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Introduction

Discrimination (the unjust or prejudicial treatment of different categories of people) has become a major problem in society, leading to oppression and silencing of oppressed groups (Aosved, Long, & Voller, 2009). Ageism is a type of discrimination based on a person's age which can lead to intolerance and judgement. For the most part, "isms" refer to individuals distinctly different from another; however, age is a fluid construct, experienced by everyone as they grow older. This transition from the in-group of youth to the out-group of old age sets ageism apart from other "isms" (Sargent-Cox, 2016). It is predicted that by 2050 the world's population of people aged 60 and older will reach nearly 2 billion, making ageism an increasingly important issue (Officer et al., 2016).

With the increase in the number of older adults (adults aged 60 and older) in society, it becomes increasingly important to understand the correlates of negative attitudes toward the elderly (Kalavar, 2001). Ageist beliefs affect the health of older adults and the quality of healthcare older adults receive. Often with increasing age, physical and cognitive decline are common, and internalization of these ideas can lead to a decreased will to live, depression, poorer health, and increased feelings of loneliness in older adults (Sargent-Cox, 2016). In healthcare, older adults with problems that could be treated with medication are often ignored and their problems are considered a natural part of the aging process. Those that need home healthcare, often, face abuse and neglect rather than receive the personal care they need to maintain good health (Levy & Macdonald, 2016). Ageism is not only present in healthcare but is common in the workplace as well, where older adults often face negative treatment in the general work environment, less access to salary increases and promotions, forced early retirement, and discriminatory practices in hiring (Levy & Macdonald, 2016). Ageism affects older adults health, the healthcare they receive, and the workplace.

Ageism is largely unexplored, specifically evidence-based interventions that positively and effectively reduce ageist attitudes (Palmore, 2015). Efforts have been made to reduce ageism including increased knowledge about older adults and increased exposure to older adults (Samra & Griffiths, 2013; Duerson, Thomas, Chang, & Stevens, 1992). Other researched intervention methods include aging progression software, promotion of positive attitudes, and intergenerational learning experiences (Rittenour & Cohen, 2016; Halpin, 2015; Powers, Gray, & Garver, 2013). The use of aging simulation (the action of imitating or pretending to be an older adult) is one largely unexplored intervention for reducing ageist attitudes. Aging simulation can be achieved through an aging suit, which is comprised of mechanisms to limit range of motion/mobility, and impair balance, posture, hearing, and eyesight, as well as simulate weight gain. An aging suit may contribute to reduced ageist attitudes by allowing young and middle-aged adults to experience the physical limitations often faced by older adults.

An aging suit can simulate an older age, however more tests could be helpful in determining the effect this technique has on attitudes towards older adults. The Senior Fitness Test (SFT) is a method of assessing the physical fitness of older adults. It consists of six tests assessing upper and lower body strength, aerobic capacity, flexibility, and balance (Todde & Melis, 2016). The Short Physical Performance Battery (SPPB) is used to assess lower extremity fitness and balance (Pavasini &Guralnik, 2016). The SFT and SPPB performed in an aging suit could create an experiential learning experience (learning through reflection on an experience) for young and middle-aged adults. Reflection on the experience of simulated older age by adults who wear an aging suit may have an effect on their attitudes towards older adults. The Aging Semantic Differential (Rosencratz & McNevin, 1969), a scale developed to measure ageist attitudes, could be useful in measuring the extent to which attitudes become more positive (Allan

& Johnson, 2009). More positive attitudes regarding older adults could potentially lead to a reduction in ageism.

The purpose of this study was to examine the effects of an aging suit on the attitudes of young and middle-aged adults toward older adults. We hypothesized that after performing the SFT and the SPPB in an aging suit, young and middle aged adults would have more positive attitudes towards older adults. If successful this intervention method could contribute to a better understanding of how to increase positive attitudes towards older adults and reduce ageist attitudes.

Literature Review

The term "ageism" was coined by Robert N. Butler, M.D. in 1969 and discussed as a process of systematic stereotyping of and discrimination against people due to their age (Achenbaum, 2015; Allan & Johnson, 2009). Since, researchers in gerontology, psychology, communication, and related fields, have been working to understand the origins and consequences of ageism. Older adults, who are perceived as "useless" to society, are often excluded from activities by younger adults with negative views of older adults (Nelson, 2005). Ageism may become an even greater problem in American society as baby boomers age and remain in the workforce longer. The Bureau of Labor Statistics has projected a 28.8% growth in workers 55 and older between 2012 and 2022 (Toossi, 2013). With more older adults in the workforce, it becomes increasingly important to understand and prevent the negative effects of ageism. In addition to the workplace, ageism affects older adults' lives in other aspects, including personal health and healthcare.

Workplace Outcomes

Older workers face substantial barriers when looking to enter the workforce across numerous occupations (Hirsch, Macpherson, & Hardy, 2000). When a job requires relatively high physical demands, older adults are less likely to be considered for the position (Young, Rinehart, & Baits, 1997). This may be due to the assumption that all older adults are frail and experience physical declines. For older adults in the workplace, Crede, Rupp, and Vodanovich (2006) found that older employees received more severe consequences for poor performance (e.g., transfer, request for resignation, demotion) and are less likely than younger workers to be recommended for training to correct skill deficiencies. Older job applicants and employees are viewed as less promotable and trainable (Maurer & Rafuse, 2001).

Despite assumptions that older adults are lesser employees in the workplace, Segrave (2001) found that older workers are less prone to turnover and are more reliable and productive than younger workers. It was found that in an organization staffed exclusively with workers at least 50 years of age had 18% higher profits, 40% less absenteeism, and 60% less inventory loss, compared with similar organizations staffed with younger workers. Older adults are valuable to the workforce, and as more older adults remain in the work force, it is important for us to be aware of the negative effects of ageism.

Health Outcomes

Another place to be aware of the negative effects of ageism is in the personal health and healthcare of older adults. Age discrimination can affect older adults self-perceptions of aging, contributing to decreased personal health. Findings from two longitudinal studies show that older adults experience more negative health outcomes when they have negative attitudes towards

aging, than individuals who have positive views (Nelson, 2016). Negative age stereotypes can increase stress in older individuals (Levy, Hausdorff, Hencke, & Wei, 2000). Specifically, frequent negative stereotypes about aging, decrease feelings of strength and power about continuance in life, in the elderly (Emile, d'Arripe-Longueville, Cheval, Amato, & Chalabaev, 2015). Older persons exposed to age discrimination are more likely to have depressive symptoms (Han & Richardson, 2014). For example, in one community dwelling sample, negative age stereotypes contributed to 50% greater likelihood of hospitalizations (Levy, Slade, Chung, & Gill, 2015). Negative attitudes towards older adults, that are reinforced over a lifetime, create stereotypes and prejudices that older adults may inflict onto themselves as they age, contributing to decreases in health.

In healthcare, older adults with problems that could be treated with medication are often ignored and their problems are considered a natural part of the aging process. Those that need home healthcare, often, face abuse and neglect rather than receive the personal care they need to maintain good health (Levy & Macdonald, 2016). Physicians and healthcare providers may be exposed to ageist attitudes and negative age stereotypes, potentially influencing the quality of care provided to older adults. It is important to reduce ageism and the negative effects of age stereotypes, in an effort to increase the quality of healthcare received by older adults and their overall health.

Ageism Interventions

Strides have been made in reducing ageist attitudes and understanding the effects of various intervention methods. Knowledge about and exposure to older adults have been studied as intervention methods to reduce negative attitudes toward the elderly. The Facts on Aging Quiz

(Palmore, 1977), developed to measure knowledge on aging, was used in a study on third year medical students to determine the impact of exposure to older adults on the student's attitudes (Duerson, Thomas, Chang, & Stevens, 1992). After six weeks of rotations working in clinics that contained large numbers of older adults, comparisons indicated that students had significantly increased scores on the Facts on Aging Quiz, indicating higher levels of knowledge about older adults. This gives way to the idea that increased exposure to older adults leads to increased knowledge. Negative attitudes towards older adults can be reduced with increased education and promotion of positive attitudes toward aging, however the amount of education required is undetermined (Halpin, 2015). Neikrug (1998) researched the relationship between knowledge of aging and anxiety about aging and found adults with greater knowledge about the aging process experienced fewer anxieties as they aged. Exposure to older adults has also shown promising results in reducing ageist attitudes. Meyer, Hassanein, and Bahr (1980) first found reports of slightly less negative attitudes toward older adults were reported from people who have worked with older adults. Further research has given light to the idea that working with older adults is not the important variable in reducing ageist attitudes, rather it is the quality of the interaction. Sedhom (1982) found significantly more positive attitudes towards older adults in students who had positive experiences with older adults than in students who had negative experiences. Increased exposure early in life may also impact a person's attitudes towards their own aging process. In a qualitative study, it was revealed that higher life satisfaction rates were related to having a grandmother in the home during childhood (Glass & Jolly, 1997). With increased education about and exposure to older adults and aging, more positive attitudes towards older adults may be fostered.

Aging progression software has shown potential in increasing positive attitudes towards

older adults, as well. These technologies are effective in encouraging people to make wiser and healthier decisions by giving them a glimpse of their future, older adult self (Rittenour & Cohen, 2016). In accordance with the idea that experience with older adults increases positive attitudes towards them, Yee and Bailenson (2006) found that when younger participants interacted with an older, rather than younger, adult avatar, they associated significantly more positive traits with older adults. Another way to increase experience with older adults is through an intergenerational learning experience. Powers, Gray, and Garver (2013) found that student's attitudes towards older adults became more positive after participating in an intergenerational learning experience with emphasis on fitness testing. More positive attitudes towards elders were attributed to the performance of older adults on the fitness tests. By conducting fitness tests where older adults exhibited good performance and characteristics of strong, healthy individuals, negative stereotypes of elders (frail, weak, unhealthy) were challenged. These stereotypes and inaccurate perceptions of elders can be changed to a more realistic view by observation of elders' actual performance (Hutchinson, Fox, Laas, Matharu, & Urzi, 2010). This idea aligns with the social cognitive theory which holds that parts of a person's knowledge attainment is related to observations of others in social interactions and experiences (Conner & Norman, 2015).

Aging Simulation

Ideas explored to reduce ageist attitudes include increased knowledge about older adults and increased exposure to older adults, however, what is lacking in the body of research is an exploration of the effects of aging simulation on reducing ageist attitudes. Tremayne, Burdett, and Utecht (2011) used a simulation suit on nursing students to enhance experiential learning by simulating the physiological changes experienced when aging. This allowed the nursing students to gain appreciation of some of the physical and sensory difficulties present for an elderly

patient. The focus was on the affective domain (emotions and feelings) and it was concluded that the age simulation suit was a useful tool to demonstrate musculoskeletal, visual, and auditory effects of aging. Similarly, Eymard, Crawford, and Keller (2010) found the use of an aging suit led to an increase in knowledge and empathy of students and previously negative attitudes towards older adults were improved. More research is needed to further understand changes in the attitudes of the general population after wearing an aging suit. In this study, we aim to investigate the effects of an aging suit on the attitudes of young and middle-aged adults towards older adults.

Methodology

Participants

This study consisted of 59 participants between the ages of 18-59 years, 18 males and 41 females. Because physical exercise tests were performed by the subjects, anyone who suffered from signs or symptoms of uncontrolled cardiovascular disease or had orthopedic limitations was ineligible to participate. The participants were recruited from the Northwest Arkansas area. All subjects that participated signed an Informed Consent form that was approved by the Institutional Review Board.

Procedures

Each participant reported to the Exercise Science Research Center at the University of Arkansas. Upon arrival, an informed consent was provided and signed. The sex and age, of each participant, were recorded, as well as their height and weight using a physician's scale and a Seca standiometer (Rashmi, Patil, Angadi, & Pattankar, 2016). Both measurements were taken without shoes. The participant was provided with the Aging Semantic Differential (ASD) scale before putting on the aging suit. Following the survey, the trained researcher dressed the

participant in the Gerontological Test Suit (GERT). The participant was given guided instruction through the Short Physical Performance Battery (SPPB), the Senior Fitness Test (SFT) and the handgrip strength test while wearing the aging suit. All assessments were administered by a trained researcher. Following completion of the tests the aging suit was removed and the ASD was completed again. The results of the survey, pre-aging suit and post-aging suit were analyzed.

Materials

The primary assessments that were used to determine the effectiveness of an aging suit in simulating old age were the SFT, SPPB, and a handgrip dynamometer. The Aging Semantic Differential (ASD) was used to assess attitudes towards older adults.

The ASD, refined version, uses a 7-point Likert scale consisting of 24 polar-opposite adjectives commonly used to describe older adults (Polizzi, 2003). Participants are asked two questions prior to completing the survey: 1) do you have prior professional experience working with older adults (yes/no) 2) do you have prior fitness test experience (yes/no). Participants were asked to mark the points on the scale between the adjective pairs that best represent their current attitudes towards older adults. The scores are summed, with lower scores indicating more positive attitudes towards older adults. The scale has been validated with a Cronbach alpha of .97 for old men and old women (Brand, Miller, Saunders, Dugmore, & Etherton-Beer, 2015).

The SFT consists of six difference assessments used to measure balance, agility, muscular strength, endurance, and flexibility (Rikli & Jones, 2013). The six assessments include the arm curl, chair stand, 6- minute walk, Zipper, chair sit-and-reach, and the 8-foot up-and-go tests. The 30 second arm curl test is used to measure upper body muscular strength. The participant is asked to be seated and perform as many bicep curls (on their preferred arm) as they can fully complete in 30 seconds. A 3.6 kilograms dumbbell is used for men and a 2.3 kilograms dumbbell

for women. The 30 second chair stand test is used to measure lower body muscular strength. To conduct this test, the participant is asked to safely sit and stand from an armless chair as many times as they can in 30 seconds, with their arms crossed against their chest. The 6-minute walk test is used to assess aerobic endurance. The participant is asked to walk as quickly and safely as they can for 6 minutes and record the total distance traveled. The zipper test is used to measure shoulder flexibility. To conduct this test, the participant is asked to reach up with one arm and then bend at the elbow to reach down the back, while simultaneously reaching down with the opposite arm and then bending at the elbow to reach up the back, with the goal of the middle fingers touching, or coming as close as they can to each other. Measure the distance between the middle fingers or the distance that the middle fingers overlap when reached behind the back. Before taking measurements, the participant is prompted to stretch their muscles by practicing this movement several times. This test is conducted four times, alternating right arm up and then left arm up. The chair sit-in-reach test is used to measure lower body flexibility. The participant is asked to begin in a seated position, extend one leg with a completely straight knee and point toes directly up, then cross one hand over the other and bend at the waist, with the goal of reaching past the foot. Measure the distance past the big toe that the middle finger reaches, or the distance from the middle finger to the big toe if the participant cannot touch their toes. Conduct this test on the right and left leg two times each. Before taking measurements, the participant is asked to practice this movement several times on both legs to stretch out the muscles. The 8-foot up and go test is used to assess agility and dynamic balance. Instruct the participant to begin seated in an armless chair, stand up, walk around a cone placed 8 feet from the chair, and sit back down in the chair. Record the amount of time it takes the participant to complete this sequence.

The SPPB consists of five tests indicative of muscular strength and endurance in older adults, including the side-by-side stand, the semi-tandem stand, the tandem stand, the 8-meter walk, and the chair stand test (Pavasini et al., 2016). The side-by-side stand measures balance. The participant is asked to stand with their feet side-by-side and hold for 10 seconds. The semi-tandem stand test measures balance. The participant is asked to stand with the heel of one foot placed beside the ball of the other foot and hold for 10 seconds. The tandem stand test measures balance. The participant is asked to stand with the heel of one foot touching the tip of the toes of the other foot and hold for 10 seconds. For each of these tests, if achieved "yes" is recorded; if the participant loses balance during the test, record "no" and the number of seconds achieved. The 8-meter walk test measures gait parameters. The participant is asked to walk as quickly and safely as they can from one cone to another. Place a piece of tape 2 meters from the first cone, another piece of tape 4 meters from the first piece and place the last cone 2 meters from the second piece of tape. This is to allow for acceleration and deceleration. Record the time the participant spends walking between the two pieces of tape. The chair stand test measures balance. The participant is asked to start seated in a chair without arms, cross their arms across their chest, and stand up and sit back down in the chair 5 times as quickly and safely as they can. Record how long it takes them to successfully complete 5 chair stands.

Handgrip strength is assessed because it can be used among older adults as a measure of total-body strength (Ling, Taekema, Craen, Jacobijn, Westendorp, & Maier, 2010). The Takei Digital Grip Strength Dynamometer is used for this (Amaral, Mancini, Junior, 2012). The handle of the dynamometer should be adjusted if needed so that the base rests on the first metacarpal and the handle rests on the middle of four fingers. The participant is asked to hold the dynamometer by his or her side and then squeeze as forcefully as possible. As the participant

squeezes, the dynamometer will register the increasing strength. Once the strength reading remains constant for 3 seconds, record the measurement. Preform on the right and left hand three times each, allowing 1 minute of recovery for each hand between efforts.

To simulate aging, a Gerontologic Test Suit (GERT) will be used. The suit consists of goggles (to simulate cataracts), knee, neck, and elbow braces (to restrict range of motion), orthotic shoes (to promote shuffling and simulate dropped arches), a weight vest and ankle weights (to emulate weight gain and alter balance/gait parameters), gloves (to change tactile functioning), and ear plugs and ear muffs (to impair hearing). The aging suit ages the participant 30-40 years above their current age (Moll, 2009).

Statistical Analysis

Descriptive data were calculated for all test variables and reported as means ± SD. One dependent samples t-test was used to analyze changes in attitudes towards older adults pre-aging suit vs post-aging suit. Between subject factors were also analyzed. These factors include sex, whether or not the participant has professional experience working with older adults, and whether or not the participant has conducted fitness assessments with older adults in the past. An alpha < .05 defines statistical significance. SPSS version 22 was the statistical analysis program used to analyze the data.

Results

The purpose of this study was to examine the effects of an aging suit on the attitudes of young and middle-aged adults towards older adults. Specifically, we hypothesized that wearing an aging suit during performance of the senior fitness test and the short physical performance battery would increase positive attitudes towards older adults as assessed by the participant's pre-aging suit and post-aging suit scores on the ASD.

Hypothesis Results

This study examined differences in attitudes towards older adults among participants before wearing an aging suit and after wearing an aging suit via completion of the ASD pre- and post-aging suit. It was hypothesized that ASD scores would be lower after wearing the aging suit. Dependent samples t-test revealed no statistically significant difference in the ASD scores pre-aging suit and post-aging suit (p = .36). The mean ASD scores pre- and post-aging suit were 77.4 and 75.6, respectively.

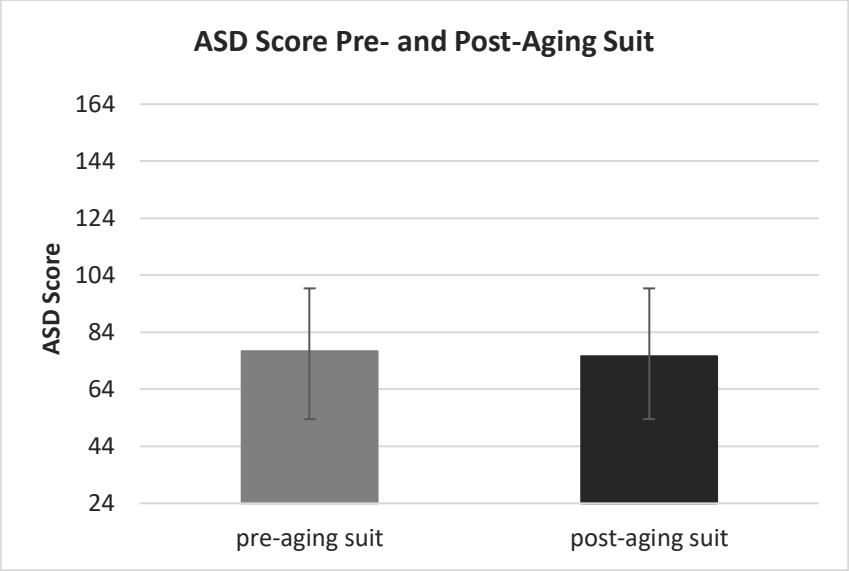

Figure 1. This graph displays the differences in ASD scores before wearing the aging suit and after wearing the aging suit. The mean scores pre- and post-aging suit were 77.4 and 75.6.

Table 1

ASD score change from pre- to post-aging suit

	Mean	Standard Deviation	p-value
Pre-aging suit	77.4	18.4	
Post-aging suit	75.6	21.1	0.36*

Note. *p < .05

No group by time interaction was indicated for participants who have prior professional experience working with older adults ($p = .35$). No group by time interaction was indicated for participants who had prior fitness test experience ($p = .91$). No group by time interaction was indicated for males versus females ($p = .50$). All factors above had no effect on whether or not the GERT aging suit lead to more positive attitudes of young and middle-aged adults towards older adults.

Discussion

The objective of this study was to compare the ASD scores of young and middle-aged adults before wearing an aging suit and after wearing an aging suit. The results of this study do not support the hypothesis that attitudes towards older adults would become more positive after wearing the aging suit. The results also revealed that gender, prior fitness test experience, and professional experience working with older adults had no effect on whether or not attitudes towards older adults improved; all three factors had no statistical significance.

An age simulation suit has been used in other studies. Tremayne, Burdett, and Utecht (2011) used an age simulation suit on ninety nursing students. One nursing student wore the aging suit while two other nursing students prepared the ‘patient’ a drink and helped the ‘patient’ with toileting. The activity was followed by a discussion which includes observations from fellow nursing students and supervisors. This allowed the nursing students to gain appreciation of some of the physical and sensory difficulties present for an elderly patient. The focus was on the affective domain (emotions and feelings) and it was concluded that the age simulation suit was a useful tool to demonstrate musculoskeletal, visual, and auditory effects of aging. This study involved a large number of participants, all from a specific population and allowed for the

discussion between peers about the experience. In another study involving an age simulation suit, Eymard, Crawford, and Keller (2010) found the use of an aging suit led to an increase in knowledge and empathy of students and previously negative attitudes towards older adults were improved. The qualitative study consisted of 42 senior level nursing students who worked with faculty to conduct in-services at healthcare facilities. These in-services required the nursing students to step into a teaching role and included 4 simulation stations, an educational lecture, activities and a DVD video. The students were required to keep journals, which were used for data analysis. It was concluded that student knowledge about older adults and empathy towards them increased. Both of these studies involved nursing students and occurred in healthcare settings. The studies demonstrated that in nursing students, an aging suit is effective for simulating aging and can contribute to increased knowledge and empathy. The present study lacked discussion about the simulation experience and education about older adults. The participants were highly diverse, being volunteers from the general population, rather than all being nursing students. All of these factors could have contributed to the differences in results obtained from the present study and the ones conducted on nursing students.

Limitations

More participants would be needed to better determine correlations in the data. In this study there were 59 total participants, 41 females and 18 males. Ideal recruitment would have been 30 males and 30 females. With an even greater number of participants statistical significance may occur. Another limitation to the study was the participants all had different levels of physical fitness. Those who were extremely fit had a tendency to not struggle while wearing the suit, while those who were less physically fit had a tendency to struggle more with the suit. The difference in abilities before wearing the aging suit could have had an effect on the

individual experiences of people while wearing the aging suit.

For future studies I recommend that tests to measure abilities to accomplish activities of daily living be performed by the participant in the aging suit along with the fitness assessments. This could help make the impairments caused by the suit more notable to the participant. Age cohorts were not looked at for this study. In the sample population we did not recruit an equal number of participants across the age recruitment (18-59 years old). Also, many of our participants were young adults. Future studies should look at changes in attitudes towards older adults across different ages.

Conclusion

The results of this study indicate that there are no significant differences among attitudes towards older adults before wearing an aging suit and after wearing an aging suit, leaving the correlation between an aging suit and attitudes towards older adults unclear. Despite there being no statistical significance, the mean score for the ASD decreased slightly after participants wore the aging suit. From this, it is reasonable to assume that future studies involving aging simulation could help better the attitudes of young and middle-aged adults towards older adults. The results highlight the need for more studies with a greater population size and more age variety to clarify the link between an aging suit and the increase in positive attitudes towards older adults. Future studies should also include a comparison of an aging simulation to integrated learning experiences to better clarify the extent to which an aging suit could help increase positive attitudes towards older adults when compared to another intervention method. Overall, our research suggests that performing fitness assessments in an aging suit shows little impact on attitudes towards older adults.

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