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Effect of Short-Term Research Training Programs on Medical Students' Attitudes Toward Aging

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Abstract

Strategies to build a larger workforce of physicians dedicated to research on aging are needed. One method to address this shortage of physician scientists in geriatrics is short-term training in aging research for early-stage medical students. The authors examined the effects of two summer research training programs, funded by the National Institutes of Health, on medical students' attitudes toward aging, using the Carolina Opinions on Care of Older Adults (COCOA). The programs combined mentored research, didactics, and some clinical exposure. In a sample of 134 participants, COCOA scores improved significantly after completion of the research training program. There was a significant interaction of gender, such that female students had higher baseline scores than males, but this gender difference in COCOA scores was attenuated following the program. Four of the six COCOA subscales showed significant improvement from baseline: Early Interest in Geriatrics, Empathy/Compassion, Attitudes toward Geriatrics Careers, and Ageism.

Keywords

Medical students; ageism; attitudes; older adults; research training

Introduction

While the number of older Americans will increase from 15% in 2014 to 21% in 2030 (Federal Interagency Forum on Aging-Related Statistics), the gap between demand for and supply of physicians with geriatric expertise will widen (Institute of Medicine). By 2030, there will be fewer than three geriatricians and less than one geriatric psychiatrist per 10,000 adults over age 75 (Geriatrics Workforce Policy Studies Center; Institute of Medicine;

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Warshaw & Bragg, 2008). By comparison, there is estimated to be one radiation oncologist per 100 adults over age 65 needing radiation therapy in 2020 (Smith et al., 2010). Limited clinical experience in geriatrics in medical school coupled with concerns about relying on Medicare and inadequate reimbursement for geriatric services are important factors in disincentivizing a career in geriatrics; negative attitudes toward older adults may also contribute. Clinicians have pervasive negative views about seniors with medical conditions (Kearney, Miller, Paul, & Smith, 2000; Meisner, 2012). Residents and medical students are reported to provide potentially age-biased recommendations for procedures such as breast conservation or reconstruction after modified radical mastectomy (Madan, Aliabadi-Wahle, & Beech, 2001). First-year medical students endorse negative attitudes toward older adults and report low interest in geriatric medicine (Fitzgerald, Wray, Halter, Williams, & Supiano, 2003; Perrotta, Perkins, Schimpfhauser, & Calkins, 1981; Reuben, Fullerton, Tschann, & Croughan-Minihane, 1995), and only 3%-4% of these students express a strong interest in geriatrics (Fitzgerald et al., 2003; Perrotta et al., 1981; Voogt, Mickus, Santiago, & Herman, 2008). Attitudes toward aging remain unchanged during the medical school training (Thorson & Powell, 1991). In one study of fourth-year medical students, interest in geriatrics was the third lowest amongst 14 specialties listed (Duthie, Donnelly, & Kirsling, 1987). Even when medical students report a moderately positive perception of older adults, 90% show an implicit preference for younger over older people (Ruiz et al., 2015).

Medical students with positive attitudes toward seniors and those who have cared for seniors prior to medical school have a greater interest in geriatrics, suggesting that interventions which reduce ageist attitudes and offer clinical geriatric experience to medical students may increase the number of physicians entering geriatrics (Fitzgerald et al., 2003). Educational programs targeted to change medical students' attitudes toward older adults lead to improved positive attitudes and reduced negative age-stereotypes (Atkinson et al., 2013; Corwin et al., 2006; Laks et al., 2016; Varkey, Chutka, & Lesnick, 2006; Wilkinson, Gower, & Sainsbury, 2002; Wilson & Hafferty, 1980). Many of these interventions were designed with the goal of changing student attitudes toward aging, and not for offering aging-focused research training. There is a need for larger workforces of both geriatric clinicians and researchers. Short-term research training programs, notwithstanding their limitations, are a pragmatic method for increasing the potential pipeline of physician scientists interested in aging (Jeste, Halpain, Trinidad, Reichstadt, & Lebowitz, 2007). Due to the limited time commitment required and since they can be offered early in the medical school training, these programs can involve sizable proportions of first-year medical students in research.

We evaluated the impact of two NIH-funded, national-level, short-term research training programs, Medical Student Training in Aging Research (MSTAR) and Medical Students' Sustained Training and Research Experience in Aging and Mental Health (M-STREAM) (Black et al., 2013; Dumbauld et al., 2014; Jeste et al., 2007), on medical students' attitudes toward aging. These programs have previously been reported to improve research self-efficacy among medical students (Black et al., 2013). A recent study by Barron and colleagues suggested highly promising longer-term results of the MSTAR program, as 7.8% of the medical students who participated in the Johns Hopkins MSTAR program between 1994 and 2010 went on to become geriatricians or were completing training to become geriatricians (Barron et al., 2015). This is a much higher percentage of geriatricians entering

the workforce than the 0.5% percent of active physicians who are practicing geriatrics nationally (Association of American Medical Colleges).

We hypothesized that participating students' attitudes toward older adults would become more positive after completing the MSTAR and M-STREAM programs. We also examined whether variation in student characteristics (e.g. gender) was associated with change in attitudes.

Methods

Program Description

The MSTAR and M-STREAM programs have been described previously (Black et al., 2013; Jeste et al., 2007). Briefly, MSTAR is a multi-site program supported by the National Institute on Aging (NIA), American Federation for Aging Research (AFAR), and the John A. Hartford Foundation. It provides funding to several selected sites, for up to 18 first-year medical students from across the US per site annually, to participate in an aging-focused summer research training program (8 to 12 consecutive weeks of full-time training, with stipends). M-STREAM was a single-site program, funded by the National Institute of Mental Health. M-STREAM was similar to MSTAR except that it focused on geriatric psychiatry or neuroscience research. Student selection criteria for both programs included past academic performance, interest in geriatrics or aging-related research, and potential for academic career advancement. Each selected student was paired with a research mentor in basic, clinical, or translational research, based on the student's interest, and conducted, during the summer following the first year of medical school, a research project under the mentor's guidance. Students participated in didactic sessions covering topics of bioethics, effective publication strategies, and successful aging, and received some clinical geriatrics exposure in other settings, primarily through a visit to a specialized geropsychiatric inpatient unit.

Study Participants

University's Human Research Protections Program approved the study protocol, and informed consent was obtained from all participants. There were a total of 178 first-year medical students who completed the MSTAR and M-STREAM programs from 2011 to 2016, and 149 completed the pre-program COCOA (83.7%). Data were available on demographic characteristics of all 178, and there were no differences between the 149 who completed the pre-program COCOA and the remaining 29 students in terms of gender, race/ethnicity, program, enrollment in a Top-20 medical school, or project-type. There were six cohorts of MSTAR students and four cohorts of M-STREAM students. Students were asked to complete several rating scales immediately prior to beginning the program and immediately following its completion. Of the 149 who completed the pre-program COCOA, 134 students completed both the pre- and post-program COCOA. Students who only completed the pre-program COCOA were more likely to be female [$X^2(1) = 4.0$, $p = .046$] and a participant of the MSTAR program [$X^2(1) = 10.5$, $p = .001$] than those who completed both the pre- and post-program COCOA.

Measurements

We used the Carolina Opinions on Care of Older Adults (COCOA) (Hollar, Roberts, & Busby-Whitehead, 2011), a standardized and validated scale with strong inter-item reliability (Cronbach's alpha = .811) for assessment of medical and health professional students' attitudes toward older adults. COCOA is a 42-item survey that contains six subscales: Early Interest in Geriatrics, Empathy/Compassion, Attitudes toward Geriatrics Careers, Ageism, Clinical and Social Services for Older Adults, and Social Value of Older Adults. Each item is scored on a 1-5 Likert-type agreement scale from 1 to 5, yielding total scores from 42 to 210. Higher scores reflect more positive attitudes toward seniors. The COCOA has been used in several studies to date (Atkinson et al., 2013; Biese et al., 2011; Laks et al., 2016). Table 1 illustrates sample questions from the COCOA.

Students' gender, race/ethnicity, and current medical school were obtained from their program applications. Student race/ethnicity was categorized as: Caucasian, African American, Hispanic/Latino, Asian, Native Hawaiian/Other Pacific Islander, Multi-Racial, or Other. Given the small cell size, these categories were then grouped as either Caucasian or Not Caucasian, and students who identified as Multi-Racial and Other were not included in the latter grouping. Top-20 medical schools were defined by the 2015 U.S. News Best Medical Schools for Research rankings. The research project each student completed was categorized by the program staff as basic, clinical, or translational research. Seven of the projects could not be categorized due to being unclear or mixed.

Statistical Analysis

Descriptive statistics were run to describe characteristics of the total sample. Linear regression and *t*-tests were used to determine baseline differences in pre-program COCOA scores by student characteristics, while paired *t*-test was employed to determine pre- and post-program differences in COCOA total and subscale scores. Linear regression was also used to assess for significant interactions between changes in COCOA scores and student characteristics such as gender, with the difference between the post- and pre-program scores as dependent variable and student characteristics, pre-program scores, and their interactions as independent variables. We employed a backward elimination procedure to remove redundant variables to improve parsimony and then examined significant variables ($p<.05$) in the final model. Multicollinearity among covariates was assessed using the variance inflation factor (VIF). To ensure valid inference, distribution-free methods such as the asymptotic and permutation tests were used for outcomes that exhibited severe departures from the normal distribution (Effron & Tibshirani, 1993; Tang, He, & Tu, 2012). The α level was set at .05. All statistical analyses were two-tailed.

Results

A majority of the participating students were female, Caucasian, from Top-20 medical schools, enrolled in MSTAR, and completed clinical research projects (Table 2). Higher pre-program COCOA scores were associated with being female, Caucasian, enrollment in MSTAR, and completing translational (rather than clinical) research projects. Students from Top-20 medical schools had lower COCOA scores than others.

Overall, there was a significant improvement in total COCOA scores from pre- to post-program (Table 3). Four of the six COCOA subscales showed significant improvement from pre- to post-program: Early Interest in Geriatrics, Empathy/Compassion, Attitudes toward Geriatrics Careers, and Ageism.

The only significant interaction found between change in COCOA scores and baseline student characteristics was in gender ($F(1,132) = 5.71$, $p = .018$), such that male students' COCOA scores improved following the program participation, thereby diminishing the gap between male and female students' post-program scores (Table 3). Project-type did not have a statistically significant moderating effect.

In all the analyses, no severe departure from normality was detected for any of the analyses (t-scores from the t-tests and regression models) as determined by Q-Q plots and formal statistical tests for univariate normal distribution. There was also no evidence of multicollinearity, as the VIF was less than 1.5 for all covariates in the regression model. To ensure valid inference, we performed asymptotic permutation tests in addition to the t-scores from the t-tests and regression models and found virtually identical p-values. Thus, results from the original t-scores and associated p-values are reported for the t-tests and regression models (Table 4).

Discussion

Our findings suggest that short-term research training programs focused on aging had a positive impact on medical students' attitudes toward older adults, especially in early interest in geriatrics, attitudes toward geriatrics careers, empathy and compassion toward older adults, and a reduction in ageism. These gains were made through mentored research training rather than a regular clinical rotation or an intervention explicitly focused on changing attitudes toward aging. There was a time by gender interaction, such that male medical students started out with worse attitudes than female students, but had a greater improvement, thereby exhibiting similar attitudes as females by the program's end.

This is, to our knowledge, the first study to indicate that aging-focused short-term research training can improve attitudes toward aging. There were multiple components within these programs that might have led to improved attitudes, including: 1) exposure to aging-related research, and in some cases, research on successful aging (-i.e., studies focusing on greater well-being among older adults); 2) participation in didactics on successful aging; 3) role modeling of mentors and program staff who had a strong interest in geriatrics, and exhibited optimism for improvement in health and well-being of older adults; 4) geriatric clinical experience, although limited, that offered some personal exposure to older adults; and 5) administration of the programs by a Center with a focus on healthy aging. A recent review of interventions to elicit positive attitude change toward older adults among physicians and medical students found that interventions with an empathy-building component, such as mentoring, informal contact with older adults, or an aging simulation game appeared to be effective in changing attitudes (Samra, Griffiths, Cox, Conroy, & Knight, 2013). The MSTAR and M-STREAM programs incorporated mentoring and contact with older adults along with an emphasis on successful trajectories of aging. The COCOA subscales of early

interest in geriatrics, empathy/compassion, attitudes toward geriatrics careers, and ageism, showed improvement following the programs, but clinical and social services for older adults, and social value of older adults did not. The MSTAR and M-STREAM programs offered very limited clinical and community exposure, and this may explain why these two domains did not improve.

Our findings of gender differences in attitudes toward aging are consistent with other studies reporting that female medical students generally have more positive attitudes toward seniors than their male counterparts (Fitzgerald et al., 2003; Hollar et al., 2011; Holtzman, Beck, & Ettinger, 1981; Reuben et al., 1995; Ruiz et al., 2015). In our study, male students demonstrated greater overall improvement in attitudes than female students, a finding that has also been reported in previous studies testing the effect of geriatric educational training and clinical exposure interventions on attitudes toward older adults (Hughes et al., 2008; Warren, Painter, & Rudisill, 1983). A likely explanation is that since females had high attitude scores pre-program, there was a ceiling effect for females, whereas male students had lower baseline scores, allowing room for improvement.

The finding of better attitudes toward aging among MSTAR compared to M-STREAM students at baseline might be due to self-selection bias. The MSTAR program focused on aging in a broad sense, whereas the M-STREAM focused on mental health and aging, perhaps drawing applicants with different views on aging in the context of health. It is not clear why students who undertook translational projects had higher COCOA scores than those undertaking clinical projects, or why students from top-20 medical schools demonstrated worse attitudes toward older adults. Possibly, more competitive medical schools need to pay greater attention to this area in their training curriculum.

There are several limitations to this study. It did not include a control group. The sample consisted of only first-year medical students from the US, and therefore, the results may not generalize to other groups. Moreover, ours was a select group of medical students with expressed interest in aging, evidenced by their higher scores on COCOA compared to the scores reported among medical students in prior studies (Biese et al., 2011; Hollar et al., 2011), and therefore, these results may not represent all first-year medical students. It is not known whether gains in attitudes would persist at later time-points (e.g., at the end of medical school). Also, as our programs consisted of multiple components, we cannot be sure which particular components were responsible for changes in student attitudes. Finally, students who completed only the baseline COCOA assessment might have not exhibited the same level of improvement in attitudes as students who completed both sets of the measure.

Nonetheless, short-term aging-focused research training programs may be able to successfully foster positive attitudes toward seniors among medical students, and potentially, lead to larger numbers of physicians who decide to pursue a geriatrics (research) career. It is notable that the MSTAR and M-STREAM programs were associated with an increase in positive attitudes toward aging among the students who had already demonstrated an interest in geriatrics through their participation. Future directions for this work will include following-up with past trainees to track how many train for a career in geriatrics (Barron et al., 2015), incorporating clinical and community exposure into the programs, and including

measures of implicit bias (Ruiz et al., 2015) to determine whether positive gains in self-report attitudes are reflected in the implicit attitudes of medical students toward seniors.

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Table 1

Sample Questions from the COCOA

COCOA Subscale	Sample Questions
Early Interest in Geriatrics	I have spent time caring for an older friend or family member.
Empathy/Compassion	I always take the time to listen to what older adults have to say. I would stop what I was doing and immediately help an older patient.
Attitudes toward Geriatrics Careers	Working in geriatrics might limit my lifestyle and career goals more than working in other healthcare specialties.
Ageism	Most older adults are relatively inactive and stay close to home.
Clinical and Social Services for Older Adults	It is important that healthcare providers directly help older patients understand and make joint decisions on their healthcare options.
Social Value of Older Adults	Older adults are valuable contributors to our society.

Table 2

Baseline Sample Characteristics and Pre-Program COCOA Scores (n = 149)

Characteristic (Number)		COCOA Total Mean Score[a] (SD)	*t*- or *f*-score (df)	*p*-value
Gender	Female (83)	156.7 (16.8)	4.24 (1, 147)	.041
	Male (66)	150.9 (17.6)		
Race/Ethnicity	Caucasian (55)	158.1 (17.4)	4.68 (1, 147)	.032
	Non-Caucasian (94)	151.8 (17.0)		
Program	MSTAR (80)	159.9 (14.0)	21.29 (1, 147)	<.001
	M-STREAM (69)	147.5 (18.5)		
Medical School Enrollment	Top-20 (75)	149.2 (18.1)	13.35 (1, 147)	<.001
	Under Top-20 (74)	159.2 (15.1)		
Project-type[b]	Basic (29)	156.1 (18.0)	3.18 (2, 139)	.044
	Clinical (92)	151.8 (17.6)		
	Translational (21)	161.9 (12.5)		

COCOA = Carolina Opinions on Care of Older Adults; MSTAR = Medical Student Training in Aging Research; M-STREAM = Medical Students' Sustained Training and Research Experience in Aging and Mental Health; SD = standard deviation; df = degrees of freedom

[a]COCOA Total Score range = 42 to 210; COCOA items 1, 5, 7, 8, 9, 11, 12, 13, 18, 24, 25, 26, 27, 29, 30, 32, 33, 34, 36, 37, 39, 40, and 42 are reverse-scored.

[b]Seven of the projects could not be categorized due to being unclear or mixed.

Table 3

Pre- and Post- Program COCOA Scores by Subscale (N = 134)

COCOA[a] Subscale (Range)	Pre- Program Mean (SD)	Post- Program Mean (SD)	*t*- or *f*-score (df)	*p*-value
Early Interest in Geriatrics (5 – 25)	14.1 (4.3)	15.6 (4.2)	−5.87 (150)	< .001
Empathy/Compassion (4 – 20)	16.2 (2.4)	16.8 (2.3)	−3.82 (152)	< .001
Attitudes toward Geriatrics Careers (8 – 40)	28.4 (4.9)	29.8 (5.6)	−3.96 (153)	< .001
Ageism (9 – 45)	32.3 (5.0)	33.2 (5.4)	−2.67 (147)	= .008
Clinical and Social Services for Older Adults (11 – 55)	43.8 (6.1)	44.2 (7.1)	−.87 (142)	= .384
Social Value of Older Adults (5 – 25)	19.9 (2.5)	20.2 (2.8)	−1.69 (150)	= .093
COCOA Total (Range)				
Female COCOA Total (42 – 210)	156.2 (17.2)	158.9 (21.1)	5.71 (1, 132)	= .018
Male COCOA Total (42 – 210)	150.5 (17.9)	159.4 (17.9)		
COCOA total (42 – 210)	153.6 (17.7)	159.1 (19.6)	−4.22 (133)	< .001

COCOA = Carolina Opinions on Care of Older Adults; SD = standard deviation; df = degrees of freedom

[a]COCOA Total Score range = 42 to 210; COCOA items 1, 5, 7, 8, 9, 11, 12, 13, 18, 24, 25, 26, 27, 29, 30, 32, 33, 34, 36, 37, 39, 40, and 42 are reverse-scored.

Table 4

Linear Regression Model Coefficients

	Estimate (beta weight)	Standard Error	*t*-value	*p*-value
	Reduced (Trimmed) Model with Backward Elimination			
Intercept	2.70	1.81	1.50	.137
Male	6.51	2.70	2.42	.017
	Full (Initial) Model			
Intercept	5.42	4.32	1.25	.212
Male	6.15	2.74	2.24	.026
Caucasian	−3.34	2.88	−1.16	.249
MSTAR Program	−0.78	2.80	−0.28	.782
Top-20 Medical School Enrollment	1.60	2.74	0.58	.560
Clinical Project-Type	−1.55	3.78	−0.41	.682
Translational Project-Type	−4.30	4.80	−0.90	.371

*The baseline category for project-type is Basic Project-Type.