses can be matched. The instructor left the room as soon as the questionnaires were distributed and returned approximately 15 minutes later to collect completed questionnaires that the students had placed on the instructor's desk in the front of the classroom. There were nine students only took the pretest and five students who only took the posttest. Some of the five students who only took the posttest may have used a code that was different from the one they used in the pretest. A post-hoc test found that the students who only took the pretest or the

**Table 1.** Comparisons of pretest FSA total score and subscale scores between participants who only took the pretest and participants who took both pretest and posttest.

| | Pretest only participants (N = 9) | | Pretest and posttest Participants (N = 31) | | | | |
|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | t | p | Cohen's d |
| Total FSA | 56.22 | 4.66 | 55.05 | 7.99 | −0.56 | .584 | −0.18 |
| Anticolution | 18.89 | 1.76 | 20.10 | 3.57 | 1.39 | .176 | 0.43 |
| Discrimination | 17.44 | 1.94 | 16.79 | 2.29 | −0.85 | .408 | −0.31 |
| Avoidance | 19.89 | 2.32 | 18.16 | 3.78 | −1.68 | .107 | −0.55 |

**Table 2.** Comparisons of pretest FSA total score and subscale scores between participants who only took the posttest and participants who took both pretest and posttest.

| | Posttest only participants (N = 5) | | Pretest and posttest Participants (N = 31) | | | | |
|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | t | p | Cohen's d |
| Total FSA | 51.40 | 11.15 | 49.90 | 7.77 | −0.29 | .785 | −0.16 |
| Anticolution | 17.40 | 4.34 | 17.72 | 4.00 | 0.16 | .881 | 0.08 |
| Discrimination | 16.00 | 2.35 | 15.52 | 2.49 | −0.42 | .687 | −0.20 |
| Avoidance | 18.00 | 5.39 | 16.66 | 2.97 | −0.54 | .614 | −0.31 |

posttest scored similar to the students took both tests on the FSA and its subscales on pretest and posttest, respectively (see Tables 1 and 2 for comparisons).

## Results

### Quantitative data

Separate paired-samples *t*-tests were performed on the FSA and its subscales (Antilocution, Discrimination, and Avoidance) pretest and posttest scores. Results presented in Table 3 show a significant decrease in total FSA scores with a moderate to large effect size. Additionally, each of the three subscales shows a significant decrease; Avoidance and Discrimination have a small to moderate effect size and Anticolution has a moderate to large effect size.

### Qualitative data

### Students' end of term evaluations of the course

The university sends out online course evaluation forms two weeks prior to the final examination week for the students to fill out. The response rate for this course is 60% and the overall summative rating for the course is 3.8 (0=lowest; 5=highest). The vast majority of the students rate the course content favorably (33% of responses rated it as 'Excellent' – the highest rating, 19% - 'Very Good,' and 33% -'Good'). There were also two specific items relevant to the course content: one is phrased as 'Amount you learned in the course was:.' The responses were 44% 'Excellent' (highest rating), 11% 'Very Good,' and 30% 'Good.' The

**Table 3.** Paired t-test on FSA total and three subscale scores (N = 31).

| | Pretest | | Posttest | | | | |
|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | t | p | Cohen's d |
| Total FSA | 55.05 | 11.15 | 49.90 | 7.77 | −3.76 | .001*** | −0.67 |
| Anticolution | 20.10 | 4.34 | 17.72 | 4.00 | −4.32 | .000*** | −0.78 |
| Discrimination | 16.79 | 2.35 | 15.52 | 2.49 | −2.57 | .015* | −0.46 |
| Avoidance | 18.16 | 5.39 | 16.66 | 2.97 | −2.39 | .024* | −0.42 |

* *p* < .05; *** *p* < .001.

other item states 'Relevance and usefulness of course content were:.' The responses were 44% (Excellent), 22% (Very good), and 26% (Good).

The student evaluations form also contains a section with open-ended questions. For the question 'Was this class intellectually stimulating? Did it stretch your thinking?.' All but one student answered 'Yes.' Here are some examples of what the students wrote: *'Yes. A lot of critical thinking and understanding different perspectives.;' 'Yes, it makes you see so many new perspectives on a subject that most people aren't even aware of;' 'This class did stretch my thinking because it allowed me to understand the lives of older adults in the community. The readings were also intellectually stimulating because they provide evidence and explanations for age-related changes.'*

### *Themes from the students' reflections on the service-learning component*

Many students commented that the visit to the independent living center was a meaningful, valuable, and enjoyable experience. Some pointed out that interacting with older adults during the visit sparked an interest that wasn't there before and had given them new perspectives and new appreciation for the older generation, especially their life stories and wisdom. Others realized the needs to bridge the gap between young and older adults and expressed desires to make more connections with the older generations including their grandparents.

## Discussion

Using a pretest and posttest paradigm, the results from this study show that a curricular intervention (i.e., taking a psychology course on aging) with a service-learning component can effectively reduce ageism as measured by the FSA. Importantly, the reduction in each of the three subscales of the FSA were significant. These results suggest that students agree less on negative age stereotypes and beliefs, avoidance of older adults, and the active discrimination against older adults after taking the course.

The current findings are consistent with the earlier studies which demonstrate that the depth of learning or the amount of exposure to aging-related information can influence the degree of change in outcome measures such as attitudes toward older adults (Angiullo et al., 1996; Dorfman et al., 2003). Short-term interventions like an age-awareness workshop (Stuart-Hamilton & Mahoney, 2003) or classroom exercises designed to dispel misconceptions of the old age (Wurtele & Maruyama, 2013) have been found to lower the Antilocution score on the FSA but not the other two subscales. A recent study also fails to find changes in the Discrimination and Avoidance subscales of the FSA after the students have taken a semester long course on adulthood and aging with a project that require the students to interact with assistant-living residents on three occasions (Andreoletti & Howard, 2018). Although these studies cannot be compared directly and future studies are needed, the significant changes on all subscales may indicate that this teaching approach with a focus on the depth of learning has the potential to affect students' attitudes toward aging as measured by the FSA to a greater extent than some approaches reported in the literature.

The contribution of this study is twofold: Firstly, it presents evidence that an undergraduate psychology class on aging can reduce ageism as measured by the FSA. The other contribution, perhaps a more important one, is that it accentuates this approach of teaching of aging to undergraduate education: integration of the goals of liberal education within the course objectives, the use of original research articles as readings, a heavy focus on research and critical thinking, and hands-on experiences outside of the classroom. Despite there being only six topics covered in the course, they are selected so that students can gain a panoramic view of aging. The relatively few number of topics allows for a focus on depth of understanding since the students have more time to think critically about each of the topics through the reading and discussion of sound empirical research and lectures. Moreover, the topics are sequenced so that the latter topics revisit the concepts discussed earlier in the course so that the students can recognize the connections between them.

Besides the course setup focusing on depth, integration of the goals of a liberal education into the course objectives may also make students more aware of the importance of humility, generosity, and

tolerance toward others including older adults, which in turn may alter some of the preconceived ideas about older adults. The Cronon's 'Only Connect . . .' model of liberal education (Cronon, 1998) is indeed introduced at the beginning of the course (the first required reading) and a class period is devoted to the discussion of the goals of liberal education (the 10 qualities that embody the values of a liberal education – e.g., #1. They listen and they hear; #6. They respect rigor so much not for its own sake but as a way of seeking truth. #9. They nurture and empower the people around them; #10. Only Connect . . .). Whenever it is appropriate, connections are made between these goals and the course content. For example, the last topic on wisdom highlights the parallels between wisdom, aging, and what a liberal education is trying to achieve – to utilize our collective wisdom to serve human freedom. This kind of connections made throughout the course may make the students see their learning of aging in a larger context and as an integral part of their liberal education, providing motivation to learn the specific contents.

## Limitations and implications

There are several methodological limitations in this study. First, the effects of curricular intervention (attending the lectures) and the service-learning component on FSA cannot be separated. There is not a control group that only takes the course but does not visit the retirement home. The studies documenting the separate effect of interacting with older adults in service-learning/high-impact learning projects do not always present consistent results (Angiullo et al., 1996; Kassab & Vance, 1999; Lytle et al., 2019), in part due to the difficulties in controlling confounding factors or the differences in the study designs. As for our study, we can only treat the effect on students' attitudes toward aging a result of the entire course (i.e., lectures and the service-learning component) until further studies with a proper control group are conducted to investigate their separate contributions. Although we cannot pinpoint which of these efforts have contributed to the significant changes in the overall FSA score and all three subscales, we suspect the emphasis on depth, connection to the goals of liberal education, and real-world application of course content in the service-learning project work together in reducing students' prejudice against older adults.

Despite that current study cannot demonstrate the separate effect of the service-learning component, it presents an option of service-learning that does not require a large amount of work to coordinate or a significant alteration of course requirements. Even though it is brief, it is still capable of providing students with an opportunity to connect the course contents to the real world through intergenerational interactions. Students would often bring up examples from their visits when relevant concepts/issues are discussed during lectures, illustrating the value of a service-learning component within a lecture-based course for translating knowledge gained from the course into an applied setting. In addition, both the end of term student evaluations and reflections in the students' project papers indicate that the students have enjoyed their visit at the retirement and a couple of students have continued their visits on their own after the end of the semester.

Another limitation of the study is lack of a control group that is taught the course by the same instructor using a method that is typically used by faculty in the Psychology Department where the study takes place (i.e., use a standard textbook and not making a deliberate effort to integrate the goals of liberal educations into the course objectives). Without data from such a control group, it is difficult to pinpoint whether it is this particular teaching approach to delivering the contents or simply being exposed to the knowledge of aging contribute to the significant changes in the FSA scores. Moreover, the students who enroll in this class is not a random sample. Although the vast majority of the students enrolled in this class (85%) are majoring in Psychology, only a fraction of them (4%) are taking it as a requirement. It is possible that these students may be more interested in aging compared to the rest of the student population prior to taking this course. It would be interesting to see whether students with other backgrounds and interests would show a similar degree of changes in their attitudes toward aging after taking the same aging course. Along the same line of concern regarding sample bias, not

every student from the class completes the pretest and posttest. It is unclear whether the significance of results would be attenuated if everyone were included in the study.

In terms of assessing outcomes, only one quantitative measure (i.e., FSA) is used in this study under the consideration of taking the least amount of instruction time away. Although FSA taps into multiple forms and different levels of ageism, there is no information about other variables that can also potentially influence ageism such as implicit attitudes toward older adults (Merz et al., 2018) or interests in working with older adults in the future (e.g., Olson, 2003). Even with FSA, the changes in its total score and subscales tell us about the changes in students' negative attitudes and beliefs against older adults, but they do not tell us how much of these changes can be translated into behavioral changes during intergenerational interactions. Some studies have cautioned that service learning may not change students' willingness to work with older adults in the future, despite that their perception and attitudes have shown positive changes after close contacts with older adults (Kassab & Vance, 1999). We also did not collect any data on the experience that the retirement home residents had with the student visits. Future research on this course design should examine the older adults' attitudes toward younger adults or other outcome measures after a one-time service-learning project within a lecture-based aging course.

There are two additional limitations that can be addressed by future studies. First, the long-term impact of taking this aging course is not clear. Evidence on the long-term influence of interventions is sparse (Funderburk et al., 2006). Follow-up studies are needed to see whether the emphasis of learning/education as a life-long process in the context of liberal education throughout the course can produce long-lasting positive changes in students' attitudes toward aging.

Finally, the effectiveness of this approach of teaching aging as an intervention to reduce ageism has not been investigated for students in the medical fields where the focus tends to be more on medical information. Future studies should test whether adding a course on aging or tweaking an existing course to focus on learning broad age-related issues and working toward the goals of a liberal education can increase the students' genuine interests in aging and decrease the chance of burnout when working with older adults in the medical fields.

## Conclusions

Despite these methodological limitations, the strength of this study stems from the design of the course in its ties to the liberal education and efforts of building a comprehensive understanding of fundamental topics in aging and an enduring curiosity of the aging process. The use of the goals of a liberal education specified in Cronon's 'Only Connect . . . ' (Cronon, 1998) as a framework let the students see the importance of learning about aging, the necessity of having science in understanding aging, and the ultimate human needs of making connections. The service-learning component of the project can also be adopted in any aging course without compromising the amount of time in the classroom. Given the aging population (e.g., He et al., 2016) and age segregation (e.g., Winkler, 2013) are growing, such service learning may not only be feasible but necessary. It may spark interests and become a starting point for the students to consider working with older adults. As ageism exists widely and cross-culturally (Lin & Bryant, 2009) and has only been exacerbated since the COVID-19 pandemic (e.g., Swift & Chasteen, 2021), the findings from this study may present a helpful tool that can be added to our toolbox to combat ageism through teaching and learning about the journey of aging in the context of a liberal education.

## Disclosure statement

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