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I, Lauren Hsuan, hereby submit this original work as part of the requirements for the degree of Master of Science in Genetic Counseling.

It is entitled:

Genetic counselor self-assessment of provision of culturally responsive care and training in social determinants of health

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Genetic counselor self-assessment of provision of culturally responsive care and training in social determinants of health

A thesis submitted to the
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by

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Abstract

Social determinants of health (SDH) can be significant influencers of health and wellness and contribute to health disparities. As providers of clinical and psychosocial care, genetic counselor awareness of cultural influences on health and management of personal biases can improve patient experience due to stronger patient-provider interactions, reduction of communication and management errors, and the development of trust between minority cultural groups and the healthcare system.

We surveyed genetic counselors who graduated between 2017-2021 to explore (1) genetic counselors' self-perception of their knowledge, skills, comfort, and attitudes relating to the provision of culturally responsive health care to diverse patient populations as measured by the Clinical Cultural Competency Questionnaire (CCCQ), and (2) methods that genetic counseling graduate programs use to address social determinants of health. A modified version of the CCCQ was distributed to genetic counselors who graduated from an ACGC-accredited genetic counseling graduate program between 2017-2021. Mean scores were calculated for all participants. Means were also compared between graduation years (2017-2019 and 2020-2021) to explore whether depth of training and curriculum methods addressing SDH differed, potentially in response to the conversations surrounding the social justice movements that occurred in 2020. SDH methods were tallied, and open-ended responses were post-coded.

83 participants were included in this study. On average, genetic counselor participants reported believing SDH, including culture, to be "quite" important health influences. However, participants reported only being "a little" or "somewhat" equipped and comfortable in navigating cross-cultural situations that may arise in patient interactions. Participants reported the most used method for teaching SDH in genetic counseling graduate programs to be group discussion. Open-

ended responses indicated that group discussions were also impactful along with training opportunities outside of their genetic counseling program curriculum (e.g., elective courses housed in their institution's College of Public Health or other elective extra-curricular opportunities). Participants who graduated from a genetic counseling graduate program between 2020-2021 (versus those who graduated between 2017-2019) reported more depth of training in several SDH topics: poverty, educational status, illiteracy, sexism, racism, classism, ableism, and homophobia. 2020-2021 graduates also scored significantly higher in Knowledge than 2017-2019 graduates. Findings suggest that there is a desire and need for more training opportunities on social and cultural dynamics related to health in genetic counseling graduate training. In-depth and multidisciplinary training about SDH for genetic counselors could help further the goal of health equity for all patient populations.

Keywords: *Genetic Counseling, Cultural Responsiveness, Cultural Competency, Social Determinants of Health, Graduate Training, Curriculum*

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Introduction

While quality of clinical medicine provided to patients is a significant influencer of health, research has revealed that understanding the relationship between social factors, termed "social determinants of health," and health also promotes positive patient health outcomes (Braveman & Gottlieb, 2014). Social determinants of health, such as racial, ethnic, and cultural background, education level, and socioeconomic status, are reported as one of the twelve leading health influencers in the United States (Healthy People 2020). As clinical providers, it is important that genetic counselors have an understanding of social determinants of health as well as competence in how to address these factors in clinical situations so they can better serve patients and reduce health disparities (Penman-Aguilar et al., 2016).

Social Determinants of Health

Social determinants of health (SDH) are defined as "conditions in the places where people live, learn, work, and play that affect a wide range of health and quality-of life-risks and outcomes" (CDC, 2020). A growing body of literature has revealed that a range of social identities, including but not limited to socioeconomic status, geographical location, race, ethnicity, culture, education, food and job security, and disability status, significantly impact health disparities in the United States (McGinnis et al., 2002).

SDH can lead to differences in health outcomes, and common terms used to describe discrepancies in health outcomes include *health inequality, health equity*, and *health disparities*. *Health inequality* refers to any general health differences in groups or individuals, without including any moral consideration to whether the differences are fair (Arcaya et al., 2015). *Health equity* and *health disparities* are intertwined concepts that do account for justice when

measuring health inequalities. *Health equity* is the principle driving the commitment to reduce health disparities; failing this principle drives health inequity (Braveman, 2014). *Health disparities* are defined as often systematic, likely avoidable health differences linked to economic, social, or environmental disadvantage (Braveman, 2014; Diez Roux, 2012). Health disparities affect groups of people who have encountered greater barriers to health and wellness, and these barriers are largely influenced by the following domains: economic stability, education access and quality, healthcare access and quality, neighborhood and built environment, and social and community contexts (Healthy People, 2030). Specifically, aspects such as racial or ethnic identity; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion can be significant influencers of health and wellness (Healthy People, 2020).

Culture and Health Outcomes

Several social identities can contribute to health disparities, including culture. Generally, the definition of culture encompasses shared values, beliefs, customs, and behaviors (Arnault, 2018; Leininger, 1985; Pasick et al., 1996; U.S. DHHS, 2000). Description of culture's influence on health outcomes varies between healthcare specialties. The United States Department of Health and Human Services defines culture to involve many aspects of identity, including the language, thoughts, communications, actions, customs, beliefs, values, and institutions of racial, ethnic, religious, or social groups that then impact health and wellness (U.S. DHHS, 2000). In context of health behavior, culture is described as being directly associated with a health-related behavior, thus directly impacting health as well as the reception and acceptance of health education (Pasick et al., 1996). Culture in a nursing context is described as values generally

transferred through generations that influence people's thinking and action modes (Leininger, 1985). Cultural components of SDH interact with societal structures and influence interpersonal and community dynamics – much like other SDH, such as gender and socioeconomic status (Arnault, 2018).

While the language to define culture and describe its impact on healthcare may vary among specialties and groups, the literature confirms that culture drives lifestyles and beliefs that influence peoples' risks for health conditions and decisions related to health management, as culture shapes people's definition of health and illness (Chang et al., 2012). Cultures can be dynamic, and understanding the dynamic nature of cultural identity is important in serving increasingly diverse and globalized populations, especially in fields like genetic counseling where culture can significantly impact the counseling process and patient decision-making (Zayts et al., 2019).

Culturally Responsive Health Care

A growing body of research asserts that increasing healthcare provider understanding of factors that drive culture works toward the elimination of health inequity (Lorié et al., 2017; Parrott, 2018). Provider awareness of cultural influences on health and management of personal biases can improve patient experience due to stronger patient-provider interactions, reduction of communication and management errors, and the development of trust between minority cultural groups and the healthcare system (Kessler et al., 2017).

Cultural responsiveness is an outcome based on one's ability to form meaningful relationships with people from diverse backgrounds to facilitate care that is "competent, inclusive, respectful, and attentive" to people's cultural needs and beliefs while receiving care

(Wilson et al., 2018). The commitment to continually learn about other groups' cultures and regard interactions with cross-cultural patients with humility promotes cultural responsiveness. In order to nurture cultural responsiveness, providers should be attuned to both the visible (e.g. skin color, traditional clothing) and the invisible (e.g. family dynamics, health beliefs) aspects of culture and adjust their care accordingly for each individual patient (Wang, 2001).

In genetic counseling specifically, several studies have explored different approaches to improving cultural responsiveness and its effect on patient care. Strategies include utilization of explanatory models of illness that elucidate patients' perception of their condition and relevant values (Abad, 2012); targeted education in values and of different cultural groups (e.g. Orthodox Jewish people) and how their beliefs impact family planning decisions (Grazi & Wolowelsky, 2015); creation of clinic spaces that promote a safe and welcoming space for disadvantaged groups (Vaupel-Klein & Walsh, 2021); and use of clinical documentation language that is inclusive and sensitive (Zayhowski et al., 2019). These studies all concluded that implementation of these strategies may improve cultural competency/responsiveness and promote patient-provider connection. However, no recent studies have aimed to measure American Council for Genetic Counseling (ACGC)-accredited program genetic counseling graduates' knowledge, skills, comfort, and attitudes related to navigating cross-cultural clinical patient encounters.

Genetic Counseling and Curriculum on Social Determinants of Health

As providers of clinical and psychosocial care, genetic counselors hold a responsibility to be cognizant of SDH, as many SDH define patient cultural identity and therefore impact health outcomes. The demographic of genetic counselors has historically been and continues to be homogenous. With demographic distributions remaining nearly constant for the past nearly four decades, the genetic counselor workforce demographics have been reported as 95% female, 90-

94% White/Caucasian, 3-8% Asian or Asian Indian, 1% Black or African American, 0-2% Hispanic, 0-1% Native Americans/American Indian or Alaskan Native, and 0-0.3% Native Hawaiian or Other Pacific Islander (Bao et al., 2020). The lack of demographic diversity has the potential to limit the profession-wide understanding of diverse experiences, as experiential knowledge of culture is predominantly from the White, female perspective. Efforts to increase demographic diversity in the workforce are ongoing but have yet to foster a significant change (Channaoui et al., 2020; Kumaravel et al., 2011).

The extent to which graduate programs educate genetic counselors on SDH and the roles of SDH in affecting health outcomes is unknown. Education addressing cultural identity and its impact as a SDH can help prepare genetic counselors to identify systems that lead to health inequities and provide quality patient-centered care to an increasingly diverse population (Mcewen & Jacobs, 2021). The ACGC graduate program accreditation standards include curricula requirements on "health disparities and other social determinants of health" under the standard B2.1.4: Social, Ethical, and Legal Issues in Genetics, and "multicultural sensitivity and competency" under standard B2.1.3: Psychosocial Content" (ACGC, Revised 2019). However, these guidelines are broad and do little to inform programs on what content and methods should be included in their training curriculum. This ambiguity allows for a wide variety of multicultural training methods and included content.

The primary objectives of this study were to explore (1) genetic counselors' self-perception of their knowledge, skills, comfort, and attitudes relating to the provision of culturally responsive health care to diverse patient populations as measured by the Clinical Cultural Competency Questionnaire (CCCQ), and (2) methods that genetic counseling graduate programs use to address social determinants of health. The data collected in this study may serve to inform

the genetic counseling community of genetic counselors' perceived ability to provide culturally responsive health care. Findings from this study may also help inform graduate training programs of what specific methods and content best facilitate student education regarding SDH; such insights may guide genetic counselors' training to develop their knowledge and skill in SDH and culturally responsive care to serve a continuously growing diverse population.

Methods

Survey Instruments

This was a quantitative, cross-sectional study. The assessment of knowledge, skills, comfort, and attitudes was measured using the Clinical Cultural Competency Questionnaire (CCCQ). The CCCQ was developed by the Center for Healthy Families and Cultural Diversity at Rutgers Medical School and used in this study with permission from the creator Dr. Robert Like.

The CCCQ was originally designed to assess physicians' knowledge, skills, and attitudes related to the provision of culturally competent health care (Like, 2001), but the original or modified versions have since been administered to pharmacy, dental, and medical students, as well as nurses and other clinicians (Classe-Cutrone et al., 2017; Echeverri et al., 2010; Ladson et al., 2006; Okoro et al., 2012). The CCCQ instrument uses 5-point Likert scale response options that allow participants to self-assess their knowledge, skills, and attitudes regarding culturally responsive patient care. The original CCCQ was modified by the research team to better target genetic counselors. Modifications included omission of survey questions assessing skills and knowledge outside of the scope of genetic counseling practice, modification of survey questions to better target genetic counseling-related skills and clinical situations (for example, questions that assessed skills related to making diagnoses were modified to assess returning genetic test

results), and addition of survey questions to include additional competencies relevant to genetic counseling, such as taking a pedigree and communicating genetic test options.

The CCCQ is divided into five sections: Knowledge, Skills, Encounters/Situations, Attitudes, and Education/Training. The Knowledge section measures how knowledgeable participants perceive themselves to be in different aspects of cultural responsiveness in relation to providing care to diverse populations (for example, "how knowledgeable do you feel in health risks experienced by diverse racial and ethnic groups?"). The Skills section measures how adept participants perceive themselves in dealing with sociocultural issues in various areas in patient care (for example, "how skilled do you feel in conducting a family history intake in a culturally sensitive manner?"). The Encounters/Situations section measures the perceived comfort level of participants in dealing with different cross-cultural encounters/situations (for example, "how comfortable do you feel speaking in an indirect rather than a direct way to a patient about their diagnosis if this is more culturally appropriate?"). The Attitudes section measures how important participants find different factors (e.g. genetics, lifestyle, racism, etc.) to be in contributing to health disparities; the Attitudes section also measures how aware participants are of their own racial, ethnic, or cultural identities and biases. The Education/Training section from the CCCQ measures the level of training in cultural responsiveness participants received in different academic and occupational stages (undergraduate college, graduate school, professional career, and self-pursued).

Three questions were added to the Education/Training section by the research team to assess genetic counseling training program curriculum. The first question assessed how thoroughly participants thought their graduate program covered the following topics related to SDH outlined in the Attitudes section of the CCCQ: genetics, lifestyle, environment, poverty,

educational status, illiteracy, ageism, sexism, racism, classism, ableism, homophobia, and an "other" option in which participants could specify other topics they deemed relevant. Response options matched those on the CCCQ and ranged from "not at all" to "very" on a 5-point Likert scale.

The second question assessed methods used to teach SDH. This question was taken from a portion of a survey documenting consortium school SDH curricula, developed by the American Medical Association's Accelerating Change in Medical Education Consortium (Lewis et al., 2020). The nine methods included:

1. Case studies with specific social determinants of health elements included
2. Virtual patient panels with specific social determinants of health elements included
3. Teaching electronic health records with social determinants of health conditions listed
4. Community-based service or research projects
5. Requirement to conduct needs-assessment(s) looking at the social determinants of health
6. History taking tool that addresses social determinants of health
7. Integrated interprofessional experiences during which students learn with and/or from peers or professionals in other healthcare professions
8. Having visiting guests/advocates from community-based organizations involved in addressing social determinants of health
9. Readings and films about addressing social determinants of health

In addition to the curriculum methods listed above, the following response options were included for this study:

- Group discussions regarding social determinants of health
- None of the above methods were used by my graduate program
- My graduate program did not explicitly address social determinants of health in their curriculum

Study participants were asked to select all topics that their graduate programs utilized to teach students about SDH. A third open-ended follow-up question inquiring which method(s) participants found the most impactful in learning about SDH was also included. A copy of the modified CCCQ used in this study may be made available upon reasonable request.

Study Participants and Survey Administration

Inclusion criteria for study participants were genetic counselors ages 18 and older who graduated from accredited genetic counseling programs in the United States and Canada between 2017 and 2021. These graduation dates were selected to better target graduates who received the most recent curricula addressing cultural responsiveness and SDH during their training. Participants who did not complete their graduate training program or were under the age of 18 were excluded from the study. Participants did not have to be certified genetic counselors, and there were no restrictions on participant employment status.

Study data were collected and managed using REDCap electronic data capture tools hosted at Cincinnati Children's Hospital Medical Center (Harris et al., 2019; Harris et al., 2009). Emails with a study description and survey link were sent to the National Society of Genetic

Counselors (NSGC) and American Board of Genetic Counseling (ABGC) email lists, as well as to members of the Association of Genetic Counseling Program Directors (AGCPD) with a request for AGCPD program directors to forward the survey to their alumni email lists. A more detailed description of the study and a consent page was included as a first page of the survey once participants clicked the REDCap link.

Descriptive Data Analysis

Descriptive statistics were used to characterize the study population. Frequencies (percentages) were reported for demographic information. For the CCCQ portion of the survey (Knowledge, Skills, Encounters/Situations, Attitudes, and Education/Training), numerical values were assigned to Likert answer scores ("not at all" = 1; "a little" = 2; "somewhat" = 3; "quite a bit" = 4; "very" = 5).

The average scores within the Knowledge, Skills, Encounters/Situations, Attitudes, and Education/Training sections were reported as means. Means were calculated by summing the Likert answer scores within each section (getting a sum score) and dividing by the total number of questions answered in each section resulting in mean scores for each section that range from 1 to 5. For example, the Knowledge section was composed of 14 questions. Participants could get a sum score with a minimum of 14 in the Knowledge section if answering "not at all" for each question and a maximum of 70 if answering "very" for each prompt. This sum score was then divided by 14 resulting in a score ranging from 1 to 5. The Skills section consisted of 16 questions; the Encounters/Situations section consisted of 11 questions; the Attitudes section was comprised of 21 questions; and the Education/Training section consisted of 4 questions.

The Likert-scale question added to the Education/Training section by the research team asking how in-depth genetic counseling graduate programs taught about 12 SDH topic were reported separately as means on a 1-5 scale for each individual SDH topic. These SDH question scores were not included in the Education/Training section mean calculation because the question is not from the original CCCQ.

The two non-Likert scale questions added to the Education/Training section were reported as frequencies. Responses for the question asking about genetic counseling graduate school SDH curriculum methods were reported as the frequency (percentage) of respondents who selected each category. The open-response question regarding the SDH teaching method(s) participants found most helpful during their genetic counseling graduate training was coded by the research team by reviewing participant responses and categorizing curriculum methods (for example: group discussions, guest advocacy speakers, etc.). Responses were reported as total number of times each category was mentioned by participants.

Comparative Data Analysis

Mean scores for the Knowledge, Skills, Encounters/Situations, Attitudes, and the Likert scale questions in Education/Training were compared based on participant year of graduation from their genetic counseling graduate program.

The graduation years were grouped into two ranges: 2017-2019 and 2020-2021. This grouping was chosen to account for events that occurred in 2020, such as the murder of George Floyd and Breonna Taylor and increased attention toward social justice movements such as Black Lives Matter, receiving international attention. In response, these events spurred discussion in the medical community about the healthcare community's responsibility to reduce

social injustices in healthcare practices (Dreyer et al., 2020; Hoofnagle et al., 2020; Weine et al., 2020) and may have led to curriculum revisions in genetic counseling training programs. By stratifying by graduation year, we could explore whether respondents reported changes in genetic counseling training and perceived aptitude regarding social determinants of health and culturally responsive care after the increased attention and discussion surrounding social equity in medicine. The means of the two graduation year groups were compared using Student's t-test.

Mean scores were used to contextualize genetic counselors' scores to other existing literature that assessed participant cultural competency using the CCCQ. If existing publications reported sum average scores rather than 1-5 mean scores used in this study, sum averages in the published literature were divided by reported number of questions in each of their survey sections to convert averages to a 1-5 scale to contrast findings between studies. Mean scores for the Education/Training section were not contrasted with scores found in the literature, due to changes made in the current study to this section.

Results

Participation

One-hundred and ten individuals participated in the survey. Twenty-seven participants reported that they did not graduate from an accredited genetic counseling graduate program between 2017-2021, which prompted the end of the survey. Therefore, a total of 83 respondents were included in this study. Most participants identified as White/Caucasian (80%) and female (92%). Participants ranged in age from 24 to 38 years old, with the majority (65%) being between 24 and 28 years of age. Forty-seven (57%) participants graduated from a genetic counseling graduate program in 2017-2019, and 36 (43%) participants graduated in 2020-2021. Most participants (77%) reported working in a direct patient care position. Seventy-four (89%)

reported they were ABGC Board certified at the time of taking the survey. Detailed participant characteristics are outlined in Table 1.

CCCQ Scores

Section means were highest for Attitudes (mean=4.1, SD=0.4) and lowest for Encounters/Situations (mean=2.8, SD=0.6). Mean Knowledge score was higher for participants who graduated in 2020-2021 compared to those who graduated in 2017-2019 (3.3 vs. 2.9, p=0.02) (Table 2).

Education/Training

All 83 participants responded to the questions asking how in-depth certain SDH topics were covered in genetic counseling graduate school curriculum. Reported depth of coverage was highest for genetics (mean=4.74; SD=0.62) and lowest for ageism (mean=1.96; SD=1.09) (Table 3). Mean scores between graduation groups differed for eight topics. Respondents who graduated between 2020-2021 reported higher mean coverage of how poverty (3.1 vs. 2.5, p=0.02), educational status (3.5 vs. 3.0, p=0.02), illiteracy (3.5 vs. 2.6, p=0.0008), sexism (2.7 vs. 2.2, p=0.049), racism (3.6 vs. 2.9, p=0.002), classism (2.7 vs. 2.2, p=0.03), ablism (3.4 vs. 2.5, p=0.0003), and homophobia (2.6 vs. 2.2, p=0.04) relate to SDH compared to respondents who graduated between 2017-2019. The 2017-2019 group did not score higher than the 2020-2021 group for any topic included in the survey.

SDH Curriculum Methods

Eighty-two participants (98.8%) responded to the question regarding methods that their graduate program used to teach about SDH. Participants were able to check all options that applied to their program's curriculum (Table 4). The majority of participants reported the

following training methods used: group discussions regarding SDH (79%), readings and films addressing SDH (72%), case studies with specific SDH included (56%), and guest speakers/advocates from community-based organizations involved in addressing SDH (54%). Additionally, one participant reported none of the available training methods were used to teach SDH at their graduate program, and one other participant reported that their graduate program did not explicitly address SDH in their curriculum. Thus 80 participants (97.6%) indicated that SDH was covered by at least one teaching method. The three most frequently reported categories from the open-ended question regarding the most impactful method used during genetic counseling graduate school were (1) group discussion, (2) methods used in training experiences found outside of the genetic counseling graduate program (for example, elective coursework taken through the College of Public Health), and (3) patient presentations (Appendix A).

Discussion

This study assessed participants' perceived knowledge, skills, comfort, attitudes, and education/training relating to the provision of culturally responsive health care using a modified version of the CCCQ. The section mean score was highest for Attitudes at 4.1, indicating that participants felt that SDH are "quite a bit" important factors in (1) contributing to health disparities and (2) interactions with patients, colleagues, and students while providing equitable clinical care, and that it is "quite a bit" important for healthcare providers to receive training in cultural diversity and/or multicultural health care. Section mean scores for Knowledge, Skills, and Encounters/Situations fell between 2 and 3 on the CCCQ 5-point Likert scale, indicating that participants perceive themselves to be "a little" or "somewhat" knowledgeable, skilled, and comfortable in providing culturally responsive care. The moderate scores in these three sections suggest there is an opportunity for improvement in cultural responsiveness training for genetic

counselors. The higher mean scores on the Attitudes section than the Knowledge, Skills, and Encounters/Situations sections could indicate that participants recognize SDH are important in providing culturally responsive care, but they do not perceive themselves to be adequately prepared to navigate culturally sensitive clinical situations. This difference in scores between attitudes versus knowledge, skills, and comfort suggests that additional training in SDH and cultural responsiveness may be both warranted and well-received by genetic counselors.

Comparisons between participants who graduated from genetic counseling graduate school between 2017-2019 vs. 2020-2021 suggest levels of training related to racial/ethnic cultural diversity and multicultural healthcare in undergraduate college, graduate school, professional career, or personally pursued were not significantly different between groups. However, the 2020-2021 graduation group scored significantly higher in depth of coverage during genetic counseling graduate training on 8 out of the 12 SDH topics included in this survey. The higher scores on these eight topics (poverty, educational status, illiteracy, sexism, racism, classism, ablism, and homophobia) among those who graduated in 2020-2021 suggests that the growing conversation about health equity after the social justice issues in 2020, such as the murder of George Floyd and the increased attention toward movements like Black Lives Matter, may have led to modifications in SDH-related curricula in genetic counseling programs. Alternately, it is possible that these topics were more salient given current events when they were taught these curricula. The 2020-2021 graduation group also scored significantly higher in the Knowledge section than the 2017-2019 graduation group, which suggests increased training or saliency related to SDH topics may have been related to the differences seen between groups.

The most used method for teaching SDH in genetic counseling graduate programs was reported to be group discussion. Open-ended responses indicated that group discussions were

also impactful along with training opportunities outside of their genetic counseling program curriculum (e.g., elective courses housed in their institution's College of Public Health or other elective extra-curricular opportunities). Frequent reporting of non-program curriculum as an impactful learning method suggests that genetic counseling programs may want to consider partnering with other groups or resources to potentially strengthen perceived SDH training among genetic counselors.

The CCCQ has been used to assess cultural competency among other healthcare providers, including pharmacy students, medical students, and nurses (Doroudgar et al., 2021; Hart & Moreno, 2016; Ladson et al., 2006; VanZant, 2014). The genetic counseling participants included in this study scored equal to or higher in attitudes and higher in knowledge, skills, and comfort on average than second year pharmacy students in two different studies (VanZant, 2014; Doroudgar et al., 2021). Genetic counselor participants in the current study scored, on average, higher in knowledge, skills, and attitudes and equal in comfort than medical students in one study (Ladson et al., 2006). Genetic counseling participants scored higher in skills, and lower in knowledge and comfort (attitudes could not be contrasted) on average compared to registered nurses in southeastern United States (Hart & Moreno, 2016). Notably, these previous studies conducted data collection before the increased conversation regarding social equity in medicine that occurred after the social justice events in 2020. Therefore, curriculum and potential learner outcomes changes in the aforementioned studies would not have been impacted by the increased focus on cultural responsiveness and SDH after the 2020 social justice events. It is also important to consider that the CCCQ surveys used for these publications were modified by their research teams to better fit their studies' target populations, so the specific competencies assessed by each survey version may not be the same.

Genetic counselors regularly navigate cultural dynamics to appropriately provide care with familial impacts. While cultural responsiveness is an important factor in any sector of healthcare, genetic counselors hold a unique role that prioritizes psychosocial counseling and navigating interfamilial dynamics as much as other clinical services (e.g., testing coordination, clinical education, etc.). Due to the higher emphasis of SDH and cultural considerations in clinical practice, it could be expected that genetic counselors should score higher in knowledge, skills, and comfort compared to healthcare specialties that don't have the same emphasis on those influencers of care in their clinical practice. While genetic counselor participants in this study did generally score higher than previously published scores for other specialties, some scores, such as knowledge and comfort, were lower than reported scores in previous studies. These trends support the idea that more effort to train genetic counselors in navigating culturally sensitive clinical situations, like through increased training in SDH in genetic counseling graduate school, may be beneficial to increase perceived cultural responsiveness preparedness among genetic counselors.

Limitations

One limitation to this study was the small sample size. This study included 83 participants. Approximately 1,800 genetic counselors matriculated into ACGC-accredited genetic counseling graduate programs from 2015-2019 (National Matching Services, 2021). Thus, participants in the current study represent only 4.6% of the target population. Small sample size also limited data analyses. For example, average scores could not be compared between certain respondent demographics (e.g. graduate school region, race/ethnicity, etc.) due to insufficient numbers of participants representing every category.

The survey was distributed through email listservs, and participation was completely voluntary with no incentive for involvement. Due to these recruitment methods, participants who have a special interest in culturally responsive care and training may be disproportionally represented in our study group. This representation could skew the responses to the survey and therefore inaccurately represent the genetic counseling community as a whole.

Recall bias is also possible as respondents, especially those who graduated several years ago, may not accurately remember what methods their graduate programs used to teach social determinants of health. Respondents also self-reported their skills, knowledge, comfort level, and attitudes which makes the responses subjective and therefore subject to recall bias.

Lastly, it is important to consider social desirability bias. This study asked respondents about how important participants believe different social determinants of health to be in providing patient care. Respondents, especially in the wake of recent social justice movements, may have felt obligated to answer the way they are "supposed to," rather than in a way that reflects their true attitudes and perceived aptitude.

Future research

One area of future research could be to assess direct levels of cultural responsiveness rather than genetic counselors' perceived aptitude in cultural responsiveness, such as assessment with a tool that does not rely on self-reporting. Further research assessing curriculum and training methods and their association with learner outcomes regarding SDH is also recommended. For instance, repeating this study with incoming genetic counseling students and reassessing at the end of their training could inform general efficacy of current SDH training in graduate programs. Another research area could focus on specific training methods and content

that best aid in improving the knowledge, skill, comfort, and attitudes of genetic counselors regarding culturally responsive care. Specifically, surveying or interviewing recent genetic counseling graduates on how SDH training methods/curricula apply to their clinical practice may inform what specific curricula/methods successfully prepare genetic counselors to navigate culturally sensitive situations.

Conclusion

Genetic counselors help patients and families understand familial risks for disease and navigate important decisions that impact health and wellness, often for multiple generations in a family. Patient-focused counseling requires significant aptitude in cultural responsiveness to facilitate informed decision making that aligns with diverse values and beliefs. While participants reported believing that cultural and social factors are important influencers of health, they reported only being "a little" or "somewhat" equipped and comfortable in navigating cross-cultural situations that may arise in patient interactions. Additionally, findings suggest that there is a desire and need for more training opportunities on social and cultural dynamics related to health in genetic counseling graduate training, professional careers, or ideally both.

Further, 2020-2021 graduates reported more depth of training in several SDH topics, as well as scored significantly higher in Knowledge, suggesting that programs may have adapted their curriculum in light of increased focus on social justice issues in the media, which in turn may have improved genetic counselor self-reported cultural responsiveness. Without intentional curriculum addressing social determinants of health and culture's place as such, genetic counselors are limited in their ability to improve healthcare quality to all patient demographics. In-depth training about SDH for genetic counselors could help further the goal of health equity for all patient populations.

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Table 1. Participant Characteristics

General	All (N=83)
	N (%)
Age	
24-28	54 (65)
29-33	24 (29)
34-38	3 (4)
Undisclosed	2 (2)
Gender	
Female	76 (92)
Male	5 (6)
Non-Binary	1 (1)
Undisclosed	1 (1)
Race/Ethnicity	
Asian/Asian Indian	3 (4)
Black/African American	1 (1)
Hispanic/Latino/Spanish Origin	1 (1)
Middle Eastern/North African	1 (1)
White/Caucasian	66 (11)
Multiracial/Multiethnic	9 (11)
Undisclosed	2 (2)
Have Ever Lived Outside of the United States	
Yes	25 (30)
No	58 (70)
Fluent in Language other than English	
Yes	10 (12)
No	73 (88)

Education/Career	All (N=83)
	N (%)
GC Graduation Year	
2017	12 (15)
2018	16 (19)
2019	19 (23)
2020	21 (25)
2021	15 (18)
Country of Graduate Program	
United States	71 (86)
Canada	12 (14)
Graduate Program Region[1]	
Region 1	1 (1)
Region 2	21 (25)
Region 3	10 (12)
Region 4	37 (45)
Region 5	4 (5)
Region 6	7 (8)
Undisclosed	3 (4)
Current GC Position Type	
Direct patient care	64 (77)
Non-direct patient care	5 (6)
Mixed position	12 (14)
Do not currently have a position	2 (2)
ABGC Board Certified	
Yes	74 (89)
No	9 (11)

[1] *Graduate program region details can be found in Appendix*

Table 2. CCCQ Mean Scores and Comparisons

CCCQ Section	Mean (SD)			
	All (N=83)	**2017-2019 (N=47)**	**2020-2021 (N=36)**	**p value**
Knowledge	3.1 (0.6)	2.9 (0.5)	3.3 (0.6)	**0.02**
Skills	3.3 (0.6)	3.3 (0.7)	3.4 (0.6)	0.26
Encounters/Situations	2.8 (0.6)	2.7 (0.5)	2.9 (0.6)	0.15
Attitudes	4.1 (0.4)	4.1 (0.4)	4.2 (0.5)	0.25
Education/Training	2.9 (0.7)	2.8 (0.8)	2.9 (0.7)	0.45

Mean scores (SD=standard deviations) are presented. Mean scores were compared between participants who graduated from genetic counseling graduate program in 2017-2019 vs. 2020-2021 using Student's t-test. Statistical significance threshold set at p=0.05.

Table 3. Mean Scores and Comparisons for SDH Topics Taught in Genetic Counseling Graduate School

How thoroughly did your genetic counseling graduate program address each of the following topics in their curriculum?	**Mean (SD)**			
	All (N=83)	**2017-2019 (N=47)**	**2020-2021 (N=36)**	**P value**
Genetics	4.7 (0.6)	4.8 (0.6)	4.6 (0.7)	0.18
Lifestyle	2.95 (1.0)	3.0 (1.1)	2.9 (1.0)	0.63
Environment	3.2 (1.0)	3.2 (0.96)	3.2 (1.1)	0.75
Poverty	2.8 (0.97)	2.5 (0.8)	3.1 (1.2)	**0.019**
Educational status	3.3 (1.0)	3.0 (0.9)	3.5 (1.1)	**0.02**
Illiteracy	3.1 (1.1)	2.6 (1.0)	3.5 (1.2)	**0.0008**
Ageism	1.96 (0.9)	1.8 (0.9)	2.1 (1.0)	0.15
Sexism	2.4 (1.1)	2.2 (0.9)	2.7 (1.3)	**0.049**
Racism	3.2 (0.96)	2.9 (0.95)	3.6 (0.97)	**0.002**
Classism	2.4 (1.1)	2.2 (0.96)	2.7 (1.1)	**0.030**
Ableism	2.98 (1)	2.5 (1.1)	3.4 (1.0)	**0.0003**
Homophobia	2.4 (0.97)	2.2 (0.8)	2.6 (1.1)	**0.04**
Overall	2.95 (0.6)	2.7 (0.6)	3.2 (0.7)	**0.004**

Mean scores (SD=standard deviations) are presented. Mean scores were compared between participants who graduated from genetic counseling graduate program in 2017-2019 vs. 2020-2021 using Student's t-test. Statistical significance threshold set at p=0.05.

Table 4. Reported SDH Teaching Methods used in Genetic Counseling Graduate Programs

SDH Training Method	Participants who Reported Method Used in their Training N (%)
Group discussions regarding social determinants of health	65 (79)
Readings and films about addressing social determinants of health	59 (72)
Case studies with specific social determinants of health elements included	46 (56)
Having visiting guests/advocates from community-based organizations involved in addressing social determinants of health	44 (54)
Integrated interprofessional experiences during which students learn with and/or from peers or professionals in other healthcare professions	40 (49)
Community-based service or research projects	29 (35)
History taking tool that addresses social determinants of health	17 (21)
Virtual patient panels with specific social determinants of health elements included	11 (13)
Requirement to conduct needs-assessment(s) looking at the social determinants of health	9 (11)
Teaching electronic health records with social determinants of health conditions listed	4 (5)
None of the above methods were used by my graduate program	1 (1)
My graduate program did not explicitly address social determinants of health in their curriculum	9 (1)

Appendix

[1]***Graduate Program Regions.*** Regions were pulled from the National Society of Genetic Counselors Professional Status Survey:

- Region 1 (AT, MA, ME, NH, RI, VT, CN, maritime provinces)
- Region 2 (DC, DE, MD, NJ, PA, VA, WV, PR, VI, Quebec)
- Region 3 (AL, FL, GA, KY, LA, MS, NC, SC, TN)
- Region 4 (AR, IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, OK, SD, WI, Ontario)
- Region 5 (AZ, CO, MT, NM, TX, UT, WY, Alberta, Manitoba, Saskatchewan)
- Region 6 (AK, CA, HI, ID, NV, OR, WA)

Appendix A. Frequency of categories reported in the following open-ended question: Please describe the most impactful method that was used during genetic counseling graduate school that taught you about social determinants of health.

Category	**Number of Times Mentioned (Total respondents = 33)**
Group discussion	15
Non-GCP curriculum/method	9
Patient presentation	7
Community engagement	4
Inadequate training	4
Specialist speaker	4
Case studies	3
Media (films, books, etc.)	3
Role play	2
Self-reflection assignments	2
Clinical opportunities	1
Multidisciplinary students	1