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# Continuing Professional Development Using Infographics Improves the Familiarity of the Social Determinants of Health

Zachary K. Winkelmann, PhD, SCAT, ATC\*; Kathryn C. Downs, MS, ATC\*; Robert Charles-Liscombe, EdD, AT, ATC†; Lindsey E. Eberman, PhD, LAT, ATC‡

\*Department of Exercise Science, University of South Carolina, Columbia; †School of Health Sciences, Mount St Joseph University, Cincinnati, OH; ‡Department of Applied Medicine and Rehabilitation, Indiana State University, Terre Haute

**Context:** Secondary school athletic trainers (ATs) may not be aware of health care delivery strategies for the social determinants of health (SDOH). Specifically, secondary school ATs have demonstrated the lowest knowledge and practice of the SDOH.

**Objective:** The purpose of this study was to determine whether infographics as a continuing professional development method changed patient-centered-care screening considerations and familiarities with the SDOH.

**Design:** Randomized controlled trial.

**Setting:** Online survey with infographic intervention.

**Patient or Other Participants:** In total, 34 participants in the intervention group and 46 participants in the control group were included for the analysis.

**Intervention(s):** The intervention group received a different SDOH infographic weekly for 12 weeks. The control group did not receive any infographics.

**Main Outcome Measure(s):** The survey asked participants to rate their patient-centered-care tasks, screening consideration, and familiarity with the SDOH.

**Results:** A significant change-score improvement was identified for the intervention group relative to providing whole-person health care ( $P = .024$ ) and recognizing the SDOH ( $P \leq .001$ ). No statistical differences were noted for screening and practices between the groups. However, familiarity with screening for 4 SDOH areas improved for the intervention group, including access to primary care ( $P = .007$ ), poverty ( $P = .048$ ), environmental conditions ( $P = .036$ ), and social cohesion ( $P = .025$ ).

**Conclusion:** The ATs improved their familiarity with screening for some SDOH after engaging in professional development using infographics, but screening practices and considerations did not change over the course of the study.

**Key Words:** Continuing education, visual data, patient-centered care

*Dr Winkelmann is currently a Clinical Assistant Professor in the Department of Exercise Science at the University of South Carolina. Address correspondence to Zachary K. Winkelmann, PhD, SCAT, ATC, Department of Exercise Science, 1300 Wheat Street, University of South Carolina, Columbia, SC 29208. winkelz@mailbox.sc.edu.*

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## KEY POINTS

- Secondary school athletic trainers reported they had both the perceived knowledge and skills to provide individualized health care to patients, yet only half reported they routinely incorporate screenings or interventions in clinical practice.
- Our data suggested that secondary school athletic trainers were unfamiliar with 2 key areas of the social determinants of health including social/community context and neighborhood/built environment.
- Engaging in continuing professional development using infographics improved the familiarity with the social determinants of health, which is a necessary first step towards long-term behavior change.

## INTRODUCTION

The *social determinants of health* (SDOH) are defined as the conditions into which people are born, live, learn, work, play, and age that influence their health outcomes.<sup>1</sup> There are 5 domains of the SDOH: (1) economic stability, (2) education, (3) social and community context, (4) health and health care, and (5) the neighborhood and built environment.<sup>1</sup> The 5 domains are expanded into 19 subcategories that create the specific SDOH.<sup>1</sup> The 19 SDOH subactivities highlight specific areas such as poverty, food security, housing stability, language and literacy, social cohesion, and access to health care.<sup>1</sup> The literature has identified that the 19 SDOH are key factors that affect long-term health disparities and outcomes.<sup>1,2</sup> The SDOH affect the general quality of life, health, and behavioral health of all populations and span various environments and settings.<sup>1,2</sup> Moreover, the SDOH are often referred to as “causes of the causes.”<sup>3</sup> For example, children who experience exposure to the stresses of poverty early in life have been found to have increased chance of issues related to physical, cognitive, and social development.<sup>4</sup> Income inequality also has a negative impact on the quality of services that children of low-income families have access to. The inequalities cause disparities with health care, school, and childcare options that have been correlated to a lower level of future academic achievement.<sup>5</sup> The previous examples illustrate the influence that the SDOH have on health outcomes in all populations.

Athletic training is a health care profession that often provides care to underserved populations that may face adversity due to the SDOH. Although credentialed athletic trainers (ATs) may work in underserved communities, previous researchers identified a knowledge gap that exists relative to public health topics.<sup>6</sup> The researchers identified that ATs had poor knowledge assessment scores related to public health topics and identified screening practices for the SDOH in their patients as one of the least-practiced health care skills.<sup>6</sup> In recent years, other health care providers have been integrating the SDOH into their practice after professional efforts by their

organizing bodies.<sup>7–9</sup> In 2016, the National Association of School Nurses introduced the SDOH into their code of ethics, stating that school nurses must address the effects of adverse childhood experiences and other SDOH in their clinical practice.<sup>10</sup> In 2018, the American College of Physicians introduced 9 standards in a position paper that outlined new practice guidelines that practicing physicians should follow to address social factors affecting the health outcomes of their patients.<sup>7</sup>

Between 2015 and 2019, the athletic training profession via the Commission of Accreditation on Athletic Training Education (CAATE) began introducing new professional academic standards.<sup>11</sup> The 2020 CAATE Standards require professional athletic training programs to ensure that graduates have the knowledge, skills, and abilities relative to the core competencies and patient-centered care.<sup>11</sup> The core competency section of the 2020 CAATE Standards, specifically Standard 57, states that professional athletic training programs must prepare graduates to identify health care delivery strategies that account for a variety of SDOH.<sup>11</sup> The standard aims to improve the delivery and quality of patient-centered care.<sup>12</sup> It is important to note that addressing factors pertaining to health-related quality of life when considering health care interventions was being discussed long before the implementation of the 2020 CAATE Standards. However, the new educational requirement inevitably means that all ATs credentialed before 2020 did not undergo an athletic training education program that was *required* to teach them about the SDOH and how to implement this patient-centered-care task in their clinical practices, leading to the identified knowledge and practice gap.<sup>6</sup> Therefore, the purpose of our study was to identify and explore continuing professional development, via infographics, which may cultivate behavior change in secondary school athletic trainers (SSATs) relative to patient-centered-care screening considerations and familiarities with the SDOH .

## METHODS

### Study Design

We used a counterbalanced repeated measures design. After exploring the previously published public health topics knowledge and practice study in more detail, we identified that the population that scored the lowest on the SDOH question and least integrated the practice behavior was SSATs, or sports medicine health care providers in high school settings.<sup>6</sup> This investigation was deemed exempt by the institutional review board at the University of South Carolina.

To begin, the participants completed a preintervention cross-sectional survey. At the end of the survey, the participants were asked to opt in or out of a follow-up intervention for 12 weeks. The follow-up continuing professional development intervention via infographics followed a randomized control

**Table 1. Survey Items and Scales**

	Question/Item	Answer Options and Scales
Demographics	<ol style="list-style-type: none"> <li>1. Age</li> <li>2. Gender</li> <li>3. Race/ethnicity</li> <li>4. Highest level of education completed</li> <li>5. Years of experience as an AT</li> <li>6. Type of secondary school they work in</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill in the blank</li> <li>2. Female, male, nonbinary, self-describe, prefer not to say</li> <li>3. White, Black/African American, American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, Other</li> <li>4. Bachelor's, professional master's, postprofessional master's, clinical doctorate, academic doctorate</li> <li>5. Fill in the blank</li> <li>6. Public (full time), private (full time), public (part time), private (part time), other (full time), other (part time)</li> </ol>
Patient-centered–care tasks	<ol style="list-style-type: none"> <li>1. I provide whole-person health care that explores the patient outside their condition, disease, or injury</li> <li>2. I assess the patient's health literacy during an evaluation</li> <li>3. I provide individualized care based on factors that may affect each patient</li> <li>4. I recognize and am aware of the social determinants of health</li> <li>5. I incorporate screenings and interventions based on the social determinants of health</li> </ol>	<ul style="list-style-type: none"> <li>• NO = No, I do NOT have adequate knowledge or skills, nor do I feel confident to meet the requirements of this task</li> <li>• YES BUT = Yes, but I know enough or can do this task if I had to; however, I am not confident doing so and would like to learn how to do it better. I need to improve my knowledge, skills, attitudes, and critical judgments</li> <li>• YES = Yes, I have the knowledge, skills, attitudes, and judgments to adequately meet all the requirements for this task. I function independently, providing high quality athletic training services and patient care</li> <li>• NA = Not applicable—This task does NOT apply to me; it may not be part of my current athletic training practice</li> </ul>
Considerations	In the past year, how often did you consider the social determinants of health in your routine care of patients or athletes at your secondary school/high school?	4-point Likert scale (1 = <i>almost never or never</i> , 2 = <i>sometimes</i> , 3 = <i>often</i> , 4 = <i>almost always or always</i> ).
Screening practices	How often do you screen, discuss, and/or intervene with your patients on the specific subgroups for the social determinant of health?	4 options for the 5 SDOH categories including: <ol style="list-style-type: none"> <li>1. Yes, I consider this with all of my patients</li> <li>2. Yes, I consider this with most of my patients</li> <li>3. Yes, I consider this with some of my patients</li> <li>4. No, I do not consider this with my patients</li> </ol>
Familiarity	Please describe your familiarity with screening for these specific social determinants of health as an athletic trainer in the secondary school setting.	5-point Likert scale (1 = <i>not familiar</i> , 2 = <i>slightly familiar</i> , 3 = <i>moderately familiar</i> , 4 = <i>very familiar</i> , 5 = <i>extremely familiar</i> ) on the 19 subactivities of the SDOH

Abbreviation: SDOH, social determinants of health.

trial design with an intervention and control groups. The independent variable was group allocation and the 4 dependent variables of interest included patient-centered–care tasks, SDOH consideration and screening practices, and familiarity with the SDOH.

## Instruments

**Survey Development.** The research team curated a web-based survey (Qualtrics) for data collection. During the development of the surveys, the researchers (Z.K.W., K.C.D.) collaborated to format and organize how the questions would be delivered to the participants. Once the

survey was complete, it was sent to the expert development team (R.C.L., L.E.E.) to be content validated. The expert development team had previous research experience on patient-centered care and the SDOH. The expert development team provided edits and suggestions for revisions on the content and format of the survey. The review and revision process continued until all members of the expert development team and researchers on the study had consensus on tool development. The survey addressed the participants' demographics and 3 main components including (1) patient-centered care behaviors, (2) SDOH consideration and screening practices, and (3) familiarity with the SDOH. The preintervention survey was used for the postintervention survey for both groups, as indicated in Table 1.

**Figure 1. Domains and categorization of social determinants of health. The social determinants of health marked with an <sup>a</sup> were included in the infographic interventions.**

EDUCATION	ECONOMIC STABILITY	SOCIAL & COMMUNITY CONTEXT	HEALTH & HEALTH LITERACY	NEIGHBORHOOD & BUILT ENVIRONMENT
<ul style="list-style-type: none"> <li>• Early Childhood Education and Development<sup>a</sup></li> <li>• Language and Literacy<sup>a</sup></li> <li>• High School Graduation</li> <li>• Enrollment in Higher Education</li> </ul>	<ul style="list-style-type: none"> <li>• Food Security<sup>a</sup></li> <li>• Housing Stability<sup>a</sup></li> <li>• Poverty<sup>a</sup></li> <li>• Employment</li> </ul>	<ul style="list-style-type: none"> <li>• Social Cohesion<sup>a</sup></li> <li>• Discrimination<sup>a</sup></li> <li>• Civic Participation</li> <li>• Incarceration</li> </ul>	<ul style="list-style-type: none"> <li>• Access to Health Care<sup>a</sup></li> <li>• Access to Primary Care<sup>a</sup></li> <li>• Health Literacy<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Crime and Violence<sup>a</sup></li> <li>• Environmental Conditions<sup>a</sup></li> <li>• Access to Healthy Foods</li> <li>• Quality of Housing</li> </ul>

**Intervention Development.** As part of continuing professional development, the need for ongoing and consistent reminders has been deemed effective to promote behavior change.<sup>13</sup> To meet that need without burdening the SSAT with time-intensive programming, we selected the use of digital infographics to share the key information on the SDOH. Infographics are a form of visual pedagogy that have been deemed effective for conveying information in a clear, concise, and appealing manner.<sup>14</sup> One researcher on the study (K.C.D.) created and developed 12 infographics before the investigation. All 12 infographics contained relevant information and statistics from current literature specific to each of the identified SDOH subactivities, with key points that were specifically applicable to the secondary school setting. Whereas the preintervention and postintervention surveys explored all 19 subactivities in the literature, 7 subactivities were redacted from the intervention because they were not specific to the patient as a minor in a secondary school. Figure 1 provides the 19 subactivities placed into the 5 SDOH categories. At the bottom of each infographic, prompts were provided to the SSATs that they could use to help them improve their current

prevention practices in the clinical setting. The infographics were reviewed and edited by the research team and have been provided as supplemental material (see Supplemental Figure 1, available online at [www.nataej.org](http://www.nataej.org)).

### Procedures and Participants

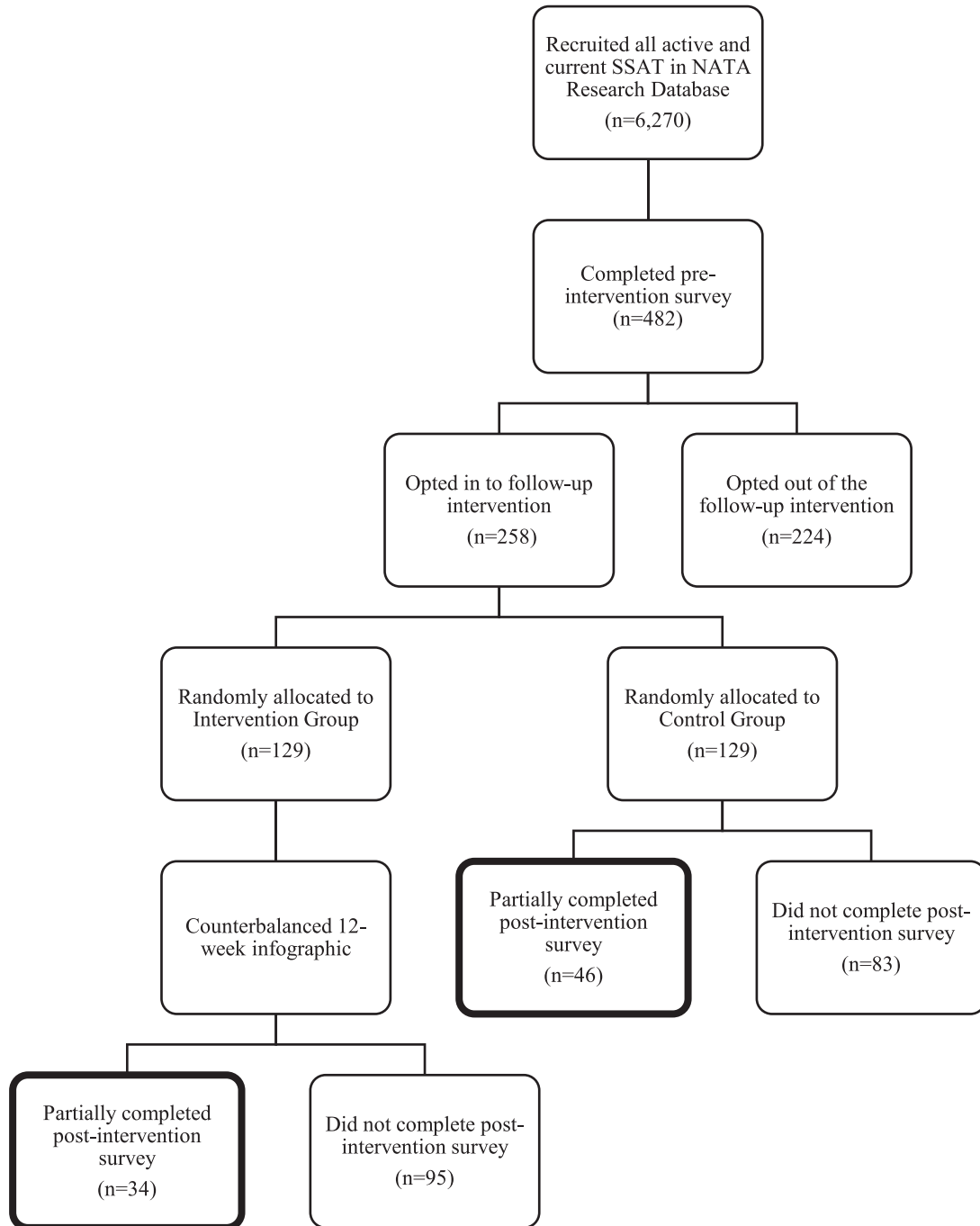
In spring 2020, initial recruitment began; 6270 current practicing SSATs who were also members of the National Athletic Trainers' Association (NATA) were invited to participate in a multiphase research study exploring the SDOH. The email addresses of SSATs were accessed from the NATA research database. The email contained a description of the study, an invitation to participate, and a timeline of the study should they continue through to the end. In total, 673 surveys were started (access rate = 10.7%), with 630 responses collected (completion rate = 93.6%). The initial recruitment yielded 482 participants in the preintervention survey. From the sample that completed the preintervention survey, 258 SSATs shared interest in participating in the intervention. Those who opted to participate provided their preferred email address and those

**Table 2. Demographics**

Variable	Intervention, n = 34	Control, n = 46
Age, mean ± SD (min, max), y	32 ± 9 (22, 56)	32 ± 11 (22, 63)
Gender, n (%)		
Female	28 (82.4)	32 (69.6)
Male	6 (17.6)	14 (30.4)
Race and ethnicity, n (%)		
White	28 (82.4)	44 (95.7)
Black	2 (5.9)	1 (2.2)
American Indian/Alaska Native	1 (2.9)	0 (0)
Asian	1 (2.9)	0 (0)
Other	2 (5.9)	1 (2.2)
Highest degree, n (%)		
Professional bachelor's degree	12 (35.3)	16 (34.8)
Professional master's degree	6 (17.6)	5 (10.9)
Postprofessional master's degree	14 (41.2)	25 (54.3)
Clinical doctorate (DAT, DPT)	2 (5.9)	0 (0)
Academic doctorate (PhD, EdD)	0 (0)	0 (0)
Secondary school type & job status, n (%)		
Public school & full time	23 (67.6)	37 (80.4)
Private school & full time	2 (5.9)	4 (8.7)
Public school & part time	9 (26.5)	5 (10.9)
Private school & part time	0 (0)	0 (0)
Years of experience as an AT, y	10 ± 9 (min = 1, max = 33)	9 ± 10 (min = 0, max = 37)

Abbreviations: AT, athletic trainer; max, maximum; min, minimum.

**Figure 2. Study methodology and participant recruitment. The bolded boxes represent the 2 samples used for post-intervention comparisons. Abbreviations: NATA, National Athletic Trainers' Association; SSAT, secondary school athletic trainers.**



assigned to the intervention group received a weekly email containing a continuing professional development resource in the form of an infographic. The research team randomly allocated 129 participants to either the intervention group or the control group. The results of a sample size estimate identified that the study needed 64 participants (32 in control, 32 in intervention) to achieve power at the 95% confidence interval with a large effect size (0.4). The demographics for the participants who completed the postintervention survey (n = 80) for the final analysis are provided in Table 2.

The order in which each participant in the intervention received the infographics was additionally randomized to limit

delivery bias. This process continued for 12 weeks until each of the participants in the intervention group received all 12 infographics. The control group did not receive any emails during the 12-week intervention period. After the 12-week infographic intervention was complete, both the intervention and control groups were sent the postintervention survey and had 5 weeks to complete it. To ensure educational advancement in the profession, the participants in the control group received the educational resources in 1 email after the postintervention data collection window ended regardless of participation. Figure 2 provides the timeline and participation retention throughout the study.

## Data Analysis

The data from participants in the control and intervention groups were downloaded from Qualtrics and analyzed with commercially available statistical software (version 28.0; IBM SPSS Statistics for Windows). We conducted descriptive analyses for all demographic data. Measures of central tendency and change scores were calculated for all items on the preintervention and postintervention survey. In addition, we performed nonparametric *t* tests (Mann-Whitney *U*) for the change scores related to the patient-centered-care tasks, considerations, and screening practices, and SDOH familiarity between the participants in the control and intervention groups, respectively.

## RESULTS

### Patient-Centered-Care Tasks

At preintervention, the participants had similar patient-centered behaviors. Both groups reported having the knowledge, skills, attitudes, and judgments to adequately provide individualized care based on factors that may affect each patient (mode = 3/3); however, both groups most commonly reported they knew enough or could do this task if they had to but were not confident doing so and would like to learn how to provide whole-person health care that explores the patient outside their condition, disease, or injury (mode = 2/3), assess the patient's health literacy during an evaluation (mode = 2/3), and recognize the SDOH (mode = 2/3). We found it interesting that neither group reported having inadequate knowledge or skills, nor did they feel confident to incorporate screenings and interventions based on the SDOH (mode = 1/3). At postintervention, the intervention group reported having the knowledge, skills, attitudes, and judgments to adequately integrate (mode = 3) all 5 patient-centered-care tasks, whereas the control group had mixed results. We identified significant differences for the task of providing whole-person health care that explores the patient outside their condition, disease, or injury whereby the intervention group (mean change score =  $0.387 \pm 0.715$ ) had a greater improvement than the control group (mean change score =  $0.089 \pm 0.596$ ; Mann-Whitney *U* = 522.5,  $z = -2.262$ ,  $P = .024$ ). In addition, the intervention group also had improved change scores for recognizing the SDOH as compared with the control group (Mann-Whitney *U* = 438.5,  $z = -3.518$ ,  $P < .001$ ; mean intervention change score =  $0.677 \pm 0.653$ ; mean control change score =  $0.133 \pm 0.661$ ).

### Considerations and Screening Practices for the SDOH

Overall, participants shared at preintervention that they sometimes (mean = 2.27/4; mode = 2) considered the SDOH in their routine care of patients at their secondary school. At postintervention, the intervention (pre: mean =  $2.31 \pm 0.97$ , mode = 2; post: mean =  $2.67 \pm 0.78$ , mode = 3) and control group (pre: mean =  $2.24 \pm 0.61$ , mode = 2; post: mean =  $2.52 \pm 0.84$ , mode = 3) both improved their screening considerations, but we did not identify any statistical difference between the change scores (Mann-Whitney *U* = 433.5,  $z = -0.138$ ,  $P = .890$ ).

Similarly, we identified that participants screened, discussed, and/or intervened with some of their patients for the domains

of education (mean = 2.42/4, mode = 2) and neighborhood and built environment (mean = 2.40/4, mode = 2) and did the same screening behaviors with most of their patients for economic stability (mean = 2.73/4, mode = 3), social and community context (mean = 2.48/4, mode = 3), and health and health literacy (mean = 2.83/4, mode = 3). At postintervention, the intervention group reported more frequent screening considerations than the control group for all 5 domains = (education: intervention =  $3.00 \pm 0.99$ , control =  $2.87 \pm 0.86$ ; economic stability: intervention =  $3.15 \pm 0.96$ , control =  $2.78 \pm 0.81$ ; social and community context: intervention =  $3.00 \pm 0.74$ , control =  $2.54 \pm 0.81$ ; health and health literacy: intervention =  $3.15 \pm 0.99$ , control =  $2.78 \pm 0.94$ ; neighborhood and built environment: intervention =  $2.74 \pm 0.90$ , control =  $2.37 \pm 0.77$ ). We did not identify any statistical difference between groups for their change scores for each domain. Table 3 provides the reported percentage of participants screening behaviors per SDOH domain.

### Familiarity With the SDOH

At preintervention, participants regardless of group allocation expressed a lack of familiarity (mode = 1/5) for screening for 10 of the 19 specific SDOHs including access to poverty, environmental conditions, early childhood development, food security, social cohesion, neighborhood crime and violence, quality of housing, crime and violence, civic participation, and incarceration and institutionalization. However, participants expressed feeling very familiar (mode = 4/5) with screening for high school graduation and enrollment in higher education.

After the intervention, we identified significant changes for the infographic group as compared with the control group for familiarity with screening for the SDOH categories of access to primary care (Mann-Whitney *U* = 514.5,  $z = -2.676$ ,  $P = .007$ ; mean infographic change score  $0.8182 \pm 1.3568$ ; mean control change score =  $0.0435 \pm .12645$ ), poverty (Mann-Whitney *U* = 584.5,  $z = -1.979$ ,  $P = .048$ ; mean infographic change score  $0.6667 \pm 1.190$ ; mean control change score =  $0.1522 \pm 1.3819$ ), environmental conditions (Mann-Whitney *U* = 556.5,  $z = -2.097$ ,  $P = .036$ ; mean infographic change score =  $0.6364 \pm 1.16775$ ; mean control change score =  $0.1087 \pm 1.12008$ ), and social cohesion (Mann-Whitney *U* = 561.0,  $z = -2.238$ ,  $P = .025$ ; mean infographic change score =  $0.7879 \pm 1.193$ ; mean control change score =  $0.2174 \pm 1.114$ ). Table 4 and Figure 3 provide a full breakdown of familiarity scores for both the intervention and control groups, as well as a visual representation of the change scores by group.

## DISCUSSION

Overall, the participants in the study who engaged with the continuing professional development via infographics reported changes in their clinical practice relative to patient-centered care tasks and familiarity with the SDOH. In addition, participants improved their considerations in screening for the SDOH in their clinical practice. Unfortunately, we did not identify any SDOH domain that was being screened for that included all of their patients at preintervention or postintervention. Moreover, we identified a general lack of familiarity with 2 key domains of the SDOH including social and community context and neighborhood and built environment. Our data revealed that continuing professional devel-

**Table 3. Screening Behaviors**

Topic	Intervention (n = 34)				Control (n = 46)			
	Yes, I consider this with all my patients	Yes, I consider this with most of my patients	Yes, I consider this with some of my patients	No, I do not consider this with my patients	Yes, I consider this with all my patients	Yes, I consider this with most of my patients	Yes, I consider this with some of my patients	No, I do not consider this with my patients
Education, n (%)								
Pre	5 (14.7)	9 (26.5)	13 (38.2)	7 (20.6)	10 (21.7)	10 (21.7)	18 (39.1)	8 (17.4)
Post	4 (12.1)	16 (48.5)	11 (33.3)	2 (6.1)	5 (10.9)	19 (41.3)	17 (37.0)	5 (10.9)
Economic stability, n (%)								
Pre	7 (20.6)	15 (44.1)	9 (26.5)	3 (8.8)	6 (13.0)	20 (43.5)	20 (43.5)	0 (0)
Post	12 (35.3)	14 (41.2)	4 (11.8)	4 (11.8)	12 (26.1)	18 (39.1)	14 (30.4)	2 (4.3)
Social and community context, n (%)								
Pre	2 (5.9)	17 (50.0)	12 (35.3)	3 (8.8)	3 (6.5)	21 (45.7)	15 (32.6)	7 (15.2)
Post	8 (23.5)	19 (55.9)	6 (17.6)	1 (2.9)	4 (8.7)	22 (47.8)	15 (32.6)	5 (10.9)
Health and health literacy, n (%)								
Pre	9 (26.5)	16 (47.1)	6 (17.6)	3 (8.8)	8 (17.4)	20 (43.5)	17 (37.0)	1 (2.2)
Post	16 (47.1)	10 (29.4)	5 (14.7)	3 (8.8)	13 (28.3)	13 (28.3)	17 (37.0)	3 (6.5)
Neighborhood and built environment, n (%)								
Pre	4 (11.8)	14 (41.2)	11 (32.4)	5 (14.7)	4 (8.7)	14 (30.4)	21 (45.7)	7 (15.2)
Post	7 (20.6)	14 (41.2)	10 (29.4)	3 (8.8)	2 (4.3)	19 (41.3)	19 (41.3)	6 (13.0)

Abbreviations: Post, postintervention; Pre, preintervention.

opment in the form of infographics was successful in enhancing awareness of the SDOH.

### Patient-Centered–Care Tasks

The 2020 CAATE Standards aim to improve patient outcomes and experiences because of education geared toward increasing graduates’ knowledge, skills, and abilities to provide patient-centered care.<sup>15</sup> The addition of this standard suggests there was no required education about patient-centered care and thus ATs credentialed before 2020 may lack necessary skills and knowledge. The lack of skills and abilities to provide whole-person health care is supported in our data and is consistent with other studies.<sup>16</sup> Moreover, ATs credentialed before 2020 should seek continuous professional development that encourages improvement of patient-centered–care behaviors in their practice. The increase in patient-centered care behaviors identified at postintervention points to the continual exposure of the infographics to bridge the patient-centered–care practice and knowledge gap.

### Considerations and Screening Practices for the SDOH

Although previous literature identified that engaging in formal continuing education, such as attending workshops, seminars, or conferences, is better at enhancing knowledge, our data revealed that informal continuous professional development in the form of infographics was also successful.<sup>17</sup> The success of the infographics as a means to improve considerations of the SDOH is consistent with other informal continuing education.<sup>17</sup> Our study identified that engaging in continual professional development via infographics can increase SSATs’ awareness. However, there were no significant changes identified between the 2 groups relative to screening. The SSATs reported they had both the knowledge and skills to provide individualized health care to patients, yet only half reported they routinely incorporated screenings or interventions in clinical practice, even at postintervention. Routinely addressing the factors that affect child health outcomes is imperative to improving long-term health for the country. Clinicians who work with children, much like the secondary school job setting in athletic training, are in a unique position in that they can address and intervene child adversity caused by the SDOH.<sup>12</sup> The structure of the secondary school setting affords ATs a duty to assess the SDOH of patients they encounter. By incorporating screenings, SSATs can help intervene “upstream” in the adversity of the populations they are working with to create better “downstream” health outcomes for the country and assist in the push to decrease the cost of health care.<sup>18</sup>

The likelihood of health care providers changing their clinical practice behaviors is dependent upon the access to resources, time to allocate to the behavior, and buy-in from their stakeholders. Whereas the 12-week timeline for the study improved awareness, long-term behavior change relative to screening behaviors may require more time. This substantiates why continuing professional development for health care providers must be individualized with regards to planning and reporting their learning activities.<sup>16</sup> Previous research in athletic training identified that selection behaviors for continuing education conferences are often dictated by content of interest, rather than by perceived needs.<sup>19</sup> Our study proposes a novel format of continuing education

**Table 4. Familiarity by SDOH<sup>a</sup>**

	Intervention, Mean ± SD	Intervention Mode	Control, Mean ± SD	Control Mode
Access to primary care <sup>b</sup>	3.79 ± 1.01	4	3.07 ± 1.10	4
Access to health care <sup>b</sup>	3.79 ± 0.91	4	3.11 ± 1.06	3
High school graduation	3.74 ± 1.05	4	3.24 ± 1.18	4
Enrollment in higher education	3.68 ± 1.04	4	3.20 ± 1.20	4
Health literacy <sup>b</sup>	3.65 ± 0.92	4	2.85 ± 1.12	2
Language and literacy <sup>b</sup>	3.59 ± 1.05	4	2.98 ± 1.12	3
Discrimination <sup>b</sup>	3.53 ± 0.90	4	2.83 ± 1.14	3
Access to healthy foods	3.29 ± 1.09	4	2.67 ± 1.01	2
Poverty <sup>b</sup>	3.24 ± 1.16	4	2.48 ± 1.13	2
Food security <sup>b</sup>	3.24 ± 1.08	4	2.59 ± 0.98	2
Crime and violence <sup>b</sup>	3.18 ± 1.09	4	2.35 ± 1.10	2
Housing stability <sup>b</sup>	3.15 ± 1.11	4	2.39 ± 0.95	2
Social cohesion <sup>b</sup>	3.15 ± 0.99	4	2.39 ± 1.11	3
Crime and violence <sup>b</sup>	3.12 ± 1.12	4	2.22 ± 1.05	2
Environmental conditions <sup>b</sup>	3.09 ± 0.97	3	2.33 ± 0.94	2
Quality of housing	2.97 ± 1.06	3	2.30 ± 0.96	2
Incarceration	2.91 ± 1.16	3	2.26 ± 1.04	1
Early childhood education & development <sup>b</sup>	2.88 ± 1.20	4	2.33 ± 1.01	2
Civic participation	2.74 ± 1.26	3	2.04 ± 1.03	1

Abbreviation: SDOH, social determinants of health.

<sup>a</sup> The 19 subactivities are ordered from highest familiarity to lowest familiarity using the mean score from the intervention group.

<sup>b</sup> Included in the infographic interventions (Supplemental Figure 1).

outside of the typical lecture, conference, or workshop. However, competency-based education<sup>20</sup> and continuing professional competency rethinks the passive process of learning for the credentialed health care provider into one focused on reflection, learning from patient encounters, and guiding.<sup>16,21</sup> Interventions designed to address the attainment or retention of knowledge solely are not practical, and continuing professional development should be focused on the influences on future patient care.<sup>22</sup> This means reporting should not solely be the completion of the activity or a passive quiz or test on the content. It should be forward-thinking with approaches such as direct clinical observation, patient feedback, and medical-documentation chart audits.<sup>15,23</sup>

### Familiarity With the SDOH

The SSATs were least familiar with the domains of social and community context and neighborhood-built environment. The participants were not provided an infographic dedicated to incarceration and institutionalization or civic participation, which may account for the unfamiliarity in these domains. Children who live in unsafe neighborhoods have been reported to engage in less physical activity, which may perpetuate SSATs' unfamiliarity providing care to incarcerated and institutionalized populations.<sup>24</sup> The unfamiliarity of access to healthy foods and quality of housing further supports previous findings that highlight ATs lack of knowledge on public health topics especially related to environmental factors.<sup>6</sup> When comparing the change in familiarity from preintervention to postintervention between the control and intervention groups, we are able to identify that the infographics had an impact on familiarity of the SDOH for the SSATs.

Previous literature supports the success of informal continuing education to improve clinical abilities.<sup>17</sup> Furthermore, the improvement of clinical practice within an intervention group

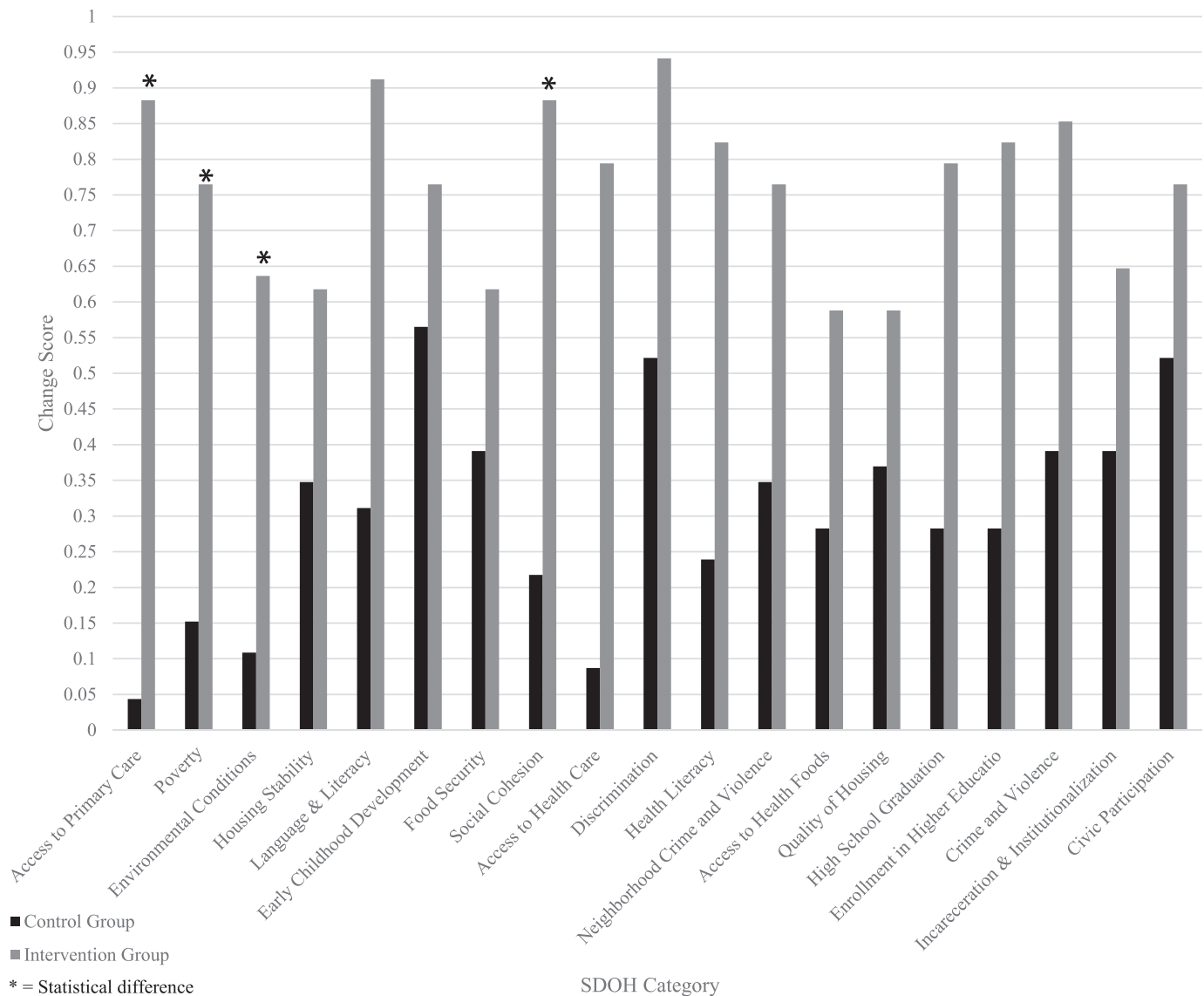
after being exposed to an educational intervention on the SDOH has also been previously identified.<sup>25</sup> Moreover, the large increase in familiarity scores reinforces the continual exposure to infographics as a tool to promote potential behavior change. The increase in familiarity scores after continual exposure to infographics may be attributed to the behavior change theory known as diffusion of innovation.<sup>26</sup> Time is a main component of this theory. Essentially, the more frequently that someone is exposed to a new idea or information, the higher the likelihood they will adopt it in the future.<sup>26</sup> Therefore, the behavior change documented in our study is most likely due to the repeated and continual exposure to the SDOH infographics for 12 weeks. We believe the educational intervention also addresses the starting point to behavior change, which is to increase awareness.<sup>27</sup> The infographics detailed the 2 main components of social learning theory including awareness of the SDOH and the ability to make the change.<sup>27</sup> Each infographic had a series of questions that ATs could ask or integrate into their clinical practice to begin the conversation on the SDOH. The purpose of the intervention was both to educate and to provide strategies for implementation, which has been a key indicator of seeing eventual behavior change, as evidenced by other health care screening practices.<sup>28</sup>

### Limitations and Future Research

Limitations of this study include patient interaction restrictions due to the COVID-19 global pandemic. However, amid the pandemic, patients' health disparities became more apparent and may have affected the way our participants provided care. For ATs to provide upstream health care and to facilitate more frequent screening for SDOH in all populations, future researchers should focus on creating a standardized tool that ATs can use to aid in SDOH screening across job settings. Whereas this study focused on exposure



**Figure 3. Change scores for the familiarity of the 19 social determinants of health. Abbreviation: SDOH, social determinants of health.**



and strategies to screen, it is important to note that screening should not be the end goal. If issues or red flags are identified, health care providers must have the resources in place to adequately address the SDOH. A guide for next steps, after an AT has identified adverse childhood events or issues among the SDOH, should be developed and implemented. Finally, exploration of infographics and other asynchronous engaging visual content such as storytelling, oral histories, flowcharts, and animated graphics interchange formats, or GIFs, for professional development should be considered for other content areas across other health care professions.

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