

Original Research

Active Aging for L.I.F.E.: An Intergenerational Program for Addressing and Changing Attitudes Toward Longevity

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Abstract

The global population of adults 65 years of age and older will increase dramatically over the next several decades, presenting economic and social challenges requiring sustainable solutions. Aging is a process in which everyone is already involved, it is a lifelong experience not just a later life occurrence. Changing world demographics illustrate that people are living longer, among the world's young people, survival to age 80 is expected to be commonplace. This new found "longevity dividend" needs to be maximized and enjoyed. Increased longevity and worldwide aging are constantly in the public view, yet preparing people for this long life has received little attention. People need to be prepared to live a long life in an aging world and one way to achieve this is through aging education. Aging education across the lifespan can prepare people for the long life ahead of them, promote aging with optimism, and combat ageism. This paper reports on the Active Aging for L.I.F.E. four-part education program which was shared with 91 high school students. The program brought the domains of Longevity, Independence, Fitness and Engagement to the high school students through an intergenerational team of older adults and college age students, using an experimental design to test the outcomes in student perceptions of their own longevity in the context of the L.I.F.E.



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programming. The treatment group findings showed that the students perceptions about aging and longevity were impacted. In addition, written responses reflected the value of the programming through participant understanding of the impact of lifestyle, diet and social interaction on successful aging through the lifespan.

Keywords

Longevity; active aging; intergenerational program; healthy aging

1. Introduction

The global population of adults 65 years of age and older will increase dramatically over the next several decades, presenting economic and social challenges requiring sustainable solutions [1]. Aging is a process in which everyone is already involved, it is a lifelong experience not just a later life occurrence. Changing world demographics illustrate that people are living longer, among the world's young people, survival to age 80 is expected to be commonplace [2]. This new found "longevity dividend" needs to be maximized and enjoyed. Increased longevity and worldwide aging are constantly in the public view, yet preparing people for this long life has received little attention. People need to be prepared to live a long life in an aging world and one way to achieve this is through aging education. Aging education across the lifespan can prepare people for the long life ahead of them, promote aging with optimism", and combat ageism [3, 4]. This paper reports on the Active Aging for L.I.F.E. four-part education program which was shared with 91 high school students in a mid-western town. The program brought the domains of Longevity, Independence, Fitness and Engagement to the students through an intergenerational team of older adults and college age students [5]. Through an experimental research design, a treatment group engaged in the 4 sessions with the intergenerational interactions. The control group received a brochure which covered the same content, but without the interaction. Each group participated in a pre/post survey and there were several statistically significant findings. In particular, the topics of longevity and active aging were perceived to be more relevant to those students who engaged in the intergenerational sessions.

1.1 Longevity Today

As people age, health is determined by patterns of living, exposures and opportunities for health protection over the life course. Thus, the health of older persons should be viewed in the context of the whole of life [6]. The average life expectancy in the U.S. has steadily risen over the past century and never before in human history have adults had so many years of life [7]. Moreover, advances in the treatment of age-related chronic diseases have resulted in a great extension of years of disability-free life expectancy [8].

The longevity we witness today at a global level is a revolution. The implications of this process transcend the individual dimension and impact the legal, health, education, culture, labor, social services and social security sectors. Longevity also has a retroactive effect, with impacts on all stages of life: it is not a further thirty years of old age, but a further thirty years of life [9].

1.2 Adjusting Norms on Longevity

Yet despite the medical advances that allow for a longer life, changing the current narrative on aging with its focus on loss and decline is not an easy task because societal and personal views of aging are extremely entrenched [10]. In terms of personal views of aging, individuals internalize negative age stereotypes from the surrounding culture from an early age [11]. These negative age stereotypes become increasingly self-relevant in midlife and later adulthood and become dangerous because they undermine individuals' behavior in the form of negative self-stereotypes [10].

Two major constructs have been considered when trying to explain why some people live longer and more healthily than others: genetic or intrinsic components (i.e., biomedical) and environmental or extrinsic factors both have been the subject of research interest and investment in empirical studies. These two types of factors are not mutually exclusive and their mutual interactions considered [12]. Thus, socio-environmental and personal conditions must be considered separately but also in interaction. There is a broad corpus of research literature supporting the importance of psycho-behavioral (PB) factors intervening in the ways of aging, specifically intelligence and cognitive functioning, positive emotion and control, personality traits, psychosocial, physical conditions, and lifestyles, all of which are highly associated with health, longevity, and survival. The importance of these factors accounting for longevity, and successful longevity must be taken into consideration as a pending issue in gerontology [13].

1.3 Active Aging

Thus, the question becomes: How can a new narrative on aging, consistent with the previously presented research findings, be developed and promoted to benefit of individuals and the larger society? Negative views of aging are dangerous because they are associated with a host of negative outcomes and they keep individuals from engaging in health promoting behaviors [14]. Because of this overall situation, a new narrative on aging is needed. The main purpose of this new narrative on aging is to show individuals the choices and opportunities they have without downplaying the challenges that accompany the process of growing old(er) [10].

To address issues that come with aging, a growing and diverse number of initiatives worldwide have been developed within an active aging framework, adopted by the World Health Organization (WHO) in the late 1990s and in 2002, the Active ageing: A policy framework was released which defined active aging as the process of optimizing opportunities for health, participation and security to enhance quality of life as people age [15]. In this policy framework, six key active aging principles were laid out including: 1) economic determinants, 2) health and social services, 3) behavioral determinants, 4) personal determinants, 5) social determinants, and 6) physical environment [15].

In order to promote and increase active or successful aging, several intervention programs have been developed, most of which have been tested by researchers and academics, while political efforts at different levels have also been planned by national and international organizations. Researchers have recently reviewed the programs which have been evaluated so far and emphasized that those which were more multidimensional and took psycho-behavioral actions into account yielded better results [16-19]. Examples of programming developed within the active aging framework include the "I am Active" program, addressing the domains of physical activity, nutrition, cognitive performance, and quality of life among adults 60 years and above [20]. Similarly, the "Vital

Aging” program framework includes cognitive and physical functioning, affect and control, and social participation for older adults [21].

1.4 Intergenerational Programming

A focus on longevity involves adopting a life trajectory perspective. The youth of today will be the older adults of tomorrow. To understand older adults, we must look back at how they led their lives to become the people they are today. Therefore, it is essential to consider the determinants of active aging: access to social and health services; behavioral (lifestyles); personal (genetic, hereditary and personality); environmental; social and economic. These aspects are interdependent, according to every culture and gender perspective [9].

While many active aging programs have been developed nationally and internationally over the past few decades, few address the concept as it relates to individuals in the more recent generational cohorts including Generation X (1965-1980) and the Millennial Generation (1981-2000) [22]. One of the few examples of such a program is the Optimal Aging Program at the University of Arizona College of Medicine. This longitudinal mentoring program paired students with older adults who were successfully aging. The program goals were to provide students with opportunities to develop relationships with an older adult and to expand the students’ perceptions of the aging process [23]. The intergenerational relationship also includes an ethical dimension that characterizes social cohesion for societies, reached by guaranteeing security for all citizens, not only those able to produce a financial contribution [24]. Against this background, the growth of intergenerational practice has emerged as a medium for intensifying generational proximity, developing acceptance and communication, fostering dedication to reciprocity and solidarity, and for building bridges across generations [25, 26].

Intergenerational programs which promote activities that bring together two generations for mutually rewarding purposes, are potentially an answer to the above challenges and represent the medium for the exchange of resources, knowledge, skills, attitudes and values among older and younger generations [27]. The number and variety of programs have proliferated, as program planners in both the youth development and aging sectors have recognized the benefits for both youth and older participants. Thus, intergenerational programs build on the positive resources that different generations have to offer each other and are an effective way to address such key priorities as building active communities, promoting citizenship, regenerating social bonding and addressing inequality. The concept of intergenerational learning, however, has not been well-integrated into theory and research [28].

1.5 Active Aging for L.I.F.E.

In 2016, an interdisciplinary group of researchers at Oklahoma State University developed the Active Aging for L.I.F.E. pilot program for college-age students and older adults age 65+ [5]. The Active Aging for L.I.F.E. program added the L.I.F.E acronym to the World Health Organization’s active aging framework and the program was delivered in four modules covering longevity, independence, fitness and engagement to participants in a group setting once a week for a four-week period [29]. The general topics within these modules included but were not limited to:

Longevity – The domain of longevity relates to the fastest growing age group globally, which is 60 and older and this population is expected to more than double to 2 billion in 2050. Data from the

World Health Organization indicates that while healthy aging begins at birth with our genetic inheritance, only about 25 percent of longevity can be explained by genetic factors [30]. The rest is tied to social, personal and physical internal and external factors which account for long life, including nutrition, physical activity, healthy eating and drinking, increased education levels, improved standards of living and better health in early years [29, 30]. This module focuses on the Blue Zones of the world where older adults live well into their 80s and 90s relatively disease free due to their cultural practices in health and wellness through social engagement, diet and exercise.

Independence – The domain of independence in active aging relates to appropriate physical environments, which are accessible and provide for individual independence. Maintaining autonomy and independence as one ages is a key goal for older adults, yet the topic of interdependence is also important as individuals who reciprocate their shared experiences and capabilities to help friends and their family maintain the ability to have personal control over their routines [29, 31].

Fitness – The domain of fitness in active aging relates to intersections and strategies for physical and cognitive health throughout the lifespan. A fitness focus recognizes and capitalizes on the experience and personal strengths of individuals, while helping them improve their physical and psychological well-being across the life course through an understanding of the relationships between cognitive health, nutrition, physical activity, managing body mass index (BMI) and cardiovascular health [29, 32].

Engagement – The domain of engagement relates to productive and fulfilling engagement that meets community needs through service and support coordination, including volunteer programs, church and places of worship and life-long learning opportunities. Social interaction and support are important components of active aging, highlighting the relevance of social networks, connection versus isolation, as well as interdependence through family ties, spirituality and volunteerism. Contribution to all areas of community life through volunteering, employment options and civic participation allow for a sense of long-term inclusion [29, 33].

Intergenerational programs offer tools that have attracted researchers to explore strategies that decrease ageism in the population, and have subsequently been used to establish and reinforce social unification for different generations [34]. Objectives of intergenerational programs include cultivating bonded relationships across generations [35, 36], reducing culturally prescribed ageist stereotypes [37], bringing together generations to solve difficult social problems together [38], bridging the gap between perceived generational dissonance [39], and constructing a common understanding of individual and social identity [40].

Following a series of focus groups delivered to participants following the original Active Aging for L.I.F.E. series, a group of the older adults and college-age students who had been through the program were invited to take the program to students at a local high school as a team of L.I.F.E. leaders. This paper describes the outcomes from this pilot study examining a selective sample of high school students, using control group and test group design, and measures the pretest/posttest attitudes towards aging and knowledge/awareness of the four L.I.F.E. domains (Longevity, Independence, Fitness, and Engagement) of these two groups prior to and following the Active Aging for L.I.F.E. programming. The content was delivered by the L.I.F.E. leaders and measures included improving attitudes about the aging process and education about positive lifestyle choices across the lifespan.

2. Methods

This study used a pre/post survey measurement tool for the quantitative evaluation of the effectiveness of the L.I.F.E. Active Aging program in changing aging attitudes and behaviors between a control group and a treatment group of high school students. L.I.F.E. leader teams of older adults 65+ and college age students delivered the L.I.F.E. components promoting active aging through videos, articles, group discussion and reflective journaling in a local high school classroom. Sessions took place twice per week (each lasting 1.5 hours) for two weeks. The intervention took place over three different classes with the L.I.F.E. leader teams leading the majority of the sessions. All presentations, videos and discussion with the L.I.F.E. leader teams took place in this location. The three classes of students made up the treatment group and one class of students was the control group of high school students who did not participate in the program nor engage in any intergenerational discussions. The control group was given a pamphlet about the Active Aging for L.I.F.E. program to learn on their own about the active aging principles, and were then given the same pre-/post test survey as the treatment group. The pre-/post test survey was completed on the same day as treatment group.

An information letter and informed consent was sent home with all of the students requesting that they take part in the study. Students who did not wish to take part were given separate tasks by their instructor during the time that the study took place. Those who chose to participate signed an informed consent along with a signature from their parents.

All students were asked to voluntarily respond to a printed questionnaire. No names were recorded, as each group and student was pre-assigned to an anonymous combination of numbers and letters, coded ahead of time, so that the pre-surveys and post-surveys of each participant was accounted for. Students had the choice to participate or opt out of the study with no consequences, and their responses were not tied to their class performance in anyway. The project was approved by the Institutional Review Board at Oklahoma State University, which was the institution of employment for all of the researchers involved in this study.

2.1 Participants

A total of 91 students agreed to take part in the study (treatment, $n = 60$; control, $n = 31$). The age range for the entire group was 15-18 years old along with one 20 year old. The mean age in both groups was 17.53%. 46% of the participants in the treatment group were female and 54% were male. In the control group 53% of the participants were male and 47% female.

70% of the treatment group population were Caucasian. 10 of the treatment group students were American Indian, 3 were Asian, 2 were Hispanic and 2 were African American. 83% of the treatment group population were Caucasian, 3 were Hispanic, 1 was African American and 1 was American Indian. A total of 84 participants completed both the pre-test (treatment, $n = 52$; control, $n = 31$) and post-test questionnaires.

2.2 Instruments

Survey questions were developed based on the insights derived from the literature review, aiming to assess attitudes towards aging and personal health-consciousness. The Attitudes to Aging Questionnaire (AAQ) and Aging Perceptions Questionnaire (APQ) were pivotal in shaping the

questionnaire for this study. The AAQ includes a 24-item scale of self-reported measures that encompass both the gains and losses in two areas of aging: 1) attitude toward aging overall, and 2) attitude toward aging from personal experience [41]. The APQ includes a 35-item scale of self-reported measures that include associated health factors related to an individual's self-perception of aging, level of physical capabilities and assessments of psychological health [42]. A subset of 24 survey questions were chosen from the AAQ and APQ questionnaire using subjective selection criterion.

Selected items from these scales were adapted to align with the specific objectives of this study. For each of the 24 items, participants were asked to mark the degree to which they agreed with the survey question using a 5-point Likert scale that ranged from (1) "Strongly Agree" to (5) "Strongly Disagree." The surveys also asked participants to provide standard demographic information (age, ethnicity, grade level), as well as specific demographic characteristics that have been associated with attitudes toward older adults such as relationships with older family members [43]. In addition in the post survey an open ended question asked students to comment on the impact of the 4 sessions and what they would change in their life moving forward.

2.3 Data Analysis

The data analysis for this study was performed in two parts, (1) exploratory factor analysis and (2) repeated measures of ANOVA. The exploratory factor analysis (EFA) was conducted to elucidate the underlying factor structure of data. Survey responses from 60 subjects who participated in the pre-training phase were chosen and analyzed. Prior to conducting the EFA, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was computed, yielding a value of 0.7, indicating that the dataset was suitable for factor analysis. Additionally, Bartlett's Test of Sphericity was statistically significant ($p < 0.05$) thereby supporting the appropriateness of conducting factor analysis on the dataset. The EFA was performed using the extraction method of Principal axis method with Promax Rotation. Cross loadings were examined and coefficients below 0.4 were suppressed. A total of three factors were extracted and labeled as (1) Attitudes towards aging as gain (ATAG), (2) attitudes towards aging as loss (ATAL) and (3) personal health-conscious level (PHCL). The reliability of each factor was assessed using Cronbach's alpha, demonstrating satisfactory internal consistency for all the factors (0.68-0.7). In the current study, the Cronbach's alpha value for our sub-factors was found to be 0.68-0.7. While this value is slightly below the commonly cited threshold of 0.7 for acceptable reliability [44], it's essential to interpret this value within the context of our research. Nunnally (1978) further emphasized that for early stages of research or exploratory studies, a reliability coefficient of 0.5 to 0.6 could be deemed acceptable.

Following the EFA, a repeated-measures Analysis of Variance (ANOVA) was conducted to assess changes between the treatment and control groups. Here, the group assignment served as the between-subject factor, while the pre-post-training measurements were considered within-subject factors. The treatment group comprised 52 subjects and the control group had 31 subjects. The dependent variables under consideration were the scores associated with the three identified factors (ATAG, ATAL and PHCL). In the event of significant interactions, a post hoc simple effect test (Tukey's) was administered. Statistical analyses were executed using JASP 0.17.3, and a significance threshold of $p < 0.05$ was used.

3. Results

The EFA revealed three distinct factors: (1) Attitudes towards Aging as Gain (ATAG), (2) Attitudes towards Aging as Loss (ATAL), and (3) Personal Health-Conscious Level (PHCL). Table 1 shows the loadings of the 14 items (out of the 24 survey questions) utilized for measurement. Table 2 shows the correlation among the three sub-factors. The outcome scores for each factor (attitude) were computed by averaging the item scores for individual subjects. Descriptive statistics of the attitude scores are presented in Table 3.

Table 1 Factor Loadings and of individual items determined using EFA.

	PHCL	ATAG	ATAL
My actions have an impact on the quality of my relationships.	0.911		
Taking care of myself will allow me to live a long life	0.779		
Brain exercise is as important as physical exercise for my well-being	0.737		
Regular physical exercise is part of an active lifestyle	0.427		
Wisdom comes with age		0.673	
As I get older, I continue to grow as a person		0.568	
It is a privilege to grow old		0.531	
The older I get, the more accepting I am of myself		0.460	
How long I live is important to me		0.442	
Aging restricts involvement in society			0.580
Aging leads to a loss of independence			0.522
I expect that as I get older I will spend less time with friends and family			0.517
My independence is supported by where I live			0.492
In general, aging is a time of loss			0.454

Table 2 Factor Correlations.

	PHCL	ATAG	ATAL
PHCL	1.000	1.000	-0.078
ATAG	0.517	0.517	-0.058
ATAL	-0.078	-0.078	1.000

Table 3 Attitude Scores.

ATAL	Group	N	Mean	SD
Pre	Control	31	3.31	0.508
	Treatment	52	3.269	0.711
Post	Control	31	3.387	0.73
	Treatment	52	2.838	0.681
PHCL	Group	N	Mean	SD
Pre	Control	31	1.493	0.563
	Treatment	52	1.356	0.382
Post	Control	31	1.464	0.495

	Treatment	52	1.426	0.507
ATAG	Group	N	Mean	SD
Pre	Control	31	1.929	0.494
	Treatment	52	1.912	0.601
Post	Control	31	1.968	0.834
	Treatment	52	1.742	0.476

The repeated-measures ANOVA showed significant differences under the factor ATAL for the following, (a) between the groups ($F = 4.68$, $df = 1$, $p < 0.03$, $\eta^2 = 0.042$), (b) treatments ($F = 6.74$, $df = 1$, $p < 0.01$, $\eta^2 = 0.015$), and (c) significant interaction between the groups and treatment ($F = 13.94$, $df = 1$, $p < 0.001$, $\eta^2 = 0.031$). Post hoc Tukey’s test indicated significant differences between the pre-control and post-treatment groups ($p < 0.013$), as well as between the pre- and post-treatment groups ($p < 0.001$). This suggests a notable shift in participants’ attitudes towards aging as a loss possibly because of the program participation. No significant differences were observed for ATAG or PHCL. Despite the absence of statistical significance, it is noteworthy that the post-treatment ATAG scores leaned towards a positive attitude, registering at 1.742. This underscores the program’s positive impact on the participants.

As addressed earlier in the literature review, ambivalence toward aging can lead individuals to engage in negative behaviors that are harmful to their health later in life. Creation of programming influencing young adults to consider all aspects of the aging process may have them consider how their current behaviors might have on them now and across the lifespan. This programming appeared to achieve this level of awareness and understanding for the students.

In addition to the quantitative findings, the feedback to the open-ended question on the post survey about the changes that participants would like to implement in their lives were enlightening. The text answers were addressed through content analysis to find common themes. A total of 25 students from the treatment population answered the open-ended question and many described being more aware of the life course and longevity as it related to themselves and to the current older adults in their lives. A female 17 year old student wrote, “I will pay attention to my level of activity to ensure that when I get older I will be able to keep my independence for as long as possible. Another female 18 year old student wrote, “I will consider my parents and grandparents as they age and how I can help them to be comfortable and independent and still get the care they need.” Other students wrote about health specific behaviors that they hope to change in their life. A male student age 16 wrote, “I will pay more attention to my health, I hope I can take care of my body now, it will be better when I’m older.” Similarly, a female student age 18 wrote, “Eating a proper diet, food safety, maintaining a healthy life now can affect your health mentally and physically in the future.” And finally, the psychosocial aspect of the intergenerational group dynamics were expressed by a female student age 16 who wrote, “The most important thing I would take away for these presentations is getting to talk to different age groups and hearing about their life.”

4. Discussion

This study provided some evidence that engaging with and educating high school students about factors of longevity in aging through the Active Aging for L.I.F.E. framework can change their

attitudes and perceptions at an early age. The potential to change one's attitude towards a subject is an important point to note, as previous research has shown that this is a crucial first step when attempting to shift an individual's behavior [45]. Through intergenerational programming such as the Active Aging for L.I.F.E. framework, the negative behavioral, psychological, and societal stereotypes about aging can be addressed by constructing a health education program that produces the outcome of empathy about older adults and the aging process in young students. Education curriculum like this, along with interacting with a diverse range of generations, can provide students with new perspectives on aging through experiential learning which may influence them to engage in behaviors that positively affect their own aging process.

The potential impact of this health education program was demonstrated in statistically significant findings in this study, especially in the differences between the control group and treatment group responses. Topics on aging were became more relevant to those who engaged in the sessions than those who did not, providing evidence for how these programs may affect younger individuals' attitudes toward the topic overall.

Additionally, increasing the relevance of topics relating to longevity for young adults is the first step in addressing the severe negative effects that come from ageism and eliminating the pervasive cultural stereotypes toward older people. Beyond the obvious factor of when one was born, the dissonance between generations is often simply due to a lack empathy or relevant understanding for how the other sees the world. The ability to sit with individuals from multiple generations and discuss topics relating to healthy living across the life course may help break the perpetual cycle that carries ageism through a culture. These ageist attitudes have implicit consequences that ultimately manifest themselves explicitly through social withdrawal, physical deterioration, or cognitive decline. The findings from this study suggest that intentional intergenerational programs which bring together generations to discuss new topics have the potential to break this cycle. High school students are open and happy to speak with older adult when given the opportunity, and as one female student pointed out, "I would like to not try to grow up so fast and would like to spend more time talking to my grandparent more." The findings between the treatment group and control group provide some empirical support in this health education program's ability to effectively influence high schoolers' ambivalent attitudes toward longevity and aging in a positive direction. The qualitative data supports this and brings a deeper understanding to how the intergenerational programming helps students gain a better appreciation regarding the prospect and expectations of living into their 90's, 100 as well as their empathy, understanding and connection with the older adults who are currently in their life.

5. Conclusion

The Active Aging for L.I.F.E. initiative supports an intergenerational approach to sharing information on healthy aging and longevity across the lifespan. Research associated with this type of mentoring community education programs can advance our knowledge of discovering effective solutions to the pressing issues that align with longevity and the related societal issues. Through empirical evidence and easy to understand, validated frameworks, the best solutions can be practically applied so that new social structures are thoughtfully realigned for all generations.

This study supports the findings of many others in recent literature, that when similar programs are introduced early in life, both the young and older generational cohorts are given the opportunity

to better reflect on their own attitudes and behaviors towards aging well throughout life [26, 27]. Additionally, prioritizing this metacognitive process on an important topic and further intergenerational studies are needed to understand how education of youth about the importance of active aging throughout life promotes awareness around the topics relating to longevity. In addition, programs such as Active Aging for L.I.F.E. may be important factors in fostering intergenerational understanding to combat ageist attitudes and stereotypes as young adults make their way into adulthood.

In Oklahoma, where adults 65 years of age and older represented 14.5% of the state's population and where the majority of counties are rural, the Active Aging for L.I.F.E. program may be promoted through county extension offices, community centers, and in public schools to provide education for improved health and wellness outcomes across the generations. Introduced early in life, similar programs could encourage the young adult cohort not only to reflect on their attitudes and behaviors in their own life course, but also to develop coping skills essential for addressing projected future demographic changes [46]. For participating older adults, having the opportunity to interact with young adults, as well as individuals within their own cohort, may in itself provide greater coping skills, purpose and engagement.

Limitations to this study include a small sample size and a sample population not previously aware of many of the topics previously. In addition, further work will be needed to develop the L.I.F.E. leader teams which are structurally sustainable to adjust to retention of the team due to differing levels of life responsibilities. It would be beneficial to also survey the L.I.F.E. leader teams to better understand the impact of their participation in the programs and suggestions for improvement of the team structure.

While the study provides preliminary evidence of the validity of the newly developed measure, the lack of concurrent validity is a notable limitation. The study did not assess the concurrent validity of the developed in-house measure. To address this limitation, future studies should incorporate concurrent validity as a measure of validity. This involves administering both the new measure and an established measure to a representative sample of participants simultaneously, measuring their scores, and calculating the correlation coefficient to evaluate the degree of similarity. By implementing these recommendations, future studies can effectively address the limitation of not using concurrent validity and strengthen the credibility and applicability of the measure for its intended purpose.

Future studies could include delineating a broader range of interactive modules and topics relating to how independence and interdependence, fitness and engagement are key factors in human longevity. This can help the programming adapt to diverse learning styles in order to encourage long-term behavior change. The programming may also be beneficial in workforce training for a generation of emerging adults who will be the future generation of gerontological service providers and geriatric healthcare practitioners interacting with an older population in the future. Longitudinal examination of the impact of participation in the initiative over time will also be an important way to gauge which approaches are most effective and which need improvement or replacement. Yet, despite these gaps in knowledge, it appears that the Active Aging for L.I.F.E. initiative serves as an effective tool in addressing intergenerational perceptions and behaviors around longevity in an aging society.

Author Contributions

Dr. Roberts was responsible for the project development and data collection. Dr. Clare was responsible for the paper development and preliminary data analysis. Dr. Balasubramanian was responsible for the final data analysis. Dr. Button helped with general formatting of the paper.

Competing Interests

The authors have declared that no competing interests exist.

References

1. Guesh JS. Aging of the world's population. In: *The Wiley Blackwell Encyclopedia of Family Studies*. New York, NY: Wiley; 2016. pp. 1-5.
2. United Nations. World Population Ageing 2015: Highlights [Internet]. New York, NY: United Nations; 2015. Available from: https://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Highlights.pdf.
3. Crawford PA. Focus on elementary: Rock of ages: Developing healthy perspectives of aging in the elementary grades: Patricia A. Crawford and April Mattix Foster, editors. *Child Educ*. 2015; 91: 395-401.
4. McGuire SL. Aging education: A worldwide imperative. *Creat Educ*. 2017; 8: 1878-1891.
5. Roberts E, Bishop A, Ruppert-Stroescu M, Clare G, Hermann J, Singh C, et al. Active aging for LIFE. *Top Geriatr Rehabil*. 2017; 33: 211-222.
6. Clare G, Roberts E, Jayadas A, Hebert P. Lessons learned from the active aging for LIFE intergenerational programming: College-age student and older adult 65+ focus group perspectives. *J Intergener Relatsh*. 2019; 17: 220-233.
7. Crimmins EM. Lifespan and health span: Past, present and promise. *Gerontologist*. 2015; 55: 901-911.
8. Crimmins EM, Zhang Y, Saito Y. Trends over 4 decades in disability-free life expectancy in the United States. *Am J Public Health*. 2016; 106: 1287-1293.
9. Kalache A. Coping with the longevity revolution. *Cien Saude Colet*. 2014; 19: 3306.
10. Diehl M, Smyer MA, Mehrotra CM. Optimizing aging: A call for a new narrative. *Am Psychol*. 2020; 75: 577-589.
11. Levy B. Stereotype embodiment: A psychosocial approach to aging. *Curr Dir Psychol Sci*. 2009; 18: 332-336.
12. Fernández-Ballesteros R, Sánchez-Izquierdo M. Are psycho-behavioral factors accounting for longevity? *Front Psychol*. 2019; 10: 2516.
13. Bandura A. Social foundations of thought and action: A social cognitive theory Englewood Cliffs, NJ: Prentice-Hall. In: *The Health Psychology Reader*. London: SAGE Publications; 2002. pp. 94-106.
14. Levy BR, Myers LM. Preventative health behaviors influenced by self-perceptions of aging. *Prev Med*. 2004; 39: 625-629.

15. World Health Organization. Active aging: A policy framework [Internet]. Geneva: World Health Organization; 2002 [cited date 2018 January 25]. Available from: http://apps.who.int/iris/bitstream/10665/186463/1/9789241599979_eng.pdf.
16. Caprara MG, Mendoza NM. Promoting successful aging. In: Cambridge handbook of successful aging. New York, NY: Cambridge Press; 2019.
17. Christophorou C, Kleanthous S, Georgiadis D, Cereghetti DM, Andreou P, Wings C, et al. ICT services for active ageing and independent living: Identification and assessment. *Healthc Technol Lett*. 2016; 3: 159-164.
18. Arai H, Ouchi Y, Yokode M, Ito H, Uematsu H, Eto F, et al. Toward the realization of a better aged society: Messages from gerontology and geriatrics. *Geriatr Gerontol Int*. 2012; 12: 16-22.
19. Willie-Tyndale D, Holder-Nevis D, Mitchell-Fearon K, James K, Laws H, Waldron NK, et al. Participation in social activities and the association with socio-demographic and health-related factors among community-dwelling older adults in Jamaica. *J Cross Cult Gerontol*. 2016; 31: 427-447.
20. Mendoza-Ruvalcaba NM, Arias-Merino ED. "I am active": Effects of a program to promote active living. *Clin Interv Aging*. 2015; 10: 829-837.
21. Caprara M, Molina MÁ, Schettini R, Santacreu M, Orosa T, Mendoza-Núñez VM, et al. Active aging promotion: Results from the Vital Aging Program. *Curr Gerontol Geriatr Res*. 2013; 2013: 817813.
22. Keeter S, Taylor P. The millennials [Internet]. Washington, DC: Pew Research Center Publications; 2009. Available from: <http://www.pewsocialtrends.org/files/2010/10/millennials-confident-connected-open-to-change.pdf>.
23. Sikora S. The University of Arizona College of medicine optimal aging program: Stepping in the shadows of successful aging. *Gerontol Geriatr Educ*. 2006; 27: 59-67.
24. Walker A. The emergence and application of active aging in Europe. In: *Soziale Lebenslaufpolitik*. Wiesbaden: VS Verlag für Sozialwissenschaften; 2010. pp. 585-601.
25. Feldman SE. Intergenerational program: Towards a society for all ages. *J Intergener Relatsh*. 2008; 6: 485-487.
26. Hatton-Yeo A, Batty C. Evaluating the contribution of intergenerational practice to achieving social cohesion. In: *Promoting social cohesion*. Policy Press; 2011. pp. 242-257.
27. Hatton-Yeo A, Ohsako T. Intergenerational Programmes: Public Policy and Research Implications--An International Perspective. ERIC; 2000; ED458364.
28. Baschiera B, Karl P, Harry Y. Building a Community Legacy Together (BCLT)--An intergenerational program for youth and older adults aimed at promoting a more equitable society. *Encyclopaedia*. 2019; 23: 29-41.
29. Roberts E, Ruppert-Stroescu M, Bishop AJ, Clare G, Hermann J, Struckmeyer K, et al. Assessing outcomes for the intergenerational active aging for life public health initiative. *Innov Aging*. 2017; 1: 126-127.
30. World Health Organization. Global recommendations on physical activity for health [Internet]. Geneva: World Health Organization; 2010 [cited date 2018 January 25]. Available from: https://iris.who.int/bitstream/handle/10665/44399/9789241599979_eng.pdf?sequence=1.
31. Bronstein L, Gellis ZD, Kenaly BL. A neighborhood naturally occurring retirement community: Views from providers and residents. *J Appl Gerontol*. 2011; 30: 104-112.

32. World Health Organization. World report on ageing and health [Internet]. Geneva: World Health Organization; 2015 [cited date 2018 January 25]. Available from: https://iris.who.int/bitstream/handle/10665/186463/9789240694811_eng.pdf?sequence=1.
33. Lubben J, Gironda M. Measuring social networks and assessing their benefits. In: Social networks and social exclusion: Sociological and policy perspectives. Farnham, UK: Ashgate Publishing; 2004. pp. 20-34.
34. Vieira S, Sousa L. Intergenerational practice: Contributing to a conceptual framework. *Int J Lifelong Educ.* 2016; 35: 396-412.
35. Greengross S. Intergenerational programs as a global approach to social issues. *J Intergener Relatsh.* 2003; 1: 11-13.
36. Jarrott SE. Where have we been and where are we going? Content analysis of evaluation research of intergenerational programs. *J Intergener Relatsh.* 2011; 9: 37-52.
37. Swift HJ, Abrams D, Lamont RA, Drury L. The risks of ageism model: How ageism and negative attitudes toward age can be a barrier to active aging. *Soc Issues Policy Rev.* 2017; 11: 195-231.
38. Holmes CL. An intergenerational program with benefits. *Early Child Educ J.* 2009; 37: 113-119.
39. Seedsman T. A mosaic of contemporary issues, insights, and perspectives surrounding intergenerational practice. *J Intergener Relatsh.* 2013; 11: 347-355.
40. Cook G, Bailey C. Older care home residents' views of intergenerational practice. *J Intergener Relatsh.* 2013; 11: 410-424.
41. Laidlaw K, Power MJ, Schmidt S. The attitudes to ageing questionnaire (AAQ): Development and psychometric properties. *Int J Geriatr Psychiatry.* 2007; 22: 367-379.
42. Barker M, O'Hanlon A, McGee HM, Hickey A, Conroy RM. Cross-sectional validation of the Aging Perceptions Questionnaire: A multidimensional instrument for assessing self-perceptions of aging. *BMC Geriatr.* 2007; 7: 9.
43. Yamashita T, Kinney JM, Lokon EJ. The impact of a gerontology course and a service-learning program on college students' attitudes toward people with dementia. *J Appl Gerontol.* 2013; 32: 139-163.
44. Nunnally JC. *Psychometric theory.* 2nd ed. New York: McGraw-Hill; 1978.
45. Faria D, Dauenhauer JA, Steitz DW. Fostering social work gerontological competencies: Qualitative analysis of an intergenerational service-learning course. *Gerontol Geriatr Educ.* 2010; 31: 92-113.
46. Mock SE, Eibach RP. Aging attitudes moderate the effect of subjective age on psychological well-being: Evidence from a 10-year longitudinal study. *Psychol Aging.* 2011; 26: 979.