U.S.-Trained Genetic Counselors’ Perspectives on International Rotations: A Thematic Analysis

by

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A key element of genetic counseling training includes clinical practice through fieldwork placements. Within some training programs, students can pursue fieldwork placements internationally. Although these types of experiences have been shown to promote professional development in other fields, there is limited literature providing information on genetic counseling international rotations. As the genetic counseling field continues to grow and provide services to more diverse patient populations, there is an increasing need to evaluate the globalization of genetic services. Therefore, the purpose of this research study was to explore the impacts and perceived value of completing an international genetic counseling rotation. We conducted a total of nine semi-structured interviews via Zoom with U.S.-trained practicing genetic counselors who participated in an international fieldwork experience in the last ten years (2013-2023) during their training. Through semantic, inductive thematic analysis, five themes were developed: (1) navigating new environments facilitated learning, (2) students’ personal goals and motivations shaped their experiences, (3) feelings of isolation: protective and risk factors, (4) relationships with international site supervisors and providers, and (5) role of genetic counseling training programs in arranging and promoting international rotations. Overall, international rotations prove to be beneficial experiences for genetic counseling professionals. These experiences provide unique opportunities for professional and personal growth. However, genetic counseling international rotations vary in difficulty and impact based on a multitude of factors. Genetic counseling training
programs and professional organizations should consider ways to promote and improve these experiences. This study benefits public health by exploring how international rotations contribute to building a skilled workforce that promotes genetic counseling services globally.
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Thank you to all the participants who took time out of their busy schedules to contribute their thoughts and perspectives on their international rotation experiences. I appreciate all our candid conversations. The knowledge you shared helped me personally learn and grow as a genetic counselor. I would also like to acknowledge the National Society of Genetic Counselors International Special Interest Group for their interest in my work and financial contribution.

And last, but certainly not least, thank you to my classmates, friends, and family. Your unwavering support was crucial in getting me through this process. Kyle, thank you for helping me recognize my own strength even when I felt I hit rock bottom. Nicole, my qualitative research partner in crime, I could not accomplish this without your understanding and advice. Thank you everyone who joined me in touring coffee shops across Pittsburgh to encourage my progress. I could not have asked for more uplifting, compassionate, and entertaining cohort. I look forward to cheering you on for the rest of your genetic counseling journeys.
1.0 Introduction

Genetic counselors are currently practicing across the globe and the number and reach of these professionals is only growing. According to Abacan et al. (2019), more than 7,000 total genetic counselors practice in about 28 different countries. As the genetic counseling field grows internationally and genetic counselors provide services to more diverse patient populations, there is an increasing need to incorporate multicultural education and globalization content within training (Ormond et al., 2018; Weil, 2001). A key part of training for genetic counselors includes clinical rotations. Experience delivering direct care within a medical team is crucial for the development of a successful practicing genetic counselor. Some training programs, provide opportunities to participate in clinics outside the associated university sites, including pursuing experiences internationally.

In the past, U.S.-trained genetic counseling students would share their international experiences in publications like the Perspectives in Genetic Counseling (Frazer, 2003; Pitt, 2003). More recently, organizations like the National Society of Genetic Counselors (NSGC) International Special Interest Group (ISIG) promote students’ experiences on their International Genetic Counselling Spotlight Blog (https://igcspotlight.wordpress.com/). Despite rising popularity of international rotations, there is limited literature on the impacts these types of experiences have on genetic counselors. In 2013, Alexander et al. surveyed genetic counseling students and practicing genetic counselors to describe the prevalence, nature, and impact of international genetic counseling experiences. They found that international experiences provided greater awareness of differing healthcare system practices, relevant professional experience, and personal growth (Alexander et al., 2013).
Of the research pursued on genetic counseling international fieldwork, no qualitative methods have been used to capture the experiences of this population. Thus, the goal of this study was to investigate the impacts and perceived value of international fieldwork experiences by conducting interviews with U.S.-trained genetic counselors who completed an international rotation during their training. Using semantic thematic analysis, multiple themes related to the research goal were identified and will be further discussed in this manuscript.

1.1 Specific Aims

Specific Aim 1: Explore the impacts of international rotations on U.S.-trained practicing genetic counselors who completed these experiences during their training.

2.0 Manuscript

2.1 Background

Internationally, the profession of genetic counseling has greatly expanded as genetic knowledge and technology evolves. To date, there are more than 7,000 total genetic counselors (GCs) worldwide practicing in about 28 different countries (Abacan et al., 2019). Based on the Accreditation Council for Genetic Counseling (ACGC) website (ACGC, 2023a) and data from Abacan et al. (2019), an estimated total of 106 genetic counseling training programs exist. While relatively widespread, the profession varies in its development across regions.

Genetic counseling has been well-established and recognized as a distinct profession within the United States since the first genetic counseling training program was established in 1969 at Sarah Lawrence College (Heimler, 1997). A total of 56 accredited programs exist in the U.S. (ACGC, 2023a). National organizations oversee the credentialing of genetic counselors and the accreditation of training programs. A total of 34 states have developed state licensure for genetic counselors (NSGC, 2024). Genetic counseling is also established in Canada, the United Kingdom, and Australia, with each having master’s-level training programs and certification processes (Ormond et al., 2018).

In other parts of the world, the extent of training, recognition, and credentialing is more diverse. As opposed to the 2-year master’s degree that is standard in the countries described earlier, some countries like India, China, and Norway, offer 1-year training programs. While the United States and Canada tend to focus on applicants who have had previous counseling experience, some countries like the Philippines, Indonesia, Taiwan, Cuba, and Romania focus on training individuals
who have prior backgrounds as physicians and nurses to address gaps in genetic services (Ormond et al., 2018). Within Africa, South Africa is the only country that provides formal genetic counseling services, has master’s training programs, and provides genetic counselor registration (Abacan et al., 2019). Although genetic counseling development and services may vary from country to country, research by Ormond et al. (2023) identified common elements of genetic counseling practice globally. Some of these activities included reviewing medical records, establishing rapport, performing risk assessments based on medical and family history information, and educating clients about possible outcomes and implications of genetic testing. However, some systematic healthcare and cultural differences were apparent when comparing endorsed genetic counseling practice activities from varying countries, which may reflect differing cultural values and importance placed on addressing psychosocial aspects across nations. For example, respondents from France and the UK were less likely to discuss genetic testing costs, which could reflect the fact that cost of services is less of an issue in countries with universal healthcare coverage. (Ormond et al., 2023).

Several professional groups have emerged in the last decades within the genetic counseling field to promote global collaboration, such as the Transnational Alliance for Genetic Counseling (TAGC) and the National Society of Genetic Counselors International Special Interest Group (NSGC ISIG). To promote international collaboration on genetic counseling research, the Connecting Science at the Wellcome Genome Campus has hosted four World Congress of Genetic Counselling events.

A need to incorporate multicultural education into genetic counseling training is increasingly evident as genetic testing expands and genetic counselors continue to serve increasingly diverse populations. Issues that genetic counselors address like reproduction, health,
disability, and personal perceptions are inherently influenced by culture (Umali, 2013; Weil, 2001), which can be a major factor in providing genetic counseling (Wang, 1994). Rosenbaum et al. (2020) found that displaying weak cultural humility, such as assuming health literacy and not recognizing culturally influenced gender norms, can damage client-counselor communication and rapport. Certain religious principles and cultural practices may also create barriers to the acceptability of genetic information, conditions, and testing (Zhong et al., 2021). However, genetic counselors have an ethical and professional obligation to develop cultural humility for equitable access of genetic services. The ACGC practice-based competencies for genetic counselors, which provide guidance on the knowledge and skills trainees must obtain before practicing as genetic counselors, address cultural humility by stating that genetic counselors must “adapt care and service delivery to honor a client’s multifaceted personal identity, including but not limited to, ethnocultural background, health beliefs, lifestyles, values, family dynamics, language, communication preferences, decision-making styles, and coping strategies” (ACGC, 2023b). Additionally, the NSGC Code of Ethics states that genetic counselors must “respect their clients’ beliefs, inclinations, circumstances, feelings, family relationships, sexual orientation, religion, gender identity, and cultural traditions” (NSGC, 2017).

Professional exchanges between countries have been reported where genetic counseling is more developed. For example, Sahhar et al. (2005) described how exchange of students from Australia to the United States, Canada, and the UK helped develop students’ competencies and academic relationships between programs. In 2013, Alexander et al. surveyed genetic counseling students and practicing genetic counselors to ascertain the prevalence, motivation, benefits, and barriers to international exchange training in genetic counseling. Significantly rated outcomes by respondents included exposure to differing healthcare systems, relevant professional experience,
and personal growth. The most common themes evaluated from open-ended responses included greater awareness of health system practices, professional culture shock, professional growth, and encouragement for others to pursue international experiences. Highly rated concepts for motivations and outcomes of international experiences overlapped, and this suggests satisfaction with the experiences. The most cited barriers included lack of financial resources to complete international experiences and limited availability or promotion of international opportunities (Alexander et al., 2013). To date, there is limited literature on the impacts international rotations have on genetic counseling students and professionals. However, initial findings show benefit to genetic counseling knowledge and professional development.

When compared to the genetic counseling profession, other fields like nursing, social work, and medicine have more robust research examining international training experiences and their impacts. Students who completed international fieldwork noted an increased awareness of transcultural issues like resource scarcity, a broadened point of view on the importance of culture on healthcare, and an open-mindedness to perceptual understanding of others (Argenbright et al., 2022; DeDee & Stewart, 2003; Dubois et al., 2006; Flatow et al., 2019; Thompson et al., 2000; Zorn, 1996). In 1993, Wilson proposed the International Experience Model, which described that individuals who engage in study abroad develop a global perspective in four areas. These areas include substantive knowledge, perceptual understanding, personal growth, and interpersonal connections (Wilson, 1993). Other research studies have used this framework to communicate positive outcomes of international experiences (Kollar & Ailinger, 2002).

Research by Levine (2009) described nursing students assuming advocacy roles and gaining confidence when working with patients with different values in response to facing challenges in their international immersion programs. Similarly, Lee (2004) found that students’
resiliency and confidence was enhanced by navigating new environments in international clinical experiences. Nursing and medical resident students also felt they developed interpersonal connections and communication skills from their international experiences (DeDee & Stewart, 2003; Kollar & Ailinger, 2002; Lee, 2004; Levine, 2009; Loignon et al., 2016). Many challenges in navigating environments outside their countries of residence were also cited by trainees completing fieldwork experiences. These included intercultural lifestyle differences, healthcare practice differences, language barriers, misalignment of expectations (Dubois et al., 2006; Koskinen & Tossavainen, 2004). Cultural shock may also limit positive effects and takeaways from international experiences (Heuer & Bengiamin, 2001; Wingenbach et al., 2006).

It has previously been described that international rotations in healthcare professional programs can help trainees develop cultural humility, confidence, and interpersonal skills in their clinical practice. With the limited research that has been completed, it seems that these clinical experiences also provide genetic counseling students with valuable international perspectives. It is critical to further investigate not only the benefits, but also the challenges and recommendations that genetic counselors describe from their international experiences to best provide and encourage these opportunities for students. As the field grows and develops globally, diversifying students’ clinical exposure with international clinical experiences may be valuable in preparing genetic counselors to interact with the diverse populations who require genetic services. Therefore, the overarching purpose of this study was to provide data surrounding the obtainment, barriers, and outcomes of international genetic counseling rotations. The study aimed to conduct semi-structured interviews with U.S.-trained genetic counselors who completed an international rotation and develop themes using semantic thematic analysis to explore the impacts of these experiences.
2.2 Materials and Methods

2.2.1 Study Design

The purpose of this study was to explore U.S.-trained genetic counselors’ perspectives about their international fieldwork experiences. Semi-structured interviews were conducted to explore the impacts and perceived value of genetic counseling international rotations. Transcripts recorded from these interviews were analyzed using semantic thematic analysis.

This study was reviewed by Institutional Review Board at the University of Pittsburgh (Appendix A) and determined to meet the regulatory requirements for exempt research. Partial funding for this project was provided by the National Society of Genetic Counselors International Special Interest Group. In response to the newly identified funding source, a modification to the IRB protocol was approved (Appendix A.1).

2.2.2 Participant Sample and Recruitment

Study participants were currently practicing certified genetic counselors who graduated from an ACGC-accredited genetic counseling program between the years 2013 and 2023 and completed a fieldwork experience outside the U.S. during their graduate training. Individuals who were not currently practicing as genetic counselors, graduated from programs outside the U.S. or from a program not accredited by the ACGC, graduated prior to 2012, or completed all their fieldwork training in the U.S. were not eligible to participate in this research study. Individuals who were not willing to be audio recorded were also not eligible for inclusion.
Participants were recruited using an IRB-approved flyer (Appendix B) which was shared via multiple email listservs and social media platforms. The flyer was distributed through the Transnational Alliance for Genetic Counseling (TAGC) email listserv on October 24th, 2023 to 248 recipients. Recruitment information was also shared on October 25th, 2023, with the Association of Genetic Counseling Program Directors (AGCPD) email listserv, which is now known as the Genetic Counselor Educators Association (GCEA). In November 2023, a description of the study with the recruitment flyer was posted to the NSGC International Special Interest Group Discussion Forum. A description of the study with a link to the screening survey was shared via the NSGC Research Survey E-blast on November 8th, 2023 and included on a follow-up reminder on November 22nd, 2023. The flyer was posted once on the University of Pittsburgh Genetic Counseling Program’s Instagram (@pittgcprogram) on November 14th, 2023 and once within the “GeneChat Gaming Guild” Discord public forum on October 30th, 2023. The principal investigator shared the flyer on their personal LinkedIn account in November 2023. On this platform, it was reposted by 4 individuals, with a total of 1,119 LinkedIn impressions.

Interested participants were asked to complete a screening questionnaire to determine their eligibility for inclusion. Individuals were able to scan a QR code on the recruitment flyer or click a direct link to access the online screening survey. Information regarding risks and benefits of study participation, the voluntary nature of the study, as well as contact information were provided on the survey welcome page (Appendix C). A total of 27 survey responses were received. These responses were reviewed and a total of 17 participants were identified as eligible based on inclusion and exclusion criteria. These participants were contacted via their preferred method of communication (by phone or email). Nine participants indicated interest after contact.
2.2.3 Interview Procedure

The principal investigator of this study conducted interviews via Zoom between November 2023 and February 2024. A script was used to indicate the goals of the study, describe the interview procedure, and obtain verbal consent for recording and transcribing interview audio. Information regarding risks of study participation, the voluntary nature of the study, as well as contact information were provided (Appendix D). A semi-structured interview guide was developed by the principal investigator to address the nature, obtainment, barriers, outcomes, impact, and perceived value of international rotations (Appendix E). Members of the research team reviewed the composition and diction of the interview guide draft. The principal investigator also performed a pilot interview with one of the members of the research team who completed an international rotation during their training to ensure interview guide fluency and completeness.

Participants consented to contact after their interview for clarification purposes. The principal investigator met with participants more than once to complete interviews if the scheduled time was not adequate. Interview transcripts were deidentified and stored on a password-protected University of Pittsburgh OneDrive account which was accessed from a personal, password-protected computer. The audio from each interview was downloaded from Zoom and uploaded to Otter.ai, a service that uses artificial intelligence for automated transcription. The principal investigator read thoroughly through the automated transcript against the audio recordings to ensure accurate and consistent transcription. The transcript output was then uploaded to a password-protected University of Pittsburgh OneDrive account. Interview recordings were deleted after transcription was complete.
2.2.4 Thematic Analysis

The study team utilized inductive, semantic thematic analysis as described by Braun & Clarke (2006) to examine the experiences of U.S.-trained genetic counselors who completed international fieldwork. This analysis framework includes six main phases: familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing a report (Braun & Clarke, 2006). Semantic identification means that we analyzed data based the explicit, or surface level, meaning of participants’ dialogue. This differs from a latent approach to qualitative analysis, which focuses on the hidden meanings, ideas, or assumptions underlying the descriptive content of data (Braun & Clarke, 2006). Analysis performed was inductive in that no preconceived frameworks were utilized to develop codes, concepts, or themes from the data.

Following each interview, audio files were imported to Otter.ai for automated transcription. Reviewed interview transcripts were exported as Microsoft Word documents and uploaded to the coding software MAXQDA. The principal investigator read the transcripts multiple times and used memos to describe codes and potential themes as they arose. Codes were added line by line as different concepts were addressed in the transcript. The codes were reviewed by another member of the research team and coding discrepancies were resolved. A codebook was developed in MAXQDA to track data. As the principal investigator reviewed the codebook, codes were grouped by generated concepts and themes. The mind mapping software MindMeister was utilized to visually represent the comparison and development of themes aligned with the specific aims of the study. The principal investigator worked with the research team to review and refine themes throughout the analytic process.
2.3 Results

2.3.1 Interviews

Ultimately a total of nine semi-structured interviews were conducted via Zoom. Total interview lengths ranged from 52 minutes to 98 minutes. The average length of interviews was 70 minutes. Two interviews were completed in two parts because the scheduled time was not adequate to cover all the questions from the interview guide. The principal investigator met with each of these participants two separate times to complete the interviews. One interview was not completed in full, and the participant was lost to follow up.

2.3.2 Participant Demographics

Nine genetic counselors from a total of six genetic counseling graduate programs who completed international fieldwork during their training were interviewed. Participant demographics are listed in Table 1. All participants completed exactly one international genetic counseling rotation. The earliest year of graduation for a participant was 2016, while the most recent year of graduation was in 2023. The length of practice as a genetic counselor ranged from three months to eight years. Participants currently work in a variety of specialties including cancer, prenatal, inpatient, general genetics, research, cardiology, and neurology. Of the nine participants, six were born in the U.S. and were residents in the U.S. when applying to genetic counseling programs. Two participants were born in Canada and resided there when applying to graduate training. One participant was born in India and applied to U.S. training programs from India.
Table 1 Participant Demographics

<table>
<thead>
<tr>
<th>Participant</th>
<th>Region of International Experience</th>
<th>Graduation Year</th>
<th>Years of Practice</th>
<th>Current Specialty</th>
<th>Country of Birth/Residence when Applying to GC Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Canada</td>
<td>2020</td>
<td>3</td>
<td>Inpatient</td>
<td>Canada</td>
</tr>
<tr>
<td>2</td>
<td>Australasia</td>
<td>2020</td>
<td>3.5</td>
<td>Cancer &amp; Research</td>
<td>USA</td>
</tr>
<tr>
<td>3</td>
<td>Asia</td>
<td>2023</td>
<td>&lt;1</td>
<td>Prenatal</td>
<td>USA</td>
</tr>
<tr>
<td>4</td>
<td>United Kingdom</td>
<td>2017</td>
<td>6.5</td>
<td>Inpatient</td>
<td>USA</td>
</tr>
<tr>
<td>5</td>
<td>United Kingdom</td>
<td>2019</td>
<td>3.5</td>
<td>Inpatient</td>
<td>India</td>
</tr>
<tr>
<td>6</td>
<td>Canada</td>
<td>2019</td>
<td>4</td>
<td>Research</td>
<td>Canada</td>
</tr>
<tr>
<td>7</td>
<td>Australasia</td>
<td>2016</td>
<td>8</td>
<td>General Genetics</td>
<td>USA</td>
</tr>
<tr>
<td>8</td>
<td>Middle East</td>
<td>2019</td>
<td>4</td>
<td>Prenatal</td>
<td>USA</td>
</tr>
<tr>
<td>9</td>
<td>Australasia</td>
<td>2017</td>
<td>6</td>
<td>Cardiology &amp; Neurology</td>
<td>USA</td>
</tr>
</tbody>
</table>

All participants completed their international rotations within a hospital setting. The length of the international rotation ranged from two and a half weeks to three months. Seven participants completed their international rotation during the summer between their first and second years of graduate school. Two of the participants completed their international experiences during the spring of their second year of graduate training. Participants completed international rotations in a variety of global regions. Three participants completed fieldwork in Australasia, two completed fieldwork in Canada, and two competed fieldwork in the United Kingdom. Other regions where fieldwork was conducted included Asia and the Middle East. Countries are not specified for these participants to protect anonymity. Cancer was the most common specialty focus for participants.
during their international rotations. A total of four participants participated in international rotations related to cancer genetics. Three participants had fieldwork experiences in general genetics. One participant completed a cardiology research-based international experience with no clinical exposure. Other international rotations included experiences in cardiology and neuromuscular clinics. More details on the region, length, and specialty focus of participant’s international rotations can be found in Table 2.

Table 2 International Rotation Structures

<table>
<thead>
<tr>
<th>Participant</th>
<th>Region of International Experience</th>
<th>Length of International Rotation</th>
<th>Timing of International Rotation</th>
<th>Specialty Focus of International Rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Canada</td>
<td>9 weeks</td>
<td>Summer Between Year 1 &amp; 2</td>
<td>Adult General Genetics</td>
</tr>
<tr>
<td>2</td>
<td>Australasia</td>
<td>2.5 weeks</td>
<td>Spring Year 2</td>
<td>Cardiology Research</td>
</tr>
<tr>
<td>3</td>
<td>Asia</td>
<td>6 weeks</td>
<td>Summer Between Year 1 &amp; 2</td>
<td>Cancer</td>
</tr>
<tr>
<td>4</td>
<td>United Kingdom</td>
<td>4 weeks</td>
<td>Spring Year 2</td>
<td>General Genetics</td>
</tr>
<tr>
<td>5</td>
<td>United Kingdom</td>
<td>4.5 weeks</td>
<td>Summer Between Year 1 &amp; 2</td>
<td>Cancer, Cardiac</td>
</tr>
<tr>
<td>6</td>
<td>Canada</td>
<td>8 weeks</td>
<td>Summer Between Year 1 &amp; 2</td>
<td>Neuromuscular Conditions</td>
</tr>
<tr>
<td>7</td>
<td>Australasia</td>
<td>6 weeks</td>
<td>Summer Between Year 1 &amp; 2</td>
<td>Cancer</td>
</tr>
<tr>
<td>8</td>
<td>Middle East</td>
<td>3 months</td>
<td>Summer Between Year 1 &amp; 2</td>
<td>General Genetics</td>
</tr>
<tr>
<td>9</td>
<td>Australasia</td>
<td>6 weeks</td>
<td>Summer Between Year 1 &amp; 2</td>
<td>Cancer</td>
</tr>
</tbody>
</table>
2.3.3 Identified Themes

A total of 1,783 codes were developed and ultimately 5 themes were identified: (1) navigating new environments facilitated learning, (2) students’ personal goals and motivations shaped their experiences, (3) feelings of isolation: protective and risk factors, (4) relationships with international site supervisors and provider, and (5) role of genetic counseling training programs in arranging and promoting international rotations. These themes are summarized and further described in Table 3.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigating new environments facilitated learning</td>
<td>Exploring new healthcare systems, new clinic structures, and new cultural contexts impacted participants’ practice, global perspective, and self-growth.</td>
</tr>
<tr>
<td>Students’ personal goals and motivations shaped their experiences</td>
<td>Participants who utilized international rotations as a way to vet job opportunities described impacts on the type of jobs they applied for after graduation. Other participants used these experiences to explore new cultural experiences or spend time with family, which impacted the takeaways they discussed.</td>
</tr>
<tr>
<td>Feelings of isolation: protective and risk factors</td>
<td>Some participants described communication from classmates being hindered due to time differences and physical distance during their international experiences. Other participants described not being impacted by feelings of isolation due to close contact with peers and faculty as well as relying on other sources of support.</td>
</tr>
<tr>
<td>Relationships with international site supervisors and providers</td>
<td>Participants’ experiences with the international supervisors and providers they worked with influenced the difficulty and impact of their experiences. Positive relationships provided support in navigating international environments, novel professional experiences, and long-lasting networks.</td>
</tr>
</tbody>
</table>
Role of genetic counseling training programs in arranging and promoting international rotations

Participants felt that their training programs played a significant part in arranging their international rotation experiences. Since they found international fieldwork valuable, participants felt that genetic counseling training programs had a role in promoting these experiences and provided suggestions to encourage more international rotations opportunities.

2.3.3.1 Navigating New Environments Facilitated Learning

Participants navigated a variety of new environments during their international experiences. They were exposed to different healthcare systems, clinic structures, and cultural contexts. Each of these aspects facilitated both professional and personal growth.

Impacts from navigating different healthcare systems

Participants discussed how their experiences in a healthcare system outside the U.S. helped them better evaluate the global landscape of genetic counseling. One participant who did not have any direct clinical exposure to patients still commented on the differences in practice between the U.S. and their international rotation site based on their conversations with genetic providers. Participants described differences in appointment obtainment, wait times, testing guidelines, testing options, cost of testing, no show rates, and equity of services between healthcare systems in the U.S. and abroad. Comparing and contrasting these differences shifted participants’ perceptions of the health systems in the U.S. One participant described the valuable insights they learned from their international rotation:

But I know there's a lot of talk right now about how great would it be to have a universal health care system. And through my rotation, I've learned a lot of really good, beneficial things that come out of a system like that. And I also saw a lot of problems with access and limited resources. And so those are things that I don't know that people appreciate unless they have lived or worked in that environment. (Participant 4)
These systemic differences also impacted the type of genetic counseling skills participants were able to practice. One participant discussed how the strict criteria for and limited scope of genetic testing at their international clinic allowed them to focus on more psychosocial aspects of cases:

…the amount of psychosocial that we were able to explore in a session was definitely a lot more in UK compared to America, just because we did not have to talk about like 101 VUSes…And so it was more so about the very direct about, “Okay, this is kind of what [genetic testing] we offer, you know, how do you feel about it? How does your family feel about it?” So, there was a lot more opportunity to talk about psychosocial, rather than the information part of the sessions. (Participant 5)

Additionally, several participants described how their international experiences influenced their perspective as a currently practicing genetic counselor. One participant discussed how their awareness of the limitations of genetics services globally informs their decision to test a patient or recommend testing of family members who live abroad:

…you have patients who say, “Oh, my family member lives overseas,” and maybe the family member who's overseas is the most informative candidate for genetic testing…I feel like sometimes, maybe some of my colleagues are…not as understanding about what genetic services might be like in another country…To them it's just like, “Well, there is genetic testing it exists, that family members should have genetic testing, let us know what the results are.” And then for me, I feel a bit more like empathetic or saying like, “Oh, yeah, maybe this family member is not going to be able to have genetic testing no matter how motivated you are, how much you want to have the genetic testing,” like just based on my experience in New Zealand…And so maybe we should just be testing this patient, even though they're not as informative…So I think that's how the rotation has certainly changed how I view things in the clinic. (Participant 7)

One participant described how they emphasize the processes related to healthcare to immigrant patients because of their experiences learning about a new healthcare system during their international rotation:

… whenever we have a family who was in a different kind of healthcare, in a different country, and immigrated to America, I definitely take pause and explain to them why the system is working the way it is. Because everyone kind of takes it for granted that well, this is how it works. So because I've seen those differences,…I pause and like talk about insurance and why insurance is a certain way and about appointments, when I see them. (Participant 5)
Impacts from navigating different clinic structures

When participants encountered challenges navigating new structures within international clinic sites, they learned skills to manage workplace dynamics. Some participants described how their international rotation experiences influenced the way they appreciate feedback, interact with different personalities, and manage expectations with supervisors. One participant discussed difficulty in implementing conflicting feedback when they were supervised by multiple genetic counselors at their international rotation site, which contrasted from their other rotation experiences. This participant shared how navigating this difference helped them grow as a student:

…but that was something I didn't experience in the rest of my program. And so, I think just that soft skill of being able to filter what is a technical, like, what's technical feedback versus what's stylistic. And being able to, like sort that out. That was sort of ad hoc learning, you know, that was much more apparent there than any of my rotations [in the U.S.], just because of how things were structured…So I think there was, it was that side of things that I wasn't necessarily expecting to learn but was really valuable experience. (Participant 1)

Several participants also suggested that they interacted with more diverse indications at their international rotation sites compared to their rotations in the U.S. because of differences in clinic structures. One participant shared how discussions with classmates helped them realize the advantage in their international rotation experiences:

But because [the international clinic] was the main hub…there are other people who came in who had sort of more rare conditions. So when I came back, I was talking to my classmates, it was just really interesting to see how much more I had seen in terms of diversity of referral reasons. You know, I had a lot of classmates or friends who were saying, oh, I essentially just saw breast cancer cases for the whole summer, like, I was lucky to see someone with a colon cancer case…I didn't realize that at the time, how sort of lucky I was to be able to experience that breadth of referral reasons. (Participant 3)

Outside of diverse case indications, some participants also described that they were able to gain novel professional experiences from unique opportunities available at their international clinic sites. For example, one participant described the ability to observe gene therapies:

I just really liked how much like different types of research that this particular group had ongoing for various things… I got to see like Spinraza…when it first like literally hit the
scene and that was so- I still am getting like shivers like thinking about like seeing the parents and thinking [of] the hope. (Participant 6)

Even with all the differences they encountered, participants described that they felt their genetic counseling training programs prepared them well to successfully complete an international experience. They noted that they were able to apply basic genetic counseling skills like constructing pedigrees and explaining genetic concepts. When encountering genetic counselors trained in countries outside the U.S., some participants also described how they were surprised by the similarities in skills and training. One participant described how their international rotation helped them realize the value of genetic counseling training:

I think one of the biggest, like takeaways from my experience is that genetics training is pretty widely applicable no matter where you go, or at least the training that I had in the U.S. prepared me well to work in another environment. It's really just like the nuance that was any different. (Participant 4)

Overall, participants felt that genetic counseling education and skills were translatable to different contexts, such as international sites.

**Impacts from navigating different cultures**

Participants felt that interacting with patients in a cultural context outside the U.S. enhanced their skills as a genetic counselor. Several participants highlighted that their international rotation helped develop their rapport building skills and allowed them to be more comfortable working with patients from different backgrounds. One participant described how navigating linguistic differences during their international rotation strengthened their adaptation skills:

I think that being comfortable with thinking on your feet, and not needing to follow any sort of script at times…was something that really was honed and improved in my time in Australia and I think big reason for that we're just navigating these linguistic differences…So I think just being comfortable leaning into that, improvisation was something that was, I think, really impactful during my time. (Participant 9)
One participant explained how observing their international site supervisor’s culturally informed interactions with patients from local populations influenced the way they tailor their current genetic counseling sessions. This participant highlighted how learning a patient population’s specific traditions can help build rapport:

I think…incorporating…this learning experience [by recognizing] that people will definitely have different cultural backgrounds and beliefs and traditions. Trying to have a better understanding of the patient population that you work with. And are there any sort of particular traditions or beliefs that these individuals might hold, so that if a comes up during a session, you're not taking, you know, by surprise, you're not reacting in a negative way, so that it would cause the patient to feel, you know, any sort of discomfort. So I think that was the main takeaway that I had. (Participant 7)

Another participant discussed how their international experience helped them evaluate the assumptions they make and influenced the way they connect with patients:

I still think about…how do we form those bridges when we have different backgrounds. And so how do I get people in the room and at ease and making choices that they really feel that either themselves or their families are aligned with? And it's interesting to do…[at my international site] where it's so multicultural…I have no clue who's going to be walking in and where they grew up, and sort of what their background is and how long they've lived here. (Participant 3)

Some participants discussed how immersive experiences in a different cultural context also provided opportunities for personal growth. When pursuing international rotations in a different country, some participants described how living independently in a new environment was a learning process. One participant shared how this type of experience helped their personal growth:

It helped me grow individually, like personally…You know, personally, because, of course, you're responsible for arranging some of the aspects of rotation, you know, being on top of communication, booking the accommodations and the airfare. And then like living by yourself in a new country, navigating the public transportation, like taking care of yourself, you know, again, just another country helped me grow personally. (Participant 7)

A few participants noted how their experiences impacted the way they evaluate global topics. One participant discussed how the positive experiences they had with medical professionals at their
international rotation site influenced the way they viewed the political conflicts the country was currently involved in:

…there's a lot going on now, politically, and there's a lot of stuff. And I am very grateful and appreciative of being on the side of things where the moral and…the giving nature of the doctors and the genetic counselors were- That's all I could say. Meaning, you hear what's going on in the news and I can tell you like, I was in the hospital, I watched them treat terrorists. Like I was in the hospital, and they treated them the same way they treated their own soldiers. And like I watched with my own eyes. I was in the hospital, and I watched, didn't make a difference. If there was two patients and one of them was Jewish, one of them was Arabic, they were at the same care. (Participant 8)

Another participant described how the insight they obtained from their international rotation changed how they interact with media:

I am actually a lot more cautious of just what I gather through media. Like, unless someone has actually experienced the thing, then I am weary of what they have to say on the subject, if that makes sense…And it also taught me that like, you should probably be listening to the people who are in the situation that you're trying to work on or trying to fix. Like, you need the right stakeholders, the people who are actually living and doing the thing, not the people who think that they know what is best. (Participant 4)

2.3.3.2 Students’ Personal Motivations and Goals Shaped Experiences

Outside of the more common impacts participants described in navigating new environments, more nuanced impacts were explained by differences in personal goals participants outlined for their experiences. Some participants utilized their international rotations as an opportunity to explore career prospects. This was especially evident for participants who were born outside the U.S. Participants who applied to graduate school as international students had a particular motivation to explore genetic counseling in different healthcare systems for potential career prospects and marketing themselves as more attractive job applicants. One Canadian participant who pursued their international rotation in Canada stated:

The job market in Canada is so small, that I, I was very aware that it wasn't necessarily guaranteed that I would end up being able to go back and stay in Canada long term and have a career in genetic counseling. So for me, it was very important to then understand
various systems. There was only time to do one rotation abroad in each setting. So I prioritized, having gone school in the states, having a Canadian rotation. (Participant 1)

These participants’ experience influenced what countries they looked at for employment positions because they learned the roles, salary, and opportunity of genetic counselors abroad from their international rotations. One participant, who was born in India and completed their international experience in the United Kingdom (UK), explained the impact their international rotation had on this aspect:

From a motivation standpoint of why I went there, it definitely gave me a lot of information about how a day-to-day GC works, whether I wanted to consider applying for UK or not, and kind of what the job opportunities look like. (Participant 5)

International rotations can also promote international work to students who were born in the U.S. One participant discussed how their international fieldwork led them to gain employment at the same international site. They shared how the connections they made and experiences they had during their international rotation made the possibility of working as a genetic counselor outside the U.S. more conceivable:

It sort of opened the door of like, oh…I could imagine working internationally, I could actually do that…I like having a little bit of familiarity. And so like, just having that international experience opened the door and let me know, like, I could believe in myself, I could do it. And then, you know, in the literal sense, I had those actual connections with people here to open the door a little wider. (Participant 3)

Two participants who spoke a language secondary to English described utilizing their international experiences to practice counseling in another language. This shaped where these participants sought out international rotations. One participant stated:

I have studied Mandarin for many years. And so I was interested, if possible, in being in a place that would have Chinese speakers as well, just to have a little bit of that exposure to be able to observe cases that were done in Mandarin, which was like absolutely no guarantee at [my training program]. (Participant 3)
On the other hand, most participants sought out international experiences in English speaking countries to prevent the additional burden of learning a new language or working through interpreters. One participant described the limitations of international rotation sites based on their language abilities:

[It was] limited for myself of countries that spoke English. I don't have a second language that I'm fluent enough in to go and immerse myself for that type of rotation. So it was limiting a bit to those countries that spoke English. (Participant 2)

Outside of their clinical work, several participants described wanting to pursue international rotations to immerse themselves in a new environment. One participant described how the opportunity to travel and experience a different culture motivated them to pursue an international rotation:

I definitely wanted to have the experience of living in another country and seeing just what the culture was like, the day-to-day life. You know, obviously, also taking advantage of, you know, traveling in that specific country, which is, you know, what I did on the weekends when we didn't have clinic was just doing some local traveling around the country. (Participant 7)

Participants who discussed this goal of exploration described utilizing free time during their rotation to try local cuisine, hike, explore nightlife, and visit destinations within the region of their international rotation site.

Participants who visited their home country or regions they already had traveled to previously described how their international rotations allowed them to reconnect with family and friends. One participant who traveled home to Canada explained the implications of pursuing an international site in their native country:

I had already not lived in [home city] for eight years…So I wanted the opportunity to be with my parents and family for the summer. But I also I had a son…and so having him have the opportunity to be with his grandparents so intimately was the other 50% [reasoning for pursuing an international rotation]. Absolutely, I was like, if I can make something work within the region of my home, then my mom…took time off work and just spent time with him. And it was like this, this was so precious for her. (Participant 6)
2.3.3.3 Feelings of Isolation: Protective and Risk Factors

Some participants mentioned experiencing loneliness during their international rotations while others did not discuss these feelings. Participants described isolation when aspects of their international rotation hindered communication with peers from their training program. One participant, who pursued their rotation back home in Canada, highlighted these feelings when they were the only genetic counseling student at their international clinic site:

…having left for the summer, and all my classmates were [in the U.S.], like I missed out on that classmate bonding for the summer…So like, even just being in that work room, and like having a side conversation, like I was alone up there. I was the only student up there. There wasn't another student from another program rotating through that summer. It was just me. (Participant 1)

Another participant felt that pursuing an international rotation impacted the connections they established with their peers, even when they went to their home in Canada for their international rotations:

But in that first year, I feel like we grew all together to like, lean on each other and then to no longer have that and having people to like talk through the day…So just being cut off from my like, support system, whether it be the few people or the full class, I found challenging. (Participant 6)

One participant described how having their first clinical experience internationally made it difficult to navigate expectation differences between the training program and their international rotation site. They shared that they may have benefited from hearing insights from others in their cohort, but the significant time difference proved to be a barrier for that communication:

[It] was just like this idea of feeling so far away. So like being my first rotation, I didn't have all the resources necessarily set up in terms of classmates and people to talk over cases and just get a sense of how everyone's experiences were going…So there's definitely this sense of like, is everyone else having this experience? Or is everyone else struggling with this? That sort of thing, and just not being able to check in the same way I would have if I had been closer. (Participant 3)

The participant goes on to describe how closer proximity to their classmates would have facilitated connection with their classmates:
I think [it] would have been different if I had been in (the city of training program) because there is sort of just this thing where it's like, oh, I'm super close to my classmates physically, like, we can just go grab a coffee someday after work or something like that. (Participant 3)

Some participants who did not feel isolated also described how their classmates were completing similar rotation experiences during participants' international rotations. For example, one participant shared during the summer when they completed their international experience, other classmates were also pursuing rotations at external sites away from their common training program. Another participant discussed how they connected with a peer who was also pursuing an international rotation at the same time as them:

…there was one other student at the time who was doing her own overseas rotation in New Zealand. And so, at the time, like, messaging each other a little bit about, oh, how things are going for you, how are things going for me…And so we were just checking in with each other to see how things were going and what differences there were in their rotation placements compared to the rotations that we had had leading up to that point. (Participant 9)

A few participants discussed how close contact with their peers and program faculty helped them maintain connection while they were abroad. One participant discussed how spending time away from their classmates during their international rotation was not a concern:

I mean, I don't feel like I missed out on anything. Like my classmates and I were all very close. Like, we all still stayed in touch and stuff. I didn't necessarily like feel excluded or anything like that. That was no big deal. (Participant 4)

Another participant, whose rotation was cut short by the onset of the COVID-19 pandemic, felt that they had constant communication with their program during their rotation. This communication increased as they had to manage lockdown procedures:

Everyone was very excited for me to send them updates and photos and things and check in…When things did start shutting down and changing,…I think that's when I was getting a lot more communication from classmates, from program faculty, of kind of here's what's happening in [the U.S.], please keep track of keep an eye on what's going on, let us know if you need additional support… (Participant 2)
Other participants who were not impacted by feelings of isolation felt adequate sources of support outside their program. Participants traveled to sites where they lived with family or friends. One participant described finding support with the peers with whom they shared a living space:

I was in a building that, you know, had a whole bunch of other students, young people, many of which were also international students that were there for various other reasons…that was more or less my primary social group. But I spent a lot of time…socializing, having parties, and occasionally, you know, going to downtown Sydney and checking out some of the nightlife there. (Participant 9)

Additionally, one participant described how having their partner travel internationally with them alleviated the isolating nature of their experience:

I did actually have my boyfriend, who's now my husband,…come with me for that entire rotation. That wasn't actually the original plan. I'm glad it ended up being the plan. That was one of the things that like, made it so awesome. But I was fully prepared to go and have this like, very independent experience. And that was a little scary for me to like, be completely by myself in a foreign country for a month. (Participant 4)

Even with their partner, this participant described how they found managing work related to their U.S. training program challenging to manage, particularly given the time differences:

That was a weird and difficult thing to, like, go to a full day of clinic and then like, come home to a house that's not your house, and like remotely do the classes at eight o'clock at night. Like that was challenging. I was also doing my own thesis at the time, which involves, like, facilitating, like, online lectures and stuff. Again, I was doing that kind of, like off hours. You know, like that was, that was difficult to do that through the program. Like, while I was trying to, like, survive in a new place. (Participant 4)

Several participants described similar experiences in attending lectures virtually and completing coursework for their training program outside their international rotation responsibilities. The requirements may have also contributed to the disconnect felt from peers and faculty.

2.3.3.4 Relationships with International Site Supervisors and Providers

Relationships that participants shared with supervisors at their international rotation sites appeared to influence participants’ level of difficulty in navigating international experiences and
their professional takeaways. Participants described how positive relationships at their international site helped them adapt to the new environment at their international rotation site. Several participants noted how their international supervisors would help them complete clearances, give local recommendations, and provide transportation. One participant discussed how the hospitality and warmth of the providers at their international rotation created a positive experience:

…everybody was…super happy to be helping with whatever I needed, which I was very appreciative for. The genetic counselor who was hosting me picked me up at the airport, got me to the grocery store to settle into my AirBnB. So kind of once I was there, didn't really have any issues,…they made sure I knew how to get around…they wanted to make sure that I was coming and having a good experience. (Participant 2)

Another participant shared how their international rotation supervisor recognized the difficulty of traveling abroad and initiated experiences to help them feel welcomed:

And when I was there, my primary supervisor for the rotation, she actually was really welcoming. And she brought me up to dinner a few times with her husband and young child. And, you know, that was a really kind of enjoyable experience, just feeling like, you know, hey, she knows that I'm coming from 9,000 miles away or far away from home, and just helping me really feel comfortable and like family. (Participant 9)

On the other hand, one participant described how their international clinic sites provided no guidance for arranging their international experiences:

…once that rotation was approved, I had to figure out how I was gonna get there. Where I was gonna live. There was no help from the clinic…they weren't like, “Oh, hey, go live in this dormitory.” It was just like, “Sure, we'll see you on this day”…I was responsible for, like, all of my existence in this foreign country. (Participant 4)

Positive clinic experiences also helped facilitate hands-on learning for participants. One participant discussed how the lead physician at the international site facilitated their involvement in clinic to benefit their learning. They stated:

…the physician was very open about me being a student. He would be like, see, look, and like do it on the patient. That patient [would] be like a happy like example…And so I just
remember getting a lot of hands-on experience, like when I got to go and watch the muscle biopsy and almost fainted. (Participant 6)

Another participant discussed how an unexpected long-term absence of their international supervisor impacted their international rotation experience. They shared the following:

I think that there are definitely days where it's like, I didn't do anything all day because no one was around…My main supervisor ended up being out sick for like, two weeks while I was there. But then like, it'd be like, “Okay, great, like, here's all this work that like, secretly you probably should have been doing during the week, but…we weren't here to tell you, so like, you should just do it all essentially, one day.” [I felt] like, “Oh, my God, I'm going to die.” (Participant 3)

Participants were able to establish a long-lasting connection with supervisors with whom they developed positive relations. Some participants described how their relationships with genetic counselors they worked with at their international rotation sites grew to be not only important professional connections, but also personal friends. One participant discussed their continuing relationship with their international supervisor by stating the following:

So I've contacted [my supervisor] both on a social level, but [also] an advice level. And that is something that obviously, in general, like any rotation, that's kind of the goal is to have these connections…but I'm more closer with them than I am with some of my other rotations…That has been really helpful career wise, obviously, they've written letters and things. (Participant 6)

One participant described how the direction of their career was shaped by the connections they made at their international site:

It just was very, very positive experience. When you're very positive experience, you appreciate your profession a lot more…Evidently, also I had built a very strong relationship with the prenatal team there, those were people I was closest to, and it kind of led me do want to be, be enjoy the prenatal genetics more than the pediatric setting. (Participant 8)

On the other hand, participants who did not have these overwhelmingly positive experiences did not maintain these networks. One participant described how a lasting relationship with their international rotation site was not developed, despite their efforts to connect:
I thought that by the time I left, I would have built a more lasting relationship with that clinic…I had reached out on a couple of occasions…to try to be that person for somebody else to say like, ‘Oh, I know, some counselors there now.’ And nobody wrote back…I'm kind of bummed that like, I haven't been able to maintain those connections. I sort of, I guess, had expected that I would have been able to do that. (Participant 4)

2.3.3.5 Role of Genetic Counseling Training Programs in Arranging and Promoting International Rotations

During interviews, participants were asked about their experiences coordinating and navigating their international rotations. Participants described a wide range of steps to obtain their international rotations, such as completing paperwork, clearances, vaccination compliances, and visa applications. Overall, participants highlighted the support they received from their training institutions for their international rotations. Participants described their program leadership taking on roles to contact, communicate with, and manage affiliation agreements with international rotation sites.

I mean, there was a ton of logistics. And essentially, it all happened…off of my shoulders…Our fieldwork coordinator had to do a ton of work just with the school itself, and with the program, just to get all the paperwork, ready for me to go…signing agreements and doing all of that stuff. And I was essentially not involved in any of that. And so I feel like that was, you know, a gift, honestly, that my professor gave me to just handle all of that on her own (Participant 3)

Some participants also stated how their programs investigated if international supervisors were certified by the American Board of Genetic Counseling (ABGC) to ensure that cases would be recognized by ACGC.

Several participants reported relying on their training program’s established contacts to identify suitable international rotation sites. One participant discussed how their program’s connections dictated where they could pursue an international experience:

I was really at the mercy of my program’s network. So, I didn't know any international counselors, I would have had no idea where to even start, unless I had leads to follow.
And those opportunities were limited, like I can only remember like three different opportunities that were like, considered possibilities. (Participant 4)

Participants also felt that training programs had a role in communicating expectations for their international rotation to international clinics. Several participants mentioned how training programs outlined fieldwork guidelines and shared those requirements with the international rotation site, which guided the participants’ fieldwork abroad. One participant discussed how this communication of expectations helped guide their experience:

I believe that [the training program] at the time had sort of a general rotation list of expectations and goals…And so that was sent to [the international rotation site] or my clinical rotation supervisor there. And they basically used that as a template to make sure that they were checking all these different things off the box in the rotation. (Participant 9)

One participant described how a lack of communication between their training program and the international site influenced their involvement on cases while on the rotation. They shared:

I could have done a little bit more counseling…I don't think there was communication about where I was at in my training and what I've taken on in the past when I've done rotations. And so that is probably why I felt that, “Oh, I could have done a little bit more.” But they were just having me focus on family history and talking about inheritance patterns. (Participant 7)

During interviews, participants were asked if they think more genetic counseling students should have the opportunity to pursue international rotations. All participants positively endorsed international rotations for genetic counseling students. They felt that training programs had a role in facilitating more opportunities for international rotations and improving the international experiences they already coordinate for students.

Participants described very limited financial supports for their international rotation experiences. Costs associated with pursuing an international rotation such as paperwork and vaccination fees, airfare, lodging, transportation, and food were expected to be covered by the
student. Some participants described the financial costs as a significant burden. One participant stated:

> Obviously, finances were a huge hurdle. My international rotation like costs me 1000s of dollars of my own money that, you know, as a grad student, I had to pay back over a long period of time. (Participant 4)

Some participants commented on opportunities to receive reimbursement from the International Summer Rotation Award funded by the NSGC International SIG, but this was not a guarantee and not something participants achieved. One participant described how their training program had a reimbursement program for cost of travels to rotations, but this was limited and used on other rotations within the U.S. Several participants tried to relieve costs by lodging with family and friends, subletting their apartments in the U.S., and working at their international rotation sites. Participants discussed how training programs can develop supports to promote these experiences. One participant commented on establishing financial and institutional supports for graduate experiences:

> Of course, I think it could be useful if there were a bit more financial opportunities. So things like scholarships, whether that's within a program to assist with some of that. Or if there's any institutional support, a bit more of that formal [support] so that rotations abroad as a graduate student should still be on the same page as an international experience as an undergraduate student. (Participant 2)

Another participant discussed utilizing host institution resources to mitigate costs:

> How could more people take advantage of this experience? Like maybe some of these programs that are hosting international students could do things, like, set students up in a dorm, for example, to relieve like, living costs and stuff like that. To help the student take advantage of like, the perks of like the hosting institution…Like that kind of help, I think would be really great. (Participant 4)

Many participants noted that in order for more students to participate in international experiences, they have to be aware that the opportunity exists. Some participants mentioned how
they felt training programs had a responsibility to communicate that international rotations are a possibility for students instead of relying on student initiative and interest. One participant noted:

But just having that foresight and heads up of [program leadership] recognizing that, yes, these rotations are available, whether we've gotten affiliation or not,…how early we should start planning, and some of those things…So I think just having the information out there on the websites for programs, “Oh, we've sent students internationally, here's some examples and blogs and some of those things.” But also, here's the work that goes into it for those who might be interested in case that something that does deter you, or your timing or kind of what you want out of your education. (Participant 2)

Several participants focused on the potential for exchange programs to promote more opportunities for students to pursue international rotations. For example, one participant highlighted proactively creating relationships with international sites:

So I think for some programs that, you know, are thinking about starting international rotations, it's just like figuring out those partnerships ahead of time and figuring out, you know, what, does and doesn't qualify for case hours, things like that all has to be done, I guess, at least in part in advance, and not just based on student interest. (Participant 3)

Another participant commented on the benefit that establishing connections between institutions would have for students:

But I know that some programs already have, you know, a peer institution in you know, another country, in a specific clinic in a specific hospital that, “Hey, we're gonna have, you know, 1 or 2 students per year do a rotation at this same exact site.” So just building those more established partnerships, I think, would take away a lot of the friction that often would prevent students from successfully obtaining one of those rotations. (Participant 9)

Other recommendations included creating a mentorship program between students who have previously completed international rotations and students who are interested in pursuing them, engaging international alumni of genetic counseling programs to develop affiliate sites, and having back-up clinical experiences for students in case international plans fall through.

Participants also recognized limitations to training programs’ influence on international rotation experiences. Several participants discussed how genetic counseling training programs
may not be equipped to support international experiences. One participant described these persistent barriers:

I think there's a lot of barriers that are outside of the student's control. You know, I think that right now, especially at my program, like our systems aren't built to support students going internationally and it's really up to each student to be able to find, you know, the money to do it, the time to do it, being able to take time away. So I think there's so many barriers to students being able to do this that…my program can't address at this time. (Participant 3)

Participants mentioned other factors that influence international rotation experiences such as time zones, international regulations, and languages barriers that are outside a training program’s control. Keeping these barriers for international rotations in mind, one participant commented on the positive impacts external rotations in general have for genetic counseling professionals:

I think…even just to go to a different state or something, you know, for [a] rotation, even just to see just how somewhere else does it versus just, you know…where you're training. Because there's just so many different approaches, styles, what can be offered…all those different dynamics, that I just think it really does help make you better prepared and aware and give you just those different perspectives going into your career, wherever that is. (Participant 1)

2.4 Discussion

A goal of this research study was to explore the experiences of U.S.-trained genetic counselors while completing their international rotations. Five themes were generated using semantic thematic analysis: (1) navigating new environments facilitated learning, (2) students’ personal goals and motivations shaped their experiences, (3) feelings of isolation: protective and risk factors, (4) relationships with international site supervisors and provider, and (5) role of genetic counseling training programs in arranging and promoting international rotations. Participants described overall positive international rotation experiences. They expressed strong
recommendations for other students to pursue these types of experiences. However, these results also reveal a complex interaction of factors that influenced the difficulty and impact of an international rotation experience.

2.4.1 Navigating New Environments Facilitated Learning

Participants indicated a wide range of impacts from their international experiences. Their takeaways were influenced by the exposure to different healthcare systems, clinic structures, and cultural contexts. Participants described an increased awareness of the global landscape of genetic counseling, professional and personal growth, as well as increased cultural sensitivity.

Participants described that working in a healthcare system outside the U.S. helped them gain insight into the global landscape of genetic counseling. They cited a greater awareness of healthcare system differences and how that impacted access to genetic services. Similarly, Alexander et al. (2013) found a greater understanding of health systems and practice a significant outcome of genetic counseling international experiences. Our findings are also consistent with studies investigating the outcomes of international fieldwork in other disciplines that noted increased awareness of resource scarcity, differences in practice, and the impact of culture on healthcare (Dubois et al., 2006; Flatow et al., 2019; Kollar & Ailinger, 2002; Thompson et al., 2000; Zorn, 1996). Participants in the current study discussed how their international rotations helped them evaluate advantages and disadvantages of privatized versus national health care systems. Their experiences led them to reanalyze systems within the U.S. Prior research also demonstrated that international experiences helped nursing students critically reflect on healthcare within their native countries (DeDee & Stewart, 2003; Maas, 2011).
Some participants discussed how working in a different clinic structure provided opportunities to work on managing feedback and expectations within a new workplace. They also described seeing more diverse patient indications when working in clinics that covered healthcare for a large portion of a population. This suggests that exposure to differing clinic structures, even domestically, can facilitate learning. For example, U.S.-based trainees may be able to experience these same benefits by pursuing rotations in multiple hospital systems, outside the city of their training program, or in more rural regions.

Several participants also highlighted how navigating linguistic and cultural differences within counseling sessions helped them develop rapport-building skills. They felt that the challenges they encountered during their rotations helped them grow as professionals. Similarly, previous literature demonstrates that students developed interpersonal and communication skills from their international experiences. For example, research by Lee (2004) described how due to language barriers during their international experiences, nursing students felt that they became better at interpreting non-verbal communication. Additionally, Loignon et al., (2016) found that Canadian family medicine residents who pursued international rotations described increased awareness of body language and openness to collaborative care in response to the cultural differences they observed. This suggests that the unique challenges that arise during international experiences allow development of skills that may extend beyond the impacts of local rotations.

Some participants discussed how living in and navigating a new environment helped them grow independence. Similarly, Lee (2004) found that nursing students grew resilience and confidence by navigating new environments in international clinical experiences. Davies et al. (2017) also noted that occupational therapy students developed personal traits such as resourcefulness, resilience, and confidence during their international experiences. Research by
Alexander et al. (2013) found international genetic counseling experiences promoted personal
growth, with a greater awareness of self and skills. Alexander et al. (2013) also cited self-
confidence, understanding of international politics, cultural sensitivity, and influences on
evaluating world issues as outcomes from these experiences. In the current study, participants
similarly discussed how their international experiences impacted their perception of international
issues and politics.

The current study establishes impacts of international experiences on genetic counselors’
practice. Several participants described how their international experiences influence the way they
tailor current genetic counseling sessions in response to cultural differences. Previous research on
the impact of international rotations for nursing students found that these experiences increased
cultural sensitivity and competence (Argenbright et al., 2022; Koskinen & Tossavainen, 2004;
Rodriguez, 2020). This affirms that international rotations are an opportunity for students to
practice navigating cultural differences, which can benefit their future practice. A few participants
in the present study also described how their international experiences inform their decision to test
patients and family members. These findings suggest that there are long-term effects of
international genetic counseling experiences on professional practice. It is important to further
study these impacts and their potency over time.

Participants identified differences in genetic counseling practice in the U.S. and at their
international site, including variability in roles, topics of discussion during sessions, and structures
of health care systems. Participants also noted similarities in general approaches to practice. They
discussed similarities in skills used for assessing family histories and describing implications of
genetic testing results. These results parallel the findings of Ormond et al. (2023) which found
common practice areas of genetic counseling being practiced internationally.
2.4.2 Students’ Personal Goals and Motivations Shaped Their Experiences

Several participants described how personal goals for their international rotations influenced their experiences and takeaways. Participants who pursued international rotations to explore novel cultural differences discussed positive takeaways in gaining novel travel experiences. Dubois et al. (2006) found that American nursing students cited discovering new culture, native food, and creating new friendships as a positive aspect of their international experiences.

Students born outside the U.S. who applied to graduate school as international students explored career prospects with their international rotations. Previous literature has found that international students apply to genetic counseling training in the U.S. because of the lack of opportunities in their home country and the transferability of qualifications globally (Akgumus et al., 2016). In particular, Canadian participants describe applying to U.S. programs because of the competitiveness for genetic counseling programs in their home country (Akgumus et al., 2016). Both Canadian participants in this study described applying to both Canadian and U.S. programs. Since they ended up training in the U.S., they utilized their international rotations to evaluate career opportunities to be able practice in their home country. One participant who was an international student from India described their openness to exploring job opportunities outside the U.S, including the UK, where they completed their rotation. This motivation to explore job opportunities outside the U.S. was unique to international students, which may indicate that international rotation experiences may differ between international genetic counseling students and U.S. residents.

Additionally, international students can experience psychosocial challenges including homesickness, isolation, and discrimination (Choi, 2005; Mori, 2000). One Canadian participant
discussed how experiencing cultural shock within the U.S. partly influenced them to seek out an international rotation in their home country. Both Canadian participants described also utilizing their international rotations to reconnect with partners, family, and friends during their experiences since they were apart while training in the U.S.

In other disciplines, it is not common for trainees to seek international rotations in familiar cultures. Typically, international experiences are intended to immerse students in new environments to promote multicultural education. It would be interesting for programs to consider the composition of these study abroad programs to compare the impacts of international rotations between U.S.-raised students and international students training in the U.S. It may be possible that participants who are born and raised in the U.S. are more inclined to complete these experiences as opposed to international students who already had learning experiences when assimilating to the U.S. for their studies.

Two other participants sought out international rotations in countries which they had previously visited. One participant had a previous study abroad experience during their undergraduate training in Australasia and another participant had previously visited relatives in the Middle East. These two participants also described reconnecting with friends, as well as better adapting to their international sites because of their familiarity with the countries. However, they still described impacts on their genetic counseling practice since their rotation provided novel experiences working in a different healthcare system. Further investigation into the differences between experiences of students who enter novel cultures versus those who are familiar with their international site is warranted.
2.4.3 Feelings of Isolation: Protective and Risk Factors

Some participants felt disconnection during their time aboard when time differences and physical distance hindered communication with peers. However, other participants did not describe feelings of isolation. The diversity in responses may be reflective of differences in support needs and available support systems. Participants whose support needs were met by individuals outside their classmates may have been less impacted by the diminished communication with their program. For example, participants described having family, friends, partners, and peers present at their international rotation sites that supported them during their experiences. However, even participants who conducted international rotations in their home countries experienced isolation. Therefore, there may be other factors at play.

When experiences between participants and their classmates were more similar, such as completing external rotations at the same time, they felt less isolated from their program. In other fields, it is common for students to partake in international experiences in groups, whether that be with classmates within their cohort or a related field. Genetic counseling students may be more prone to feelings of isolation due to the individual nature of international rotations. When differences in expectations arose between those completing international experiences and their classmates in the U.S., this contributed to isolation. For example, most participants described working at international clinic sites during standard working hours and days. For some participants, they described how this schedule was disparate with their classmates where they only attended clinical sites two to three days a week. This proved to be a difficulty when students had to devote time to other program-related responsibilities such as coursework and thesis during their international rotation. Students may be expected to commit more hours towards clinical work when rotating internationally to ensure they are optimizing their experiences during a limited time.
Students from other disciplines that have pursued international experiences have expressed homesickness and cultural shock as negative aspects on their experiences (Dubois et al., 2006; Heuer & Bengiamin, 2001; Wingenbach et al., 2006). Participants in this current study did not highlight emotions relating to homesickness or cultural shock. It may be possible that participants in this study did not encounter major cultural differences that caused these feelings in other international experiences. For example, language is a major consideration for students that dictates where they pursue international rotations. In the present study, a majority of participants completed international rotations in English-speaking countries. Those that pursued international rotations in non-English speaking countries discussed having fluency in the native language of the country to which they traveled. Previous studies have shown that language is a significant barrier in navigating international exchange programs and it caused students to minimize their involvement with local students and people (Dubois et al., 2006; Koskinen, & Tossavainen, 2004).

Most participants completed their international rotations before the onset of the COVID-19 pandemic. One participant described how their experience was abbreviated by the pandemic. Modalities for education and social communication were drastically changed to accommodate for the social distancing recommendations in response to the pandemic. Participants did not describe difficulties associated with coordinating virtual attendance to classes while they were abroad. However, it would be interesting to investigate how the normalization of virtual communication and education may have shaped the way participants interacted with their program and peers.

2.4.4 Relationships with International Site Supervisors and Providers

The relationships participants established with their supervisors and other providers they worked with during their international rotations impacted the difficulty of navigating their
experiences, their learning opportunities, and networking. Participants described many impacts resulting from positive relationships with their international supervisors. This included assistance with transportation, hands-on learning, and long-lasting networks. Other did not experience this type of support from their international sites, which suggested more impartial experiences with supervisors.

In other disciplines, international supervisor relationships have also played a role in student experiences. For example, Italian nurses who completed international experiences in the U.S. cited their supervisor’s lack of trust in their competence as negative aspects of their experience. They described obtaining hands-on practice later in their experiences once they demonstrated their competence (Dubois et al, 2006). Previous literature has described that host supervisors perceive draining of resources and potential harms to patient care as negative impacts of students who conduct international rotations (Bozinoff et al., 2014). This may impact the extent of care that supervisors allow visiting students to be involved in. It is also established that supervising and teaching visiting students requires additional time and effort, which can strain clinic resources (Attrill et al., 2016; Crump, 2011). It may be possible that supervisors from high volume clinics or clinics with limited resources may not dedicate as much effort to building relationships with visiting trainees. To better understand what factors may facilitate positive, negative, and neutral relationships with supervisors, research on host institutions’ perspectives on genetic counseling international rotations should be conducted.

All participants described primarily working with genetic counselors. Participants also discussed working with other healthcare workers, such as nurses, physicians, and researchers. It is possible that providers more familiar with the role of genetic counselors may have been more engaged with participants. Participants described positive relationship with providers who worked
in highly collaborative teams. However, most participants conducted international experiences in countries and regions where genetic counseling is more well described (i.e. U.S., UK, Australia, Canada). It would be interesting to investigate the influence that international supervisors have on student experiences at clinical sites where providers are less familiar with genetic counseling as a profession.

2.4.5 Role of Genetic Counseling Training Programs in Arranging and Promoting International Experiences

Participants felt that their training programs had a role in promoting and improving international rotations for genetic counseling students. Participants noted two main aspects to encourage international experiences: providing more information about international rotation opportunities and establishing institutional supports. This was reflective of experiences where participants felt their training programs had an integral role in arranging their international rotations. Programs were able to assist students with arranging international experiences by communicating with international sites and completing affiliate agreements. Additionally, participants discussed that training programs with previous experience sending students internationally and utilizing established affiliate sites facilitated their arranging experiences. Participants cited more difficulty in securing an international rotation when they had to initiate contact with international clinic sites and complete more logistical tasks on their own.

Initiating international experiences is somewhat unique to genetic counseling international experiences. Research in other fields has focused on impacts of organized programs of travel and exchange where a group of students pursue international experiences at a common site together. For example, Rodriguez (2020) evaluated levels of cultural competence from a one-day capstone
project experience to Mexico of twenty American nursing students from the same graduating cohort. The service program provided students transportation, food, and language services. The individual nature of genetic counseling international rotations may exacerbate rotation challenges and feelings of isolation. Programs can continue to work on institutional supports for students so that these experiences can be improved. Establishing networks with international clinics through exchange programs may help alleviate some of the barriers students face when trying to contact and arrange international rotations. More established frameworks for guiding genetic counseling international experiences may provide some relief for the challenges participants faced in navigating foreign infrastructures during their rotations. These recommendations are consistent with results from other studies in which trainees recommended educational institutions better prepare them with logistical planning and navigational resources (Cameron et al., 2013; Dubois et al., 2006).

Participants described how their international rotation experiences did not always align with their expectations. One participant described their opportunities in counseling during patient sessions were limited by their supervisor’s perceptions of their skills. Similarly, nursing trainees have reported a negative impact on their international experiences when hosts were unfamiliar with their skill level or there was a misalignment of expectations (Dubois et al., 2006; Koskinen & Tossavainen 2004). Trainees from previous studies have suggested that clear expectations and communication between sites and a method to provide ongoing feedback could help to improve international experiences (Cameron et al., 2013; DeDee & Stewart, 2003; Dubois et al., 2006; Koskinen & Tossavainen, 2004). Formal structures to establish feedback and communication with training programs and international host sites could also be beneficial to genetic counseling international rotations based on the results of the current study.
Participants felt that international rotations were not promoted enough at their training programs. Therefore, participants had to rely on initiative and self-motivation to make their international rotations experiences a reality. This is consistent with findings from Alexander et al. (2013) in which genetic counseling students and professionals perceived limited knowledge of opportunities as a major barrier to completing international experiences. With more readily available information about the types of international experiences possible for students and the necessary steps for logistical planning, more genetic counseling students may be willing to pursue international rotations. As a result, more students may experience professional and personal benefits to their genetic counseling training.

Participants described finances as a major barrier to international rotations. These results are consistent with previous research investigating barriers to international genetic counseling experiences (Alexander et al., 2013). Studies regarding barriers to international experiences in other disciplines have also found finances to be a common concern for students (Powell et al., 2007; Wingenbach et al., 2006). In this way, international rotations may promote inequities as more economically privileged genetic counseling students may have better access to international rotations and students with limited financial resources may be overlooked.

Although international experiences had many beneficial impacts, participants recognized that barriers may persist, even with improved institutional supports. It is not reasonable to assume that training programs can support international experiences for each of their genetic counseling students. If programs cannot create opportunities for students to experience new clinical environments, they may need to rely on existing resources to promote transnational and multicultural education. For example, institutions have started to offer virtual international exchange experiences that have demonstrated increased professional knowledge and global
collaboration (King et al., 2021; Mirza et al., 2021; Suyama et al, 2023). Integration of topics related to the global landscape of genetic counseling in didactic coursework may help students experience similar impacts to international perspective and cultural sensitivity as those that pursued rotations abroad. This could look like discussion of case studies that have interesting cultural implications or lectures evaluating differences in genetic counseling across the world. In the past, programs have designed curriculum and organized joint conferences to help students increase their awareness of and learn about differences between genetic services abroad (Laurino & Padilla, 2013; Sahhar et al., 2005). Again, formal relationships between programs are essential to facilitate these options. However, they can act as effective alternatives to international rotations so that more students have access to international learning opportunities.

2.4.6 Limitations

Several limitations may impact interpretation of the results from this study. The qualitative methods utilized in this study with open-ended interviews and semantic thematic analysis are intended to have participants provide a rich description of experiences. However, coding and theme development inherently involve some subjective interpretation. The principal investigator of this study played an active and integral role in the analysis of data and generation of themes (Braun & Clarke, 2022). As a current genetic counseling student, the principal investigator’s experiences inform the execution and analysis of these interviews. To counter this, another member of the research team read through transcripts and line-by-line codes to refine coded sections. However, this research team member is also trained as a genetic counselor and works as genetic counseling training program faculty, which may influence the analysis. Additionally, time
constraints on this project may have prevented more in-depth analysis of data and identification of more appropriate themes.

We interviewed a total of nine participants. Theoretical saturation has historically been used as a measure for qualitative research sample sizes. No singular, straightforward rule or set of rules define saturation. According to frameworks outlined by Saunders et al. (2018), theoretical saturation is achieved when no new codes or themes are identified within a dataset. Although generated themes did not change substantially during the last few interviews, novel codes were added with each interview to encompass new concepts discussed by participants. Based on this definition, theoretical saturation has not been achieved. Future studies with more participants may be necessary to further refine themes. Theoretical saturation has been criticized. For example, Braun and Clarke (2021) have described how saturation is not useful for reflexive thematic analysis because the interpretative nature of data will always yield new theoretical insights.

Dey (1999) proposed the concept of theoretical sufficiency, where researchers reach a level of understanding adequate enough to build a theory. Based on the richness of the data generated and rigor of analysis, we believe our analysis achieved theoretical sufficiency. Malterud et al. (2016) proposed information power as a tool to assess the quality of qualitative data which describes the notion that the more information a sample holds, the smaller the required sample size. Information power can be increased with a narrow study aim, specific sample, using an established theory, high-quality dialogue, and in-depth analysis. We believe that the sample specificity (targeted genetic counselors trained in the U.S. in a defined time period), rich dialogue (there were no tensions or ambiguity in responses and participants were well-articulated), and in-depth analysis of data helped to attain greater information power from this limited sample.
All study participants were recruited from email listservs and social media. Individuals who did not have access to these platforms were not able to participate. With the time commitment required for interviews, participants who participated in interviews may have been more willing to discuss their experiences or have more availability to share their experiences compared to others. Additionally, individuals who had more positive experiences may have been more willing to contribute to the study compared to individuals who had negative experiences. This convenience sampling may have impacted the types of outcomes we described.

Given the qualitative approach used for the study, we did not strive to select participants who would be representative of genetic counselors who pursued international rotations. Demographic information in relation to gender, age, and race were not obtained. Additionally, not all genetic counseling training programs who offer international rotations and not all regions in which genetic counseling student complete international rotations were represented. Therefore, these perspectives may be dictated by these factors that are not represented with the results of this study. Moreover, the population of practicing genetic counselors who completed international rotations during their training is currently not defined. This poses a challenge for future research when ascertaining if a sample is representative of this particular group of genetic counselors.

2.4.7 Future Directions

Participants described a number of professional and personal impacts from their international rotations. Results of this study highlighted the influences that new environments, student motivations, feelings of isolation, supervisor relationships at international sites, and genetic counseling program involvement have on international experiences. The current study addresses a gap in the literature involving the impacts of genetic counseling international rotations.
Additional studies on genetic counseling international rotations are needed to validate the findings of the study. Due to the time constrained nature of this project, the number of interviews and time for data analysis was limited. Further research may build upon the themes developed here by interviewing more participants and using consensus among several researchers for analysis. Additionally, we focused our sampling cohort to genetic counselors who graduated in the past 10 years (2013-2023). Future studies may investigate impacts of international rotations in genetic counselors who graduated outside this timeframe or investigate how rotations impact genetic counselors over time.

It would be beneficial for future studies to define the population of genetic counselors who pursued international rotations during their training to better determine the representativeness of future studies in this topic area. Especially with the occurrence of the COVID-19 pandemic, it may be important to also study the change in frequency of international experiences. Further studies may also assess the readiness of training programs to offer international rotation opportunities to students and perspectives from international site supervisors. With the recommendations provided with this study, it may be helpful to investigate the feasibility and effectiveness of pedagogical options outside of international rotations to promote transnational and multicultural education.

2.5 Conclusion

This study aimed to explore the impacts and perceived value of international rotations on practicing genetic counselors who completed these experiences during their training. Participants provided detailed accounts of factors such as navigating new environments, their personal goals
and motivations, feelings of isolation, relationships with international site supervisors, and training program involvement that influenced the impacts from their international rotation experiences.

Participants found that their international rotations benefited their professional development by providing relevant genetic counseling experiences. They felt they gained a greater understanding of the global landscape of genetic services and differences between healthcare system structures, which impacted their practice as genetic counselors. Participants also identified other positive aspects of their experiences such as personal growth in learning to live in a new environment, working with patients from different cultural backgrounds, and navigating workplace dynamics. Positive relationships with international supervisors helped participants adapt to international environments, benefited their learning, and facilitated long-lasting networks. Participants found that their international experiences were valuable and recommended that other genetic counseling students seek these rotation opportunities. Outcomes and barriers in the present study are similar to those found in research of international experiences in other professions.

Given the several benefits participants discussed, it is important for genetic counseling training programs to evaluate their international experience opportunities and frameworks. Participants suggested that training programs provide assistance with rotation logistics and financial supports. They also recommended that training programs promote international rotations by having more readily available information about these opportunities and establish exchange programs with international sites. To combat inequities, training programs can also offer pedagogical options to expand awareness on difference in genetic services abroad and promote multicultural education. This study demonstrated that international rotations play a role in helping genetic counselors develop skills to work in different healthcare systems and with diverse populations. As genetic testing and services expand globally, there is a need for a more
interconnected profession to serve diversifying populations. Expansion of these genetic counseling experiences worldwide can foster international awareness and collaboration. Future research can build upon these results with a more representative sample to further investigate the benefits of genetic counseling international rotations, as well as models to promote international experiences.
3.0 Research Significance

3.1 Research Significance to Genetic Counseling

We interviewed practicing genetic counselors who completed international rotations during their training and analyzed interview transcripts to assess the impacts and perceived value of these experiences. Semantic thematic analysis highlighted factors that influence the impacts of international experiences including navigating new environments, students’ personal goals and motivations, feelings of isolation, relationships with international supervisors, and training program involvement.

This study informs genetic counseling practice and education in several ways. Genetic counselors practicing in the U.S. must recognize that the patients they serve are influenced by the international landscape of genetic services. Results from this study highlighted that there are limitations to the testing options for patients seen in nationalized healthcare systems. They may not receive as extensive testing as patients seen in the U.S. This context is important when assessing risk for immigrant populations and coordinating testing for family members abroad. Participants described how their experiences provided them with an increased understanding of different healthcare systems, which was not taught as a part of their genetic counseling training. This international perspective informed participants’ career decisions and interaction with international genetic counselors. Outside of international rotations, integrating topics on the globalization of genetic counseling in U.S. training may help to promote international core competencies and collaboration.
Participants in this study also provided specific recommendations for training programs regarding international rotations. Based on the results in this study, genetic counseling training programs should strive to make their students aware of opportunities to complete fieldwork abroad and provide guidance with arranging these experiences. Participants focused on training programs facilitating international affiliate sites through alumni contacts or exchange program to make international rotations more accessible and standardized. If training programs were able to initiate these connections, it may be easier for students to arrange these experiences and promote these opportunities. Results in the current study demonstrate that institutional support is critical in facilitating positive international experiences. In other fields, students typically participate in international experiences through organized programs with clearly established frameworks. Therefore, programs must evaluate their current infrastructure for providing these types of rotations to genetic counseling students.

Outside of challenges in navigating international rotations, participants highlighted the financial limitations that prevent more students from pursuing international experiences. Given the limitations that genetic counseling training programs may have in funding international rotations, it is critical that professional organizations like NSGC invest in international collaboration and exchange. Providing consistent scholarship opportunities to a selected students may help to encourage these experiences across the profession.

3.2 Research Significance to Public Health

Results from the current study also inform public health efforts. The Center for Disease Control and Prevention (CDC) describe ten essential public health services (CDC, 2023). One of
these tenants is to build a diverse and skilled workforce. In order for genetic counselors to serve a diversifying patient population, they need to build both cultural competency and international awareness of genetic services. This study demonstrates that experiences from international rotations impacted genetic counselors’ practice by fostering skills to work with patients from different backgrounds. Additionally, international experiences during training may be a way to encourage genetic counselors to work internationally. Participants in this study discussed how their rotations shaped their career paths, with some genetic counselors currently working abroad because of their international experiences. Therefore, international rotations may be one way that training programs help to develop a diverse and skilled genetic counseling workforce.

Another key tenant includes strengthening, supporting, and mobilizing communities and partnerships. International rotations can serve to develop relationships between genetic counseling institutions globally. This study provides examples of how established international connections with alumni or program affiliate sites were beneficial in promoting international experiences for students. Genetic counseling is a relatively young and small field, which makes this type of collaboration critical to develop genetic counseling practice and promote equity in access to genetic services. International rotation experiences can help to strengthen established relationships and create novel partnerships in the genetic counseling field.
Appendix A IRB Approval

EXEMPT DETERMINATION

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<td>PI:</td>
<td>Victoria Kostour</td>
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<tr>
<td>Title:</td>
<td>U.S.-Trained Genetic Counselors’ Perspectives on Completing International Rotation Experiences</td>
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<td>Funding:</td>
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The Institutional Review Board reviewed and determined the above referenced study meets the regulatory requirements for exempt research under 45 CFR 46.104(d).

**Determination Documentation**

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- Approved Documents:
  - Kostour - Interview Guide IRB.docx, Category: Data Collection;
  - HRP-721 - Kostour Interview.docx, Category: IRB Protocol;
  - Kostour - Recruitment Flyer EDITED.pdf, Category: Recruitment Materials;
  - Kostour - Screening Qualtrics Survey EDITED.pdf, Category: Recruitment Materials;
  - Kostour - Study Introduction.docx, Category: Recruitment Materials;

If you have any questions, please contact the University of Pittsburgh IRB Coordinator, Amy Fuhrman. **NOTE:** Modifications are only required if they will affect the exempt determination. However, it is important to close your study when finished by submitting a Continuing Review.

*Please take a moment to complete our [Satisfaction Survey](#) as we appreciate your feedback.*

The University of Pittsburgh has a Federal Wide Assurance approved through the Office of Human Research Protections (FWA00006790).
EXEMPT MODIFICATION

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<td>Title:</td>
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<tr>
<td>Funding:</td>
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The Institutional Review Board reviewed the above referenced modification and determined the study continues to meet the regulatory requirements for exempt research under 45 CFR 46.104(d).

**Determination Documentation**

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If you have any questions, please contact the University of Pittsburgh IRB Coordinator, Amy Fuhrman. **NOTE:** Modifications are only required if they will affect the exempt determination. It is important to close your study when finished by submitting a Continuing Review.

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~ ATTENTION GENETIC COUNSELORS! ~

HAVE YOU EVER COMPLETED AN INTERNATIONAL ROTATION?
~ WE’D LIKE TO HEAR FROM YOU! ~

This research study is interested in exploring the effects and value of completing a genetic counseling international rotation experience.

You are eligible if you:
- Graduated from an ACGC accredited genetic counseling program in the U.S. between the years 2013-2023
- Completed a fieldwork experience outside the U.S. during your genetic counseling training

This research study requires:

01 ~5 minute virtual survey

02 ~60 Minute Virtual Interview

Questions? Please contact
Victoria Kostour: vik95@pitt.edu

IRB Protocol #: 23090046
Date Approved: 10/3/2023

 SCAN ME

University of Pittsburgh
Appendix C Study Introduction Script for Screening Survey

Thank you for your interest in my study. My name is Victoria Kostour. As a second-year genetic counseling student at the University of Pittsburgh, I am completing this research as a part of my thesis project. The purpose of this research study is to explore the lasting effects and value of completing a genetic counseling international rotation experience. This survey is to help determine eligibility for inclusion in the study. We will be asking for details about your contact information, genetic counseling training, and international rotation experience. Once you complete the survey and are determined to meet inclusion criteria, I will reach out via your preferred method of communication to set up a date and time for a virtual interview. We ultimately will be interviewing 10-15 genetic counselors about their international experiences.

Your confidentiality is important to us, and there are steps in place to protect it. Responses will be stored within the password-protected Pitt Licensed Qualtrics platform which will be accessed from password-protected personal computer. Research materials will only be shared with other members of the study teams for data analysis. Confidentiality via Internet communication cannot be guaranteed, even if reasonable efforts are taken. It may be possible that additional information beyond that for the purposes of this research study may be captured and used by others not associated in the study. There are no other foreseeable risks associated with participation in this study. There are no direct benefits for you.

Your participation is completely voluntary, and you can withdraw from the study at any time by closing out of the web browser. Any recorded responses will be deleted from all repositories. If you choose to not participate or finish the survey/interview, it will have no impact on your relationship with the University of Pittsburgh.

You may contact me with any questions or concerns after our interaction today by emailing vik95@pitt.edu. You can also contact my faculty advisor, Dr. Robin Grubs, MS, PhD, LCGC at rgrubs@pitt.edu. If you have any concerns, you may also reach out to Human Subjects Protection Advocate at the University of Pittsburgh Human Research Protection Office by calling (866) 212-2668 or by emailing askirb@pitt.edu.

If you would like to participate, click below to proceed to the online survey.
Appendix D Study Introduction Script for Interview

Thank you for agreeing to participate in my study. My name is Victoria Kostour. As a second-year genetic counseling student at the University of Pittsburgh, I am completing this research as a part of my thesis project. The purpose of this research study is to explore the lasting effects and value of completing a genetic counseling international rotation experience. We will be asking 10-15 genetic counselors to describe their international experiences. This interview includes questions surrounding the nature, obtainment, experience, challenges, and impacts of the international rotation you completed during your genetic counseling training. I expect the interview to take approximately one hour.

Your confidentiality is important to us, and there are steps in place to protect it. I will be recording the audio from this interview for transcription. No video recordings will be saved. Deidentified interview transcripts will be stored on a password-protected University of Pittsburgh OneDrive which can be accessed from a personal, password-protected computer. Research materials will only be shared with other members of the study teams for data analysis. The original recordings will be deleted after transcription is complete. Confidentiality via Internet communication cannot be guaranteed, even if reasonable efforts are taken. It may be possible that additional information beyond that for the purposes of this research study may be captured and used by others not associated in the study. There are no other foreseeable risks associated with participation in this study. There are no direct benefits for you.

Your participation is completely voluntary, and you can withdraw from the study at any time by informing me during the interview. If you choose to not participate or finish the interview, it will have no impact on your relationship with the University of Pittsburgh.

You may contact me with any questions or concerns after our interaction today by emailing vik95@pitt.edu. You can also contact my faculty advisor, Dr. Robin Grubs, MS, PhD, LCGC at rgrubs@pitt.edu. If you have any concerns, you may also reach out to Human Subjects Protection Advocate at the University of Pittsburgh Human Research Protection Office by calling (866) 212-2668 or by emailing askirb@pitt.edu.

With that being considered, would you like to proceed with participation in this study?
Appendix E Interview Guide

Opening the Interview
If you have any questions or need anything repeated during the interview, please let me know. To start off, can you tell me a little about yourself and how you came into the genetic counseling field?

Demographic Information
We’d like to learn a little about your current practice and to help us best cater to your background.

• Where do you currently practice as a genetic counselor?
  ○ Country and/or state
• How long (in years) have you been practicing as a genetic counselor?
• What specialty best described your primary area of practice?
• Within what additional specialties have you worked in the past?

Next, we want to learn about your places of birth and residence to best adapt our conversation moving forward.

• What country were you born in?
• What was your country of residence when applying to U.S.-based genetic counseling training programs?

Nature of Experience
During training, genetic counseling students’ fieldwork experiences can take place in a variety of settings such as in hospitals, labs, or private clinics. I’d like to learn about the structure of the international clinic in which you rotated at.

• How long (in days, weeks) did your international experience last?
• What kind of institution did you work at?
• What health professionals did you work with?
• (If were in a patient-facing setting) What types of patients did you interact with?
• What type of health professional supervised you?

Within a fieldwork experience, students may have different roles and expectations depending on their year of study and didactic coursework. For example, those beginning their training may observe sessions while those at the end of their training may be expected to conduct a full session.

• During what season/semester of your training did you complete your international rotation?
• What responsibilities did you take on during your international rotation?
• Could you run me through what a typical day would look like during your international experience?
Obtaining the Experience
I’d like to hear more about what factors influenced your decision to pursue a rotation outside the U.S.

- When did you first become aware of the opportunities to do international training?
- What motivated you to seek out an international rotation?

Some individuals have certain criteria when it comes to applying to genetic counseling training programs.

- What factored into your application decisions?
- Did you consider factors like location, cost, curriculum, other external or international rotation opportunities?

When students pursue rotations outside their program’s affiliate sites, there may be certain logistical considerations. For example, obtaining contact information for international fieldwork sites, obtaining clearances, and coordinating travel accommodations.

- What types of steps did you have to take in order to obtain and finalize your experience?
  - What was the level of program involvement in these steps?
  - Was there any financial support available?
- Were there any specific expectations such as learning a language or completing trainings set in place before engaging with your international rotation?

Professional Development
I’d like to hear more about your takeaway from your international rotation experience.

- When you look back on your experience today, what was the most memorable part of your international genetic counseling experience?
- Tell me about a situation or patient interaction from your experience that has stuck with you.
  - Why do you feel this has stayed with you?
- What did you learn during your experience that has influenced the way you practice as a genetic counselor?
- What skills that you learned during your genetic counseling training were reinforced during your international experience?
- What skills did you learn during your international experience that you feel were not taught as a part of your genetic counseling training program?
- How did your experience shape your career path?
  - Did having this experience influence the types of jobs you applied for?
  - Did it influence the way you network with other genetic counselors?
Personal Development Influences
• To what extent has your international experience as a student shaped how you evaluate world issues?

Barriers/Challenges
We are interested in learning about any barriers or difficulties you may have faced in preparing for, during, or while wrapping up your international rotation.
• What challenges did you face when arranging your international experience?
• What was something that was particularly difficult to face during your experience?
• In your opinion, what steps can programs take to help relieve the challenges you faced?

Perceived Value/Outcomes
We talked previously about your motivations in pursuing an international rotation.
• With those initial motivations in mind, what goals do you feel you fulfilled with your international experience?
• What expectations that you had for your experience prior to its completion do you feel were not met?

Finally, I’d like to learn more about your impressions of international rotations and their role in genetic counseling training.
• What surprised you about your experience?
• What aspects of your international experience do you feel could not be replicated in a clinical rotation within the U.S.?
• If you were to complete your international rotation today, what may you have done differently?
  ○ Is there something different you would have focused on or would have tried to practice more?
• Would you recommend that more genetic counseling students have the opportunity to pursue an international rotation? Why or why not?

Those are all the questions I had. Are there other things that you’ve thought of as we’ve been talking about international rotations that you’d like to share before we end today? May I contact you should other questions arise after our interview?

Thank you again for participating in this study. Do you have any last questions or comments for me?


