Describing the Experiences of Canadian Genetic Counseling Students Studying in the United States

Madeline Emma Ladouceur

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DESCRIBING THE EXPERIENCES OF CANADIAN GENETIC COUNSELING STUDENTS STUDYING IN THE UNITED STATES

by

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Bachelor of Science
University of Western Ontario, 2020

Submitted in Partial Fulfillment of the Requirements

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School of Medicine

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DEDICATION

I would like to dedicate this project to my grandma, Sharon Ladouceur; one of my favourite Canadians. Always with me in my heart. I will remember the good.
ACKNOWLEDGEMENTS

I would like to thank my thesis advisor, Janice Edwards, and my committee members, Jenna Scott and Alexis Carere, for their time and the thoughtful feedback they have contributed to this project. I would also like to thank my program’s Assistant Director of Thesis Research, Amy Wardyn, for the support and guidance she has provided both myself and my classmates throughout the entirety of the thesis process. Finally, thank you to my family, friends, and classmates for your love and support. It means more than you know.
ABSTRACT

There are four accredited genetic counseling master’s programs in Canada relative to 52 in the United States, which makes it challenging for prospective Canadian students to train in their home country. We investigated which factors influenced Canadian students to apply or not to apply to American genetic counseling training programs, as well as the experiences of Canadians who attended a program in the United States. We predicted that Canadian students applied to American genetic counseling training programs primarily because of limited training opportunities in Canada and a competitive application process across North America. We used a mixed methods online survey to study Canadian genetic counseling students who matched with an American or Canadian training program during the 2018-2021 application cycles. Descriptive statistics and thematic analysis were used to analyze the collected data. With a response rate of 48.6%, there were a total of 72 respondents, most of whom identified as female, white, and not Hispanic or Latino. Limited training opportunities in Canada and a competitive application process were the most common factors that influenced Canadian students to apply to American programs. Cost of education in the United States and cost and logistics of the GRE requirement for American programs were the most common factors that influenced Canadians not to apply to an American program. Canadian genetic counseling students who studied in the United States faced challenges related to being an international student. Respondents stated that more information about the international student process and requirements, contact with other Canadians who studied in the United States, and support from the program and/or
institution would have improved their experience. We propose the development of informational materials and a support network of Canadian genetic counseling students become a joint effort by the Canadian Association of Genetic Counsellors, National Society of Genetic Counselors, and Association of Genetic Counseling Program Directors. To our knowledge, this is the first study to investigate the experiences of Canadian genetic counseling students and our findings highlight the unique challenges faced by this group.
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CHAPTER 1: INTRODUCTION

1.1 Becoming a Genetic Counselor

Genetic counselors are healthcare professionals with specialized master’s degree-level training in human genetics and psychosocial counseling. Although students with any undergraduate major can apply to genetic counseling training programs, most genetic counseling students who responded to a 2005 survey had undergraduate degrees in biology or genetics (Lega et al., 2005). A recent replication of this study found 59.1% of genetic counseling students had majored in biology during undergraduate studies while 12.8% had majored in genetics and 12.3% in psychology (Stoddard et al., 2021). These undergraduate majors provide ample opportunity to complete the prerequisite courses typically required for graduate training in genetic counseling and may be more likely to expose undergraduate students to genetic counseling as a career option.

As of January 2022, 56 genetic counseling master’s programs in North America are accredited by the Accreditation Council for Genetic Counseling (ACGC). Maintaining accreditation status requires a program’s compliance with ACGC’s Standards for Accreditation (Accreditation Council for Genetic Counseling [ACGC], 2019). The Standards require a minimum program length of 21 months or two academic years. Training provided during this time must help students attain ACGC Practice Based Competencies by graduation. The Standards outline minimum requirements for curriculum content, such as principles of genetic counseling and clinical genetics, psychosocial content, and professional development. Programs may also develop their own unique plan
for instruction including, but not limited to, didactic courses, fieldwork training, research, presentations, case conferences, and journal clubs. Fieldwork training must include student participation in a minimum of 50 cases under supervision of a genetic counselor with at least one year of clinical experience and board certification by one or more of the American Board of Genetic Counselors, Canadian Association of Genetic Counsellors, or American Board of Medical Genetics and Genomics. Participatory cases and supplemental fieldwork experiences must demonstrate appropriate depth and breadth across clinical practice areas. Programs can receive full accreditation for up to eight years, at which point they must apply for re-accreditation to evaluate their continued compliance with the Standards and attempt to renew their accreditation status (ACGC, 2019).

Prior to applying to genetic counseling programs, students often spend years gaining experiences to make them a more competitive applicant. Lega et al. (2005) found that genetic counseling students spent an average of 2.68 years considering the career of genetic counseling prior to applying. Stoddard et al. (2021) noted a moderately significant increase in this value, finding that students were spending an average of 3.11 years considering the field prior to applying. Additionally, despite the increase in number of accredited programs between 2005 and 2021, significantly fewer students were accepted on their first application attempt (Lega et al., 2005; Stoddard et al., 2021). This reflects that students have spent more time strengthening their resume prior to applying and, in turn, the application process has become increasingly competitive for prospective students. This may also indicate that students are becoming aware of the genetic counseling profession in earlier stages of their education.
Across North America, the application process for genetic counseling programs typically spans December to April, including interviews with select applicants beginning in February (National Society of Genetic Counselors [NSGC], n.d.). The highly competitive process requires personal statements, letters of recommendation, and a well-balanced curriculum vitae. Between 2018-2021, the mean GPA of successful applicants was approximately 3.6 on a 4.0 scale, while that of unsuccessful applicants was approximately 3.4 (National Matching Services Inc [NMS], n.d.a). Advocacy and counseling experiences are encouraged or required by most programs as a way of developing an understanding of how they cope in a counseling role, particularly in crisis counseling settings (NSGC, n.d.). Stoddard et al. (2021) reported that nearly 100% of genetic counseling students had at least one form of advocacy experience and most had more than one. The most common experience was a crisis hotline counselor, but other common experiences included working with individuals with a neurodevelopmental disorder or physical disability (Stoddard et al., 2021). Additionally, some students were teaching assistants and over one fourth of students were genetic counseling assistants/interns (Stoddard et al., 2021). Similarly, shadowing and/or internship experience in genetic counseling is highly recommended. If an applicant cannot complete shadowing and/or internships, it is suggested they interview a genetic counselor about their role in healthcare (NSGC, n.d.). According to Lega et al. (2005), 76.2% of genetic counseling students had shadowed at least one genetic counselor before applying whereas Stoddard et al. (2021) reported that 93.7% of students had shadowing experience.

Historically, many American genetic counseling programs have required applicants to take the Graduate Record Examination (GRE) General Examination, a standardized test
assessing skills in reading, writing, and mathematics. However, there is conflicting evidence about whether GRE scores are an accurate predictor of academic success and ongoing discussion about the use of these scores in the application process (Myers et al., 2021). A recent study investigated the correlation between select application factors, such as GPA, GRE scores, and demographic factors, and passing the American Board of Genetic Counseling (ABGC) certification exam on the first attempt. These results suggest an association between highest scores on the verbal and quantitative sections of the GRE exam and passing the ABGC exam on the first attempt (Myers et al., 2021). However, they acknowledge demographic differences in GRE scores that suggest the GRE requirement may serve as a barrier for underrepresented groups. For example, female students of all backgrounds and male students of racial and ethnic minorities tended to score lower on the GRE compared to White and Asian-American males (Myers et al., 2021). Therefore, in an effort to foster diversity and inclusion in the field of genetic counseling, some programs have removed or made optional the GRE requirement (Myers et al., 2021).

In 2018, the Association of Genetic Counseling Program Directors (AGCPD) decided that the application process would utilize a matching process conducted by National Matching Services (Association of Genetic Counseling Program Directors [AGCPD], n.d.). During this process, applicants confidentially rank the programs at which they interviewed and are interested in attending. Each program also submits a ranking of the applicants interviewed. Upon submission of the rank lists, National Matching Services runs an algorithm that matches applicants with a training program using preferences stated in the submitted lists. All applicants are notified about their match results on the same day in late April. If an applicant matches with an institution, they must attend that program
A post-match process for unmatched applicants and programs with unfilled positions allows applicants and programs to contact each other directly to fill the remaining openings (NMS, n.d.b). Training programs typically begin in August or September following the application cycle (NSGC, n.d.).

A notable challenge throughout the application process is cost. Prior to applying to training programs, all applicants must register with National Matching Services, which costs $100 USD (NMS, n.d.b). Anyone applying to a training program that requires the GRE must pay $205 USD for each attempt, which does not include the purchase of any preparation materials (Educational Testing Services, n.d.). Most genetic counseling training programs have an application fee. Upon reviewing public data published on genetic counseling training program websites, application fees may vary in price between approximately $25 USD and $140 USD. Often, application fees are more expensive for international applicants compared to domestic applicants. Before the SARS-CoV-2 pandemic, most programs required selected students to interview in-person, but many could not provide financial assistance for the cost of travel or accommodations (NSGC, n.d.). On average, genetic counseling students apply to 6 programs during their first application cycle and spend on average $1,650 during the application process or about $270 per program (Stoddard et al., 2021). Some students reported spending up to $8,000 on the application process alone (Stoddard et al., 2021).

1.2 Genetic Counseling in Canada

Over the past several decades, the field of genetic counseling has seen significant global expansion. In 2018, there were approximately 7,000 genetic counselors practicing in at least 28 countries around the world (Abacan et al., 2019). Expansion in the field has
been driven by advancements in sequencing technology that have allowed for a broader genomic approach to both rare and common diseases. Increased scientific and public knowledge about genetics combined with an increased capacity to obtain complex genetic information has made expansion of the genetic counseling field necessary (Baty, 2018). Additionally, genetic counselors have diversified into increasingly varied roles. Originally established as a patient-facing occupation, only about half of genetic counselors currently work in a direct patient care position (NSGC, 2021). While most still work in the three main specialties of prenatal, pediatric, and cancer genetics, there are expanding opportunities for genetic counselors in other clinical areas, such as preconception and neurogenetics (Burns et al., 2019; NSGC, 2021). Those working in non-direct patient care positions may work, for example, in public health and policy development, education, research, or genetic testing laboratories (NSGC, 2021).

Many of the developments in the field are noted in the United States, where the profession remains largely concentrated. In the 2021 match process, a total of 55 participating programs and 553 positions were offered (NMS, n.d.a). Of the 55 participating programs, only four were housed in Canada and accepted a combined total of 20-25 students per year (NMS, n.d.a). The 51 American programs that participated in the 2021 match process offered a combined total of approximately 530 positions (NMS, n.d.a). Additionally, the estimated number of practicing genetic counselors in the United States in 2018 was approximately 4,000 compared to the estimated 350 in Canada (Abacan et al., 2019). The smaller size of the Canadian genetic counseling workforce, however, does not reflect the country’s demand for the profession. Across the country, wait times for non-urgent appointments vary from several months to 4 years (Costa et al., 2020). A recent
study reported that Canadian employers want to hire more genetic counselors but are limited by funding (Costa et al., 2020). Canada’s health-care system is publicly funded and health insurance falls under provincial control. While this system has many advantages, the reliance on government funding also means that the opportunities for growth seen in privately funded health-care systems, such as that of the United States, are not often possible in Canada (Ormond et al., 2018).

Despite the limitations of growing the genetic counseling profession within Canada, there is a population of Canadian students interested in entering the field. Between 2018 and 2021 there were 693 genetic counseling applicants that listed a permanent address in Canada (NMS, n.d.a). This includes 174 Canadian applicants with 42 matching a program in 2018, 171 applicants with 38 matching in 2019, 179 applicants with 36 matching in 2020, and 169 applicants with 32 matching in 2021 (NMS, n.d.a). Literature detailing the experiences of these Canadian genetic counseling students is limited.

Having fewer and smaller Canadian genetic counseling training programs makes it more difficult for Canadians interested in genetic counseling to train in their home country and makes the application process more competitive (Akgumus et al., 2016; Merchant & McDermid, 2019). A study evaluating a course that launched at the University of Alberta in 2011 demonstrates the competitive nature of the application process. The course offered students thorough exposure to the field of genetic counseling at the undergraduate level. Acceptance into the course required an application and interview and preference was given to students with competitive credentials, such as relevant undergraduate courses, high GPA, and face-to-face counseling experience. Only 1-4 students were selected each term. All 18 former students were later surveyed about their experience and half of them had
been offered acceptance to genetic counseling training programs on their first attempt. With additional attempts, the former students achieved an overall acceptance rate of 66.7%. While this is an impressive initiative to create highly experienced and competent genetic counseling candidates, it furthers the issue of limited opportunities and competitive entry. This experience had few openings for interested students and those limited spots were preferentially offered to students that were already impressive candidates. Additionally, even with such a competitive element added to their resume, only 66.7% of former students were offered acceptance to genetic counseling programs (Merchant & McDermid, 2019).

1.3 Attending Genetic Counseling Training Programs in the United States

Many Canadian students apply to genetic counseling master’s programs in the United States, likely in an attempt to improve their chances of gaining acceptance due to limited training opportunities in Canada. This is consistent with the findings of a study by McCarthy et al. (2012) that surveyed Canadian students (all majors) enrolled at D’Youville College in Buffalo, New York about their motivations to study in the United States. All Canadian students enrolled at D’Youville College at the time of the study were invited to participate. The survey respondents included undergraduate students, graduate students, students in professional programs, and doctoral students. The majority of respondents were in an education, nursing, or health-related major. Results indicated that Canadians were influenced by lack of desired program in Canada or competitive application process for desired program in Canada, broadening life experiences, enhancing prospects for future employment, and proximity to Canada, among others (McCarthy et al., 2012). Additionally, this study defined Canadians as a unique group of students who do not entirely fit in with the title of international nor domestic. Though they faced some similar
concerns to international students, such as lack of programs or competitive entry in their home country, they also did not share some concerns of other international students, such as having a common language with their home country. Sometimes Canadian students even resembled domestic students, for example, by prioritizing the location of an institution (McCarthy et al., 2012). Establishing Canadian students studying in the United States as neither international nor domestic posits this group as a niche population for study.

Canadian students studying in the United States do not need to go through a visa application process; an F-1 visa is provided when they cross the border to begin their program of study (U.S. Embassy & Consulates in Canada, n.d.). The F-1 visa allows full-time students to study at an accredited institution in the United States (U.S. Citizenship and Immigration Services, 2020). To receive F-1 visa status at the border, Canadian students must first acquire an I-20 “Certificate of Eligibility for Nonimmigrant Student Status” from their school. This form proves that the student has been admitted to an American school as a full-time student and that the student has sufficient funds to attend school and live in the United States (Berkeley International Office, n.d.). Therefore, for the student to receive an I-20, they need to demonstrate that they have enough money to pay for tuition and estimated cost of living expenses for their entire first year of study.

Once a student has received their I-20 document, they must register with Student and Exchange Visitor Information System (SEVIS) and pay the I-901 SEVIS fee of $350 USD (U.S. Immigration and Customs Enforcement, n.d.). SEVIS is a system housed within the U.S. Department of Homeland Security that maintains information about international students studying within the United States (U.S. Immigration and Customs Enforcement,
Throughout their course of study in the United States, Canadian students must be aware of and adhere to the strict rules for maintaining their F-1 visa status.

One factor that all genetic counseling students must consider is financing their education. A study published in 2014 found that training program cost was second only to location as the most influential factor in selecting a genetic counseling training program and over 80% of respondents reported feeling burdened by their student debt (Kuhl et al., 2014). Many genetic counseling students start their training program immediately after completing their undergraduate degree; their undergraduate debt has not been paid back before starting to accrue graduate school debt (Kuhl et al., 2014).

In the United States, each state has public colleges and universities that receive funding from the tax dollars of that state’s residents. As such, residents of that state may attend these public institutions for in-state tuition, which is a discounted price relative to the out-of-state tuition charged to students residing outside of that state (HEATH Resource Center at the National Youth Transitions Center, n.d.). Most Canadians studying in the United States would be considered “out-of-state” and would therefore have to pay higher tuition prices. To offset costs, Kuhl et al. (2014) found that 63% of recent alumni of North American genetic counseling training programs reported that they held a job during graduate school and worked an average of 8-9 hours per week. However, international students on an F-1 student visa are only eligible for on-campus employment and therefore have limited opportunities to offset their costs (U.S. Citizenship and Immigration Services, 2020). Additionally, some training programs are housed partially or entirely in off-campus facilities and students may establish themselves closer to where their program is located.
If this is the case, they may face the additional challenge of finding transportation to on-campus employment.

Training in the United States also has several implications for post-graduate work opportunities. Costa et al. (2020) found that genetic counselors who trained in Canada were significantly more likely to work in Canada than those who trained in the United States. Of those who trained and worked in the United States, some desired to work in Canada but had difficulty finding a position. Others may have chosen to work in the United States because they were more likely to find a permanent position in their preferred specialty (Costa et al., 2020). Those that decide to stay in the United States may experience challenges during the job application process due to their non-citizen status. Due to the small and relatively unknown nature of the field, human-resources departments and border officials may be unfamiliar with genetic counseling, which can make the process of obtaining a work visa more challenging (Akgumus et al., 2016).

For many Canadian students, studying in the United States means they must move away from their family, friends, and a sense of familiarity. These students must then face the challenges of completing post-secondary education while in a new environment without their established support systems. A study of undergraduate students by Acharya et al. (2018) found that depressive symptoms were significantly higher in international and female students compared to domestic and male students, respectively. As females are overrepresented in the genetic counseling profession, most Canadian genetic counseling students studying in the United States would fall into both increased risk categories (NSGC, 2021). Additionally, Hyun et al. (2007) reported that a significantly lower
percentage of international graduate students were aware of on-campus mental health services compared to domestic students and they were less likely to utilize such services.

1.4 Rationale

Applying to genetic counseling training programs is a rigorous and lengthy process. Applicants may spend years preparing a well-rounded and competitive package prior to the 4-5 month application process (Lega et al., 2005; Stoddard et al., 2021). Canadian students interested in entering the field may have difficulties doing so in their own country because of limited domestic training opportunities (Akgumus et al., 2016; Alexander et al., 2013; Merchant & McDermid, 2019). Many choose to study in the United States and face additional challenges such as financial burden, obtaining the necessary travel documentation, being across the border from friends and family, and work eligibility upon graduation. Previous studies have investigated motivations and barriers to obtaining international genetic counseling experiences, but little is known about the unique experiences of Canadian genetic counseling students applying to and completing training programs in the United States (Alexander et al., 2013). This is a niche group to study because, while they must go through the same technicalities as other international students, they are often viewed more similarly to domestic students (McCarthy et al., 2012).

As a field, genetic counseling has experienced continued growth due to our expanding knowledge of genetics and increasingly advanced technology. However, expansion of genetic counseling in Canada is slowed by limited allocation of government funds. As it is anticipated that the demand for genetic counseling services will continue to outpace the supply of qualified genetic counselors, growing the field in Canada will become increasingly important to properly serve the country’s citizens (Hoskovec et al.,
2018). This study aimed to provide an appreciation for the experiences of and challenges faced by Canadian genetic counseling students and propose ways in which we can support Canadian students as they enter the field of genetic counseling.

1.5 Purpose of Present Study

This study was conducted to evaluate factors that influenced the decision of Canadian students to apply or not to apply to American genetic counseling training programs during the 2018-2021 application cycles. We predicted that Canadian students applied to American genetic counseling training programs primarily because of limited training opportunities in Canada and a competitive application process across North America. The aims of this study were as follows:

1. Identify what motivated Canadian students to apply to American genetic counseling training programs.

2. Describe challenges associated with applying to and attending American genetic counseling training programs as a Canadian student.

3. Propose ways to improve the experiences of Canadian students studying genetic counseling in the United States.
CHAPTER 2: DESCRIBING THE EXPERIENCES OF CANADIAN GENETIC COUNSELING STUDENTS STUDYING IN THE UNITED STATES\textsuperscript{1}

\textsuperscript{1} Ladouceur, M., Edwards, J., Scott, J., & Carere, A. To be submitted to \textit{Journal of Genetic Counseling}. 
2.1 Abstract

There are four accredited genetic counseling master’s programs in Canada relative to 52 in the United States, which makes it challenging for prospective Canadian students to train in their home country. We investigated which factors influenced Canadian students to apply or not to apply to American genetic counseling training programs, as well as the experiences of Canadians who attended a program in the United States. We predicted that Canadian students applied to American genetic counseling training programs primarily because of limited training opportunities in Canada and a competitive application process across North America. We used a mixed methods online survey to study Canadian genetic counseling students who matched with an American or Canadian training program during the 2018-2021 application cycles. Descriptive statistics and thematic analysis were used to analyze the collected data. With a response rate of 48.6%, there were a total of 72 respondents, most of whom identified as female, white, and not Hispanic or Latino. Limited training opportunities in Canada and a competitive application process were the most common factors that influenced Canadian students to apply to American programs. Cost of education in the United States and cost and logistics of the GRE requirement for American programs were the most common factors that influenced Canadians not to apply to an American program. Canadian genetic counseling students who studied in the United States faced challenges related to being an international student. Respondents stated that more information about the international student process and requirements, contact with other Canadians who studied in the United States, and support from the program and/or institution would have improved their experience. We propose the development of informational materials and a support network of Canadian genetic counseling students.
become a joint effort by the Canadian Association of Genetic Counsellors, National Society of Genetic Counselors, and Association of Genetic Counseling Program Directors. To our knowledge, this is the first study to investigate the experiences of Canadian genetic counseling students and our findings highlight the unique challenges faced by this group.

### 2.2 Introduction

Genetic counselors typically receive a minimum of two years training at a genetic counseling master’s program (Accreditation Council for Genetic Counseling [ACGC], 2019). In 2021, there were 55 North American programs accredited by ACGC and 553 positions offered to prospective students (National Matching Services Inc [NMS], n.d.a). Of these programs, four were housed in Canada; these programs accept a combined total of 20-25 students per year (NMS, n.d.a). Between 2018 and 2021 there have been 693 Canadian genetic counseling applicants (NMS, n.d.a). Having fewer and smaller Canadian training programs makes it difficult for Canadians to receive genetic counseling training in their home country (Akgumus et al., 2016; Merchant & McDermaid, 2019).

Applying for genetic counseling master’s programs is a competitive and costly process that requires personal statements, letters of recommendation, and a well-balanced curriculum vitae (Lega et al., 2005; Stoddard et al., 2021). Historically, American programs have also required applicants to take the Graduate Record Examination (GRE) General Examination; however, there is recent discussion about the value of this requirement (Myers et al., 2021). On average, genetic counseling students spend about $1,650 during the application process alone, with some spending up to $8,000 (Stoddard et al., 2021).

Since 2018, the application process has utilized a matching process in which applicants and programs submit rank lists and an algorithm considers their preferences to
match applicants with a specific program (Association of Genetic Counseling Program Directors [AGCPD], n.d.; NMS, n.d.b). A post-match process for unmatched applicants and programs with unfilled positions allows applicants and programs to contact each other directly to fill remaining openings (NMS, n.d.b).

A study by McCarthy et al. (2012) showed that Canadian students apply to schools in the United States when there are limited training opportunities available in Canada, likely to improve their chances of gaining acceptance to their desired program. Though this study was not conducted with genetic counseling students, it is likely a similar phenomenon occurs with this student population. Limited genetic counseling training opportunities in Canada may be partly attributed to the smaller workforce of practicing genetic counselors in Canada compared to the United States (Abacan et al., 2019). Though Canadian employers want to hire more genetic counselors, they report being limited by funding (Costa et al., 2020).

Canadians that apply to and attend an American genetic counseling training program must acquire proper documentation and pay the necessary fees to receive an F-1 student visa at the border (U.S. Embassy & Consulates in Canada, n.d). Most Canadians must pay out-of-state tuition fees, which are typically more expensive (HEATH Resource Center at the National Youth Transitions Center, n.d.). Additionally, F-1 visa status restricts Canadian students to on-campus employment and therefore their ability to work to offset program costs is limited (Kuhl et al., 2014; U.S. Citizenship and Immigration Services, 2020). Training in the United States also has implications for post-graduate work opportunities, as Costa et al. (2020) found that genetic counselors who trained in Canada were significantly more likely to work in Canada than those who trained in the United
States. For many Canadians, studying in the United States means they must move away from their family and friends, and face the challenge of completing post-secondary education in a new environment without their established support systems.

Previous studies have investigated motivations and barriers to obtaining international genetic counseling experiences, but little is known about the unique experiences of Canadian genetic counseling students applying to and completing training programs in the United States (Alexander et al., 2013). This is a niche group to study because, while they must go through the same technicalities as other international students, they are often viewed more similarly to domestic students (McCarthy et al., 2012). This study aimed to provide an appreciation for the experiences of and challenges faced by Canadian genetic counseling students and propose ways in which we can support Canadian students as they enter the field of genetic counseling.

This study was conducted to evaluate factors that influenced the decision of Canadian students to apply or not to apply to American genetic counseling training programs during the 2018-2021 application cycles. We predicted that Canadian students applied to American genetic counseling training programs primarily because of limited training opportunities in Canada and a competitive application process across North America. The aims of this study were as follows:

1. Identify what motivated Canadian students to apply to American genetic counseling training programs.
2. Describe challenges associated with applying to and attending American genetic counseling training programs as a Canadian student.
3. Propose ways to improve the experiences of Canadian students studying genetic counseling in the United States.

2.3 Methods

2.3.1 Participants

Participation was restricted to English-speaking Canadian genetic counseling students who matched with or were placed post-match with an American or Canadian genetic counseling master’s program in 2018, 2019, 2020, or 2021. For the purposes of this study, Canadian students were defined as those who held Canadian citizenship and/or permanent resident status in Canada at the time of applying to genetic counseling master’s programs. Students who held dual citizenship at the time of application were not excluded. Only English-speaking students were eligible to participate in this study due to limited access to resources for translation and interpretation; this exclusion criteria was not expected to materially impact results, as all accredited genetic counseling programs in North America have English as their primary language of instruction.

Between the years 2018 and 2021, a total of 148 Canadian students matched with a genetic counseling training program in the United States or Canada (NMS, n.d.a.). We attempted to recruit these individuals via email and social media. An email including a brief description of the study and a link to the online survey (Appendix A) was sent to program leadership of all accredited American and Canadian genetic counseling programs accredited via the AGCPD listserv. In addition to leadership of fully accredited programs, some members of the AGCPD listserv may belong to developing programs not yet accredited by ACGC. Members of the AGCPD listserv were asked to forward the survey link to Canadian students that matched with their program in the years 2018, 2019, 2020,
and 2021. A reminder was sent approximately one month after the initial email. A similar email invitation (Appendix B) was sent to all members of the Canadian Association of Genetic Counsellors via their listserv. The link to the online survey was also advertised on Twitter using the hashtag #GCchat (Appendix C).

This study was reviewed by University of South Carolina’s Institutional Review Board which granted exemption from Human Research Subjects Regulation (Pro00112109). Participation in this study was completely voluntary and anonymous. Upon completing the survey, participants were given the opportunity to opt into a raffle to win one of five $25 Visa gift cards. Participants who opted into the raffle were asked to enter their email address in a separate form to preserve the anonymity of their survey responses. Full funding for this project was provided by the National Society of Genetic Counselors (NSGC) International Special Interest Group.

2.3.2 Instrumentation

An online survey was created and published using Qualtrics (Appendix D). Four multiple choice questions (related to citizenship, program match/placement, and program attendance) were used to assess eligibility. Data collected included personal demographics: gender (six categories), ancestry (13 categories)\(^2\), Hispanic or Latino ethnicity (yes/no), age (years), education level (four categories), and source of financial support for graduate education (six categories). Application-related demographics were collected: physically residing in Canada at time of application (yes/no), all countries in which they applied (three categories), number of application attempts (two categories), if/during which application attempt they applied to an American program (four categories). Respondents were also

\(^2\) See Statistics Canada (2020)
asked about their program location (country and NSGC-defined region) and post-graduate experience (country of employment or anticipated employment post-graduation and country in which they would consider employment in the next 10 years).

Respondents were asked which factors motivated them to apply or not to apply to American genetic counseling programs in a “select all that apply” format with multiple pre-loaded options, plus the ability to specify “other” reasons in free-form text. Participants were asked to rank those factors that they selected from the pre-loaded options from most to least important. A “select all that apply” style question was also used to ask participants who studied in the United States where they sought information about enrollment after the match process. Participants who studied in the United States were asked to describe the following in free-form text: their general experience as an international student, challenges experienced as an international student between application and end of first semester, and resources that would have improved their experience between application and end of first semester. Suggested study improvements were also gathered via a free text question.

Respondents who applied to at least one American program and matched with an American program were asked a total of 29 questions; those who applied to at least one American program and matched with a Canadian program were asked 23 questions; and those who never applied to an American program and matched with a Canadian program were asked 22 questions. The survey was opened in October 2021 and data collection proceeded for a total of four months, concluding in January 2022. All questions were optional to complete and participants could exit the survey at any time with their data submitted to that point preserved.
2.3.3 Data Analysis

Raw data were downloaded to Microsoft Office Excel for analysis. Participant responses were only included in data analysis if they completed over 95% of the survey. Descriptive statistics were computed to determine the frequency of variables for all multiple choice and ranking questions. The first author (ML) reviewed all free-text responses and identified themes. All themes were reviewed by a second author (AC) and discrepancies were discussed to reach a consensus. Quotations were extracted from free-text responses to exemplify major themes. Tables and figures were constructed using Microsoft Office Excel software.

2.4 Results

2.4.1 Demographic Information

A total of 72 participants were included in data analysis (Figure 2.1) for a response rate of 48.6% (72/148). Demographic information for all participants is detailed in Table 2.1. Most participants identified as female, white, and not Hispanic or Latino and were between the ages of 24 and 27. Of those who went through the application process once, 44.8% (13/29) applied to at least one American genetic counseling training program and 55.2% (16/29) only applied to Canadian programs. Of those who went through the application process two or more times, 27.9% (12/43) never applied to an American program, 2.3% (1/43) applied to an American program on their first attempt but not subsequent attempts, 27.9% (12/43) applied to an American program during their first attempt and at least one subsequent attempt, and 41.9% (18/43) did not apply to an American program during their first attempt but did on at least one subsequent attempt.
Figure 2.1 Participant recruitment and inclusion/exclusion criteria. Gray boxes signify individuals not included in final data set.

Table 2.1 Participant Demographics

<table>
<thead>
<tr>
<th>Item</th>
<th>Response Category</th>
<th>n</th>
<th>% of total (N=72)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td>Mean +/- SD (range)</td>
<td>26.2 +/- 2.3 (22-36)</td>
<td></td>
</tr>
<tr>
<td>Gender identity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>64</td>
<td>88.9</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>6</td>
<td>8.3</td>
</tr>
<tr>
<td>Transgender</td>
<td></td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Genderqueer/Gender nonconforming</td>
<td></td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Not listed</td>
<td></td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Ancestry*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td></td>
<td>50</td>
<td>69.4</td>
</tr>
<tr>
<td>Mixed ancestry</td>
<td></td>
<td>6</td>
<td>8.3</td>
</tr>
<tr>
<td>South Asian</td>
<td></td>
<td>6</td>
<td>8.3</td>
</tr>
<tr>
<td>Chinese</td>
<td></td>
<td>5</td>
<td>6.9</td>
</tr>
<tr>
<td>West Asian</td>
<td></td>
<td>2</td>
<td>2.8</td>
</tr>
<tr>
<td>Black</td>
<td></td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Arab</td>
<td></td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>Not Hispanic or Latino</td>
<td>70</td>
<td>97.2</td>
<td></td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>2</td>
<td>2.8</td>
<td></td>
</tr>
</tbody>
</table>

**Highest level of education prior to starting genetic counseling training program**

<table>
<thead>
<tr>
<th>Highest level of education</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor's Degree</td>
<td>51</td>
<td>70.8</td>
</tr>
<tr>
<td>Master's Degree</td>
<td>21</td>
<td>29.2</td>
</tr>
</tbody>
</table>

**Country of residence while applying to genetic counseling training programs**

<table>
<thead>
<tr>
<th>Country</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>71</td>
<td>98.6</td>
</tr>
<tr>
<td>Lebanon</td>
<td>1</td>
<td>1.4</td>
</tr>
</tbody>
</table>

**Total number of application attempts**

<table>
<thead>
<tr>
<th>Number of attempts</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>29</td>
<td>40.3</td>
</tr>
<tr>
<td>Two or more</td>
<td>43</td>
<td>59.7</td>
</tr>
</tbody>
</table>

**Countries in which you applied to a genetic counseling training program**

<table>
<thead>
<tr>
<th>Countries</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>28</td>
<td>38.9</td>
</tr>
<tr>
<td>United States</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Canada and United States</td>
<td>42</td>
<td>58.3</td>
</tr>
<tr>
<td>Canada, United States, and other&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2</td>
<td>2.8</td>
</tr>
</tbody>
</table>

**Location of genetic counseling training program (country)**

<table>
<thead>
<tr>
<th>Location</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>43</td>
<td>59.7</td>
</tr>
<tr>
<td>United States</td>
<td>29</td>
<td>40.3</td>
</tr>
</tbody>
</table>

**Location of genetic counseling training program (NSGC-defined region)**

<table>
<thead>
<tr>
<th>Region</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Region I&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Region II&lt;sup&gt;c&lt;/sup&gt;</td>
<td>25</td>
<td>34.7</td>
</tr>
<tr>
<td>Region III&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Region IV&lt;sup&gt;e&lt;/sup&gt;</td>
<td>20</td>
<td>27.8</td>
</tr>
<tr>
<td>Region V&lt;sup&gt;f&lt;/sup&gt;</td>
<td>9</td>
<td>12.5</td>
</tr>
<tr>
<td>Region VI&lt;sup&gt;g&lt;/sup&gt;</td>
<td>16</td>
<td>22.2</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>1.4</td>
</tr>
</tbody>
</table>

**Largest source of financial support for graduate school education**

<table>
<thead>
<tr>
<th>Source</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Student, bank, or personal loans</td>
<td>41</td>
<td>56.9</td>
</tr>
<tr>
<td>Financial assistance from family members</td>
<td>16</td>
<td>22.2</td>
</tr>
<tr>
<td>Personal savings</td>
<td>10</td>
<td>13.9</td>
</tr>
<tr>
<td>Scholarship, grant, or bursary</td>
<td>5</td>
<td>6.9</td>
</tr>
</tbody>
</table>

<sup>a</sup>Categories included those in the 2021 Canadian census questionnaire
<sup>b</sup>UK and Australia
<sup>c</sup>CT, MA, ME, NH, RI, VT, NL, PE, NS, NB
<sup>d</sup>DC, DE, MD, NJ, NY, PA, VA, WV, PR, VI, QC
Factors that motivated respondents to apply to at least one American genetic counseling program are outlined in Table 2.2a. All participants were motivated by limited training opportunities in Canada and almost all participants were motivated by the competitive application process. When subsequently asked to rank those factors they considered, limited training opportunities in Canada was ranked as the most important factor most often and competitive application process was ranked as the second most important factor most often (Figure E.1).

Table 2.2a Factors Influencing Canadian Students to Apply to American Genetic Counseling Training Programs

<table>
<thead>
<tr>
<th>Factor</th>
<th>n</th>
<th>% of total (N=44)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited training opportunities in Canada</td>
<td>44</td>
<td>100</td>
</tr>
<tr>
<td>Competitive application process</td>
<td>42</td>
<td>95.5</td>
</tr>
<tr>
<td>Program reputation and/or characteristics</td>
<td>27</td>
<td>61.4</td>
</tr>
<tr>
<td>Geographical proximity</td>
<td>19</td>
<td>43.2</td>
</tr>
<tr>
<td>Opportunity to broaden personal experience</td>
<td>18</td>
<td>40.9</td>
</tr>
<tr>
<td>Opportunity for travel</td>
<td>15</td>
<td>34.1</td>
</tr>
<tr>
<td>Gain experience in a different health care system</td>
<td>8</td>
<td>18.2</td>
</tr>
<tr>
<td>Desire to work in the United States after graduation</td>
<td>8</td>
<td>18.2</td>
</tr>
<tr>
<td>Having family/loved ones in the United States</td>
<td>5</td>
<td>11.4</td>
</tr>
<tr>
<td>Already residing in the United States</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>None of the above</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

The importance of limited training opportunities in Canada, geographic considerations, and program reputation and/or characteristics were reflected in the qualitative data. When given the opportunity to discuss other factors that motivated their
decision to apply to American programs, four participants (4/16, 25%) discussed how financial considerations, such as the availability of in-state tuition for residents of Ontario, influenced their decision to apply to American programs. Five participants (5/16, 31.3%) discussed how they were influenced by their perception of American programs:

*I found American programs tended to be more holistic in their application review and many programs tended towards having a stronger emphasis on psychosocial skills.*

*I felt like American schools spoke more about DEIJ issues. This was important to me as a racial minority, immigrant, low SES applicant.*

*The programs that had extensive information on visas, housing, licences, financial aid, etc on their program websites were prioritized.*

Seven participants (7/16, 43.8%) indicated their chance of gaining acceptance to a genetic counseling training program would be higher if they applied to American programs due to the greater number of training opportunities in the United States compared to Canada:

*I felt there were more opportunities in the US and so I would have a better chance of being accepted into a program.*
When asking Canadian training program directors for feedback following a failed application cycle, I was strongly encouraged to apply to American training programs.

2.4.3 Decision Not to Apply to American Genetic Counseling Training Programs

Factors that influenced respondents not to apply to any American genetic counseling programs are outlined in Table 2.2b. All participants reported that cost of education in the United States influenced their decision not to apply to American programs. The second most considered factor was the cost and logistics of the GRE requirement for American programs. When subsequently asked to rank those factors they considered, cost of education in the United States was ranked as the most important factor most often and the GRE requirement was ranked as the second most important factor most often (Figure E.2).

Table 2.2b Factors Influencing Canadian Students Not to Apply to American Genetic Counseling Training Programs

<table>
<thead>
<tr>
<th>Factor</th>
<th>n</th>
<th>% of total (N=28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of education in the United States</td>
<td>28</td>
<td>100</td>
</tr>
<tr>
<td>Cost and logistics of the GRE requirement</td>
<td>22</td>
<td>78.6</td>
</tr>
<tr>
<td>Cost and logistics of travel to/from home</td>
<td>17</td>
<td>60.7</td>
</tr>
<tr>
<td>Long distance from home and support systems</td>
<td>16</td>
<td>57.1</td>
</tr>
<tr>
<td>Implications for returning to Canada for work after graduation</td>
<td>16</td>
<td>57.1</td>
</tr>
<tr>
<td>Cost of living in the United States</td>
<td>13</td>
<td>46.4</td>
</tr>
<tr>
<td>Travel documentation</td>
<td>10</td>
<td>35.7</td>
</tr>
<tr>
<td>Personal concerns for safety and/or cultural acceptance</td>
<td>9</td>
<td>32.1</td>
</tr>
<tr>
<td>I never considered applying to an American genetic counseling training program</td>
<td>4</td>
<td>14.3</td>
</tr>
<tr>
<td>Family responsibilities/obligations at home (in Canada)</td>
<td>3</td>
<td>10.7</td>
</tr>
<tr>
<td>Limited part-time work opportunities due to visa restrictions</td>
<td>2</td>
<td>7.1</td>
</tr>
<tr>
<td>None of the above</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
The importance of financial considerations, such as cost of education in the United States, implications for post-graduate employment opportunities, and the influence of the GRE requirement were reflected in the qualitative data. When asked to discuss other factors that motivated their decision not to apply to American programs, five participants (5/15, 33.3%) mentioned their perception of American politics and culture:

*I felt like the United States was not a [place] I was interested in living in at this time. Given the politicization of the COVID-19 pandemic and the general political polarization of the American people right now I much preferred to stay at home in Canada where I felt more comfortable.*

*Political situation in the USA at the time (Trump presidency) made me uneasy about leaving Canada to study in the states.*

*Based on the news in Canada, the US was at the height of unrest.*

Four participants (4/15, 26.7%) expressed concerns about the American healthcare system, both for conflict with personal values and the ability to access healthcare while living in the United States:

*I have a chronic health condition, and was concerned about how health care would work for me if I had to go to an American school.*
The healthcare system in the states was also a deterrent; I was not interested in learning/practicing genetic counselling in a private insurance system because of my own values. I strongly value our public healthcare system in Canada even with its flaws.

I was uncertain whether it would be hard or prohibitively expensive to obtain health insurance due to having multiple preexisting conditions.

Two participants (2/15, 13.3%) held a negative perception of applying to American schools as a Canadian:

[I]f you apply to the States and go to a school there, it may be viewed as you didn't get into the Canadian program so you had to go to the states. [...] It's almost like you weren't good enough to get into the Canadian Program.

I wasn't sure how much priority each program would give to domestic vs. international applicants (i.e. I thought I might have a better chance of matching to a Canadian program than an American one as an international applicant).
2.4.4 Attending a Genetic Counseling Training Program

Among those participants who studied at an American genetic counseling training program (n=29), most sought information from their program directors and staff (72.4%) and/or current/former international students from their training program (72.4%). Many sought information from the institution’s International Student Services department (69.0%), online resources about being an international student in the United States (55.2%), and other Canadians who had studied or were studying in the United States in any program/school (48.3%). Fewer sought information from friends or family in the United States (20.7%), online chatrooms, listservs, or groups for graduate or international students (17.2%), friends or family in Canada (10.3%), and other faculty or staff at the institution (6.9%). One respondent (3.4%) sought information from government websites and staff.

Participants who studied at an American genetic counseling training program described challenges they experienced related to their international student status and the top four themes are outlined in Figure 2.2: Box 2.1 and Figure 2.3: Box 2.2. Respondents desired additional information about what to expect when crossing the border for the first time, navigating banking and healthcare in the United States, and obtaining a social security number. Many respondents wanted explicit instructions (e.g. to-do list, checklist) with what is required to study as an international student in the United States. Several respondents discussed how it would have been helpful to connect with other Canadian students who had gone through the process before or who were also going through it for the first time. Additionally, some respondents stated that they would have benefited from direct contact with a faculty member associated with the genetic counseling training program and/or someone associated with the institution (e.g. international student advisor).
Box 2.1 – Thematic analysis of challenges experienced by Canadian genetic counseling students studying in the United States from the time they matched with the program until they started the program (n=27)

**Getting established in the United States (16/27, 59%)**

I\textsuperscript{1}t was really challenging with opening bank accounts, finances. Getting set up in a new country involves a lot of small pieces that you don\textquotesingle t think about.

We don\textquotesingle t have a SSN so landlords cannot do credit checks and sometimes prefer someone with rental history in America.

I changed my phone number with the move, and I didn\textquotesingle t realize until arriving in the US that I would need to change my car insurance, driver\textquotesingle s license, and license plate. This took quite a bit of time and money that I hadn\textquotesingle t planned on spending.

**Obtaining a visa and lack of information about the process (11/27, 41%)**

I didn\textquotesingle t receive explicit guidance on how to apply for a US visa as a Canadian and ended up paying over $400 USD for a visa stamp which wasn\textquotesingle t actually required.

Having to prove the financial requirements to apply for visa. This was not made clear until after I had matched.

My institution\textquotesingle s staff could give me guidance on a limited number of things, but there was so much more for me to figure out by myself.

**Securing sufficient funding (10/27, 37%)**

I ended up applying to an American bank with an American relative as a co-signer but you need your pre-visa (I-20) to apply, and you can only get your I-20 if you show that you can afford your first-year costs.

I had to show proof of funds to get my visa which was over 70,000 USD.

**Restrictions due to SARS-CoV-2 (8/27, 30%)**

I also had to track COVID-19 restrictions to be sure I would be allowed to cross the border, and had anxiety about whether my partner and I would both be able to get vaccinated in time.

The border being closed during this time was also difficult, I was unsure if my parents were able to cross with me to help me move.

---

\begin{table}
\centering
\begin{tabular}{|l|}
\hline
**Box 2.1 – Thematic analysis of challenges experienced by Canadian genetic counseling students studying in the United States from the time they matched with the program until they started the program (n=27)**
\hline
\textbf{Getting established in the United States (16/27, 59%)**}
\hline
I\textsuperscript{1}t was really challenging with opening bank accounts, finances. Getting set up in a new country involves a lot of small pieces that you don\textquotesingle t think about.
\hline
We don\textquotesingle t have a SSN so landlords cannot do credit checks and sometimes prefer someone with rental history in America.
\hline
I changed my phone number with the move, and I didn\textquotesingle t realize until arriving in the US that I would need to change my car insurance, driver\textquotesingle s license, and license plate. This took quite a bit of time and money that I hadn\textquotesingle t planned on spending.
\hline
\textbf{Obtaining a visa and lack of information about the process (11/27, 41%)**}
\hline
I didn\textquotesingle t receive explicit guidance on how to apply for a US visa as a Canadian and ended up paying over $400 USD for a visa stamp which wasn\textquotesingle t actually required.
\hline
Having to prove the financial requirements to apply for visa. This was not made clear until after I had matched.
\hline
My institution\textquotesingle s staff could give me guidance on a limited number of things, but there was so much more for me to figure out by myself.
\hline
\textbf{Securing sufficient funding (10/27, 37%)**}
\hline
I ended up applying to an American bank with an American relative as a co-signer but you need your pre-visa (I-20) to apply, and you can only get your I-20 if you show that you can afford your first-year costs.
\hline
I had to show proof of funds to get my visa which was over 70,000 USD.
\hline
\textbf{Restrictions due to SARS-CoV-2 (8/27, 30%)**}
\hline
I also had to track COVID-19 restrictions to be sure I would be allowed to cross the border, and had anxiety about whether my partner and I would both be able to get vaccinated in time.
\hline
The border being closed during this time was also difficult, I was unsure if my parents were able to cross with me to help me move.
\hline
\end{tabular}
\caption{Box 2.1 Challenges prior to starting a program. Thematic analysis of challenges experienced by Canadian genetic counseling students studying in the United States from the time they matched with the program until they started the program (n=27)
Figure 2.3: Box 2.2 Challenges during first semester. Thematic analysis of challenges experienced by Canadian genetic counseling students studying in the United States from the time they started the program until the end of their first semester of the program (n=23)
Respondents who attended an American program were asked about their general experience as a Canadian studying in the United States and the two most discussed themes are as follows. Over half of participants (15/27, 55.6%) discussed culture shock and feeling like an outsider among their American classmates:

Even though 3/12 of the students in my class were Canadian, we were still treated as “other”. Not in a malicious way and I don’t think intentionally, but certainly our “Canadian-ness” was seen as an oddity. And that can be hard, and can make you feel like an outsider and not accepted. I certainly felt a lot of pressure to assimilate, and to drop Canadian phrases/pronunciations that would be commented on.

It was definitely an adjustment and I also felt singled out at times because I was the “Canadian”. I also felt like I got a lot of comments about being Canadian and sometimes I think there was some stigma surrounding that. I think sometimes people would make jokes about it that I wouldn’t always appreciate.

Approximately half of participants (14/27, 51.9%) expressed that they were happy with and/or grateful for the experience:
There have definitely been a lot of complications, mostly made worse by the pandemic, but I think that these have been worth it for the experience of attending school here.

I was very appreciative of the ability to go to GC school in the states, particularly while living in Canada and commuting. It truly was the best option for me given where I lived.

I felt welcomed. I felt like someone had finally given me a chance. It reaffirmed that I am worth more than my undergraduate GPA.

2.4.5 Employment After Graduation

There were no participants who attended a Canadian genetic counseling training program and worked in or planned to work in the United States after graduation. Thirty-seven of those trained in Canada (37/43, 86.0%) worked in Canada after graduation or were planning to work in Canada after graduation. In comparison, an equal number of those trained in the United States worked/planned to work in the United States (11/29, 37.9%) and worked/planned to work in Canada (11/29, 37.9%). Two participants that trained in Canada (2/43, 4.7%) and two participants that trained in the United States (2/29, 6.9%) did not know where they planned on working after graduation. One participant that trained in Canada (1/43, 2.3%) worked/planned to work in England after graduation. One respondent trained in the United States (1/29, 3.4%) had initially accepted a job in the United States after graduation but subsequently faced visa issues and ended up getting a job in Canada.
Another respondent who was trained in the United States (1/29, 3.4%) accepted a job or planned to accept a job that allows them to live in Canada and work remotely for an American company.

Among all participants, 29.2% (21/72) would only consider applying for and accepting a job in Canada within the next 10 years. One participant (1.4%) would consider working in the United States. Thirty-four participants (47.2%) would consider the United States and Canada. Ten participants (13.9%) would consider the United States, Canada, and other countries. Four participants (5.6%) would consider Canada and another country other than the United States. Some of the other considerations included the British Isles, Ireland, Australia, New Zealand, and the Middle East. One participant (1.4%) indicated they would consider Canada and also selected the option “I do not know”. One participant (1.4%) indicated they would consider the United States, Canada, and they also selected the option “I do not know”.

2.5 Discussion

To our knowledge, this is the first study to investigate the experiences of Canadian genetic counseling students studying in the United States. Our findings suggest that limited training opportunities in Canada and a competitive application process are the primary factors considered by Canadian students who apply to American programs. The most common factors that influenced Canadian students in our study to not apply to American programs were perceived cost of education in the United States and the cost and logistics of the GRE requirement for American programs. Canadian genetic counseling students who studied in the United States faced challenges related to being an international student, including immigration-related logistical challenges, such as the process of moving to a new
country and obtaining a visa, securing funding, culture shock, and navigating the American healthcare system. Respondents who studied in the United States indicated that more information, contact with other Canadian students with current or recent experience studying in the United States, and personal support from faculty at their program and/or institution would have improved their experience.

This study achieved a response rate of almost 50%, suggesting that this population was motivated to share their experiences and may reflect the importance of continued investigation into this topic. It was anticipated that most of our respondents would identify as female, white, and not Hispanic or Latino as these groups are overrepresented in the genetic counseling profession (NSGC, 2021). Approximately 70% of our respondents identified as white, which is consistent with data from the match process. Between the years 2018 and 2021, an average of 69% of all matched applicants have identified as white (NMS, n.d.a). This may, however, represent greater representation than the population of practicing genetic counselors in general, as the most recent NSGC Professional Status Survey reported 90% of respondents identified as white (NSGC, 2021).

Almost 85% of our respondents studied in only three of six NSGC-defined regions: Regions II, IV, and VI. These three regions encompass Canada’s most populated provinces (Ontario, Quebec, and British Columbia (Statistics Canada, 2021)) and they house the majority of all genetic counseling training programs in North America (ACGC, n.d.). These regions may be overrepresented in our sample population as there are more training opportunities compared to other regions and Canadians may prefer to apply to programs that are geographically closer to where they live in Canada. Additionally, it may also reflect greater awareness of the genetic counseling profession in these regions as where there are
more training programs, there also tends to be more practicing genetic counselors and thus opportunities for involvement in education and awareness.

Our findings are consistent with the results of a previous study by McCarthy et al. (2012) that investigated Canadian students enrolled at an American college in a program other than genetic counseling. Competitive entry requirements in Canada and the inability to gain acceptance to a desired program in Canada were two of the most important factors that influenced Canadians to study outside of Canada (McCarthy et al., 2012). Similarly, 100% of our respondents who chose to apply to American programs were influenced by limited training opportunities in Canada and 95.5% were influenced by a competitive application process. McCarthy et al. (2012) found that geographical proximity and the ability to commute to an American program were also important factors when deciding to study in the United States. Geographical proximity was the fourth most considered factor among our respondents who chose to apply to American programs.

Almost 80% of respondents who chose not to apply to an American program indicated that cost and logistics of the GRE requirement influenced their decision. This adds to the discussion surrounding the use of these scores in the application process. The findings of a recent study suggest an association between highest scores on the verbal and quantitative sections of the GRE exam with passing the American Board of Genetic Counseling certification exam on the first attempt (Myers et al., 2021). However, there are demographic differences in GRE score distributions that suggest it may serve as a barrier for underrepresented groups (Myers et al., 2021). The findings of the current study may lend support to the argument for removing or making optional the GRE requirement in an
effort to make the application process more accessible to a greater number of applicants, including Canadians.

In terms of challenges experienced by Canadians studying in the United States, a range of experiences were described by survey respondents. For example, some respondents mentioned that their program faculty were helpful in their transition to the United States whereas others stated that their faculty were uninformed about what is required of international students. Many respondents discussed the culture shock they experienced while attending school in the United States, but one respondent specifically mentioned that they did not face any culture shock. A potential explanation for both discrepancies may be program location, as Canadian students may preferentially choose to study at American programs closer to the border, and these schools may be more familiar with the international student process for Canadian students. The extent to which Canadian students experience (or report) culture shock while studying in the United States may similarly be influenced by geographic closeness but also cultural similarity between a student’s home (in Canada) and the setting of their genetic counseling program.

Almost 60% of respondents who studied in the United States indicated they experienced challenges associated with getting established in the United States prior to starting their training program. Some of these challenges included opening an American bank account, changing phone plans, and finding housing without rental history in the United States or a social security number that could be used for a credit check. Additionally, 43.5% of respondents indicated they faced similar immigration-related logistical issues during the first semester of their program. In an effort to improve the experiences of Canadian genetic counseling students studying in the United States, we
propose the development of informational resources for prospective and newly matched Canadian students. Such resources may include “to-do” lists for getting established in the United States (e.g. open bank account, change phone plan, enroll in American health insurance plan) and an informational guide with tips and helpful websites to visit when preparing to study in the United States. As 40.7% of respondents experienced challenges related to the visa process, these resources may also include a checklist of what documentation is required to receive an F-1 visa upon initial border crossing. A sub-set of resources specific to those Canadian students who commute to American programs could address unique challenges, such as those related to frequent border crossings.

We propose that these informational items be made publicly available through the Canadian Association of Genetic Counsellors (CAGC) and NSGC websites; partnering with AGCPD could make this information readily accessible to programs and program directors in order to facilitate dissemination to Canadian students. The Transnational Alliance for Genetic Counseling (TAGC) is an international network within the genetic counseling community that fosters transnational communication and cooperation (TAGC, n.d.). There may be value in collaborating with TAGC to extend similar resources to international students from outside of Canada. Additionally, we propose the establishment of a network of current and former Canadian students with experience studying genetic counseling in the United States to provide support and guidance for prospective and current Canadian students.

2.5.1 Study Limitations

It is possible that those who participated in this study may have experienced greater challenges as a Canadian applying to genetic counseling programs and/or attending an
American program than is typical, whereas individuals who were invited but did not complete the survey may have felt they had little to contribute to this topic. However, this bias is likely at least somewhat mitigated by a relatively high response rate for this type of survey. The scope of our study was primarily focused on experiences between the application process and end of the first semester of the training program because those respondents who matched in 2021 were currently completing their first semester at the time of data collection. However, our participant pool included all of first year students, second year students, and graduates so second year students and graduates had experiences beyond the first semester that could have influenced their responses. Notably, the impact of the SARS-CoV-2 pandemic was not expected to be consistent across all participants in this study (dependent on years of enrollment in genetic counseling training) and we were unable to study the effects of SARS-CoV-2 in a systematic way. This study included only the experiences of those Canadian students who matched with a genetic counseling training program; there may be different challenges experienced by those Canadian students who applied to but did not match with a program in the years studied that are not reflected in this study.

2.5.2 Future Directions

Future research could pursue a more in-depth investigation of the factors identified in the current study, such as financial challenges for Canadian genetic counseling students. Extending this research beyond the first semester of study may also reveal additional challenges or positive experiences related to clinical rotations and the process of seeking employment post-graduation. Perceptions of prospective students regarding cultural
differences between the United States and Canada and whether decision-making during the application process was impacted by the SARS-CoV-2 pandemic could also be valuable.

2.5.3 Practice Implications

This study may inform recruitment of prospective students as it provides insight into what factors influence Canadian students as they consider American genetic counseling training programs. This study also highlights the importance of applicants having easy access to the full scope of costs associated with a genetic counseling training program (e.g. tuition, rent, transportation). Our findings may be used to inform professional societies, program directors, and genetic counseling students about the unique challenges faced by Canadian genetic counseling students studying in the United States. With more widespread understanding of these challenges and development of informational resources for this group of students, we may be able to better support Canadians entering the field of genetic counseling.
CHAPTER 3: CONCLUSIONS

When deciding to apply to genetic counseling training programs in the United States, Canadian genetic counseling students appear to be motivated by limited training opportunities in Canada and a competitive application process, as well as other factors. On the other hand, factors influencing Canadian students to not apply to American programs included the perceived cost of education in the United States and the GRE requirement for several American programs, among others. Canadian students attending genetic counseling training programs in the United States report facing challenges related to their international-student status. These challenges, such as culture shock and navigating a foreign healthcare system, may or may not be shared with their American classmates. Based on responses from Canadian genetic counseling students with experience studying in the United States, we propose several resources to improve the experiences of this group. We suggest the development of targeted informational resources for newly matched or prospective Canadian genetic counseling students. These may be most accessible if made publicly available on CAGC and NSGC websites and disseminated in a joint effort with AGCPD. In addition, a network of current and former Canadian genetic counseling students with experience studying in the United States may provide further support and guidance. To our knowledge, this is the first study to investigate the experiences of Canadian genetic counseling students. It may be used to inform stakeholders of the genetic counseling field about the unique experiences of and challenges faced by this group.
REFERENCES


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APPENDIX A: PARTICIPANT RECRUITMENT VIA AGCPD LISTSERV

The following text was emailed to members of the Association of Genetic Counseling Program Directors listserv, along with a link to complete the survey:

My name is Madeline Ladouceur and I am a genetic counseling student at the University of South Carolina. Would you please consider forwarding the following invitation along to all the Canadian students who matched with your program in the years 2018, 2019, 2020, and 2021.

We are looking for Canadian students who matched with or were placed Post-Match with a genetic counseling training program in the United States or Canada in the year 2018, 2019, 2020, or 2021. This survey aims to identify what motivates Canadian students to apply or not apply to American genetic counseling training programs and what challenges exist for those Canadian students studying in the United States. This anonymous survey should take approximately 20 minutes to complete. Upon completion of the survey, participants may choose to enter a raffle to win one of five $25 Visa gift cards.

Please contact Madeline.Ladouceur@uscmed.sc.edu with any questions.
APPENDIX B: PARTICIPANT RECRUITMENT VIA CAGC LISTSERV

The following text was emailed to members of the Canadian Association of Genetic Counsellors listserv, along with a link to complete the survey:

We are looking for Canadian students who matched with or were placed Post-Match with a genetic counseling training program in the United States or Canada in the year 2018, 2019, 2020, or 2021. This survey aims to identify what motivates Canadian students to apply or not apply to American genetic counseling training programs and what challenges exist for those Canadian students studying in the United States. This anonymous survey should take approximately 20 minutes to complete. Upon completion of the survey, participants may choose to enter a raffle to win one of five $25 Visa gift cards.

Please consider sharing this survey with any Canadian genetic counseling students you know from the years outlined above. Thank you in advance.

Please contact Madeline.Ladouceur@uscmed.sc.edu with any questions.
APPENDIX C: PARTICIPANT RECRUITMENT VIA TWITTER

The following text, along with a link to complete the survey, was posted to Twitter using the University of South Carolina Genetic Counseling Program’s account:

Attn Canadian GC students – we’re conducting a study to learn your perspective! If you or someone you know is a Canadian who matched with a GC program in 2018, 2019, 2020, or 2021, learn more at the link below. #GCchat
APPENDIX D: SURVEY QUESTIONS

The following is a copy of the online survey questions and survey flow:

ELIGIBILITY QUESTIONS:

1. Were you a Canadian citizen and/or permanent resident of Canada at the time of applying to genetic counseling training programs?
   a. Yes \(\Rightarrow\) proceed to next question
   b. No \(\Rightarrow\) survey will end

2. Did you match with an American or Canadian genetic counseling program in the year 2018, 2019, 2020, or 2021?
   a. Yes \(\Rightarrow\) proceed to question #4
   b. No \(\Rightarrow\) proceed to next question

3. Were you placed with an American or Canadian genetic counseling program in the Post-Match process in the year 2018, 2019, 2020, or 2021?
   a. Yes \(\Rightarrow\) proceed to next question
   b. No \(\Rightarrow\) survey will end

4. Are you currently attending or have you graduated from a genetic counseling training program in the United States or Canada?
   a. Yes \(\Rightarrow\) proceed to next question
   b. No \(\Rightarrow\) survey will end
DATA COLLECTION QUESTIONS:

5. Were you physically residing in Canada at the time of applying to genetic counseling training programs?
   a. Yes
   b. No (please specify in which country you were living, and briefly explain why: e.g., school, work, grew up there)

6. Please indicate all countries in which you applied to a genetic counseling training program.
   a. Canada
   b. United States
   c. Other (please specify)

7. In what country is your genetic counseling training program located?
   a. Canada
   b. United States

8. In which NSGC region is your genetic counseling training program located?
   a. Region I (Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont, Maritime Provinces, Newfoundland)
   b. Region II (District of Columbia, Delaware, Maryland, New Jersey, New York, Pennsylvania, Virginia, West Virginia, Puerto Rico, Virgin Islands, Quebec)
   c. Region III (Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee)
d. Region IV (Arkansas, Iowa, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, North Dakota, Nebraska, Ohio, Oklahoma, South Dakota, Wisconsin, Ontario)

e. Region V (Arizona, Colorado, Montana, New Mexico, Texas, Utah, Wyoming, Alberta, Manitoba, Saskatchewan)

f. Region VI (Alaska, California, Hawaii, Idaho, Nevada, Oregon, Washington, British Columbia)

9. Consider your final application cycle. After initially deciding in which country or countries to apply for genetic counseling training programs (e.g. Canada only, US only, or both), did you learn anything during the process of researching programs that changed your decision about which country’s training programs to consider? If so, please describe what you learned and how it impacted your decision.

a. Free response

10. How many total times did you go through the application process prior to matching with a genetic counseling training program?

a. One time → skip to question #12

b. Two or more times → proceed to question #11

11. During which application attempts (if any) did you apply to an American genetic counseling training program?

a. None. I have never applied to an American genetic counseling training program.  → Skip to question #17

b. I applied to an American program during my first application attempt, but not subsequent attempts.  → Skip to question #13
c. I applied to an American program during my first application attempt and during at least one subsequent attempt. → Skip to question #13

d. I did not apply to any American programs during my first application attempt, but I did apply to an American program during at least one subsequent attempt. → Skip to question #13

12. Did you apply to one or more American genetic counseling training programs?
   a. Yes → proceed to question #13
   b. No → skip to question #17

13. Which of the following factors influenced your decision to apply to an American genetic counseling training program (during any application cycle)? Please check all that apply.

   - [ ] Limited training opportunities in Canada
   - [ ] Competitive application process
   - [ ] Gain experience in a different health care system
   - [ ] Having family/loved ones living in the United States
   - [ ] Opportunity for travel
   - [ ] Opportunity to broaden personal experience
   - [ ] Program reputation and/or characteristics
   - [ ] Geographical proximity
   - [ ] Already residing in the United States
   - [ ] Desire to work in the United States after graduation
   - [ ] None of the above
14. Please rank the factors you considered from most to least important.
   a. They will be asked to rank all the factors they selected in the previous question

15. Please tell us about any other factors (not listed previously) that influenced your decision to apply to an American genetic counseling training program?
   a. Free response

16. Did you match with (or were placed Post-Match with) an American genetic counseling training program?
   a. Yes  ➔ skip to question #20
   b. No  ➔ skip to question #26

17. You indicated that you have never applied to an American genetic counseling training program. Which of the following factors influenced your decision not to apply to an American training program? Please check all that apply.
   □ Cost of education in the United States (e.g. tuition, supplies, travel to clinic sites, etc.)
   □ Cost of living in the United States (e.g. housing, groceries, etc.)
   □ Cost and logistics of travel to/from home (e.g. transportation, accommodations, etc.)
   □ Long distance from home and support systems
   □ Implications for returning to Canada for work after graduation (e.g. possible mismatch between American and Canadian practice, limited opportunities to network in Canada, etc.)
   □ Travel documentation (e.g. cost and logistics of obtaining visas/passports)
   □ Limited part-time work opportunities due to visa restrictions
□ Personal concerns for safety and/or cultural acceptance

□ Family responsibilities/obligations at home (in Canada)

□ Cost and logistics of the GRE (Graduate Record Examination) requirement for American programs

□ I never considered applying to an American genetic counseling training program (i.e. I had no interest in attending school in the United States)

□ None of the above

18. Please rank the factors you identified as challenges from most to least important.

   a. They will be asked to rank all the factors they selected in the previous question

19. Please tell us about any other factors (not listed previously) that influenced your decision not to apply to an American genetic counseling training program?

   a. Free response (skip to question #26)

20. Where did you seek additional information about the enrollment process after matching with an American training program?

   □ Program directors and staff

   □ The institution’s International Student Services department

   □ Other faculty or staff at the institution

   □ Current/former international students from the program where you matched

   □ Other Canadians who had studied/were studying in the United States (any program/school)

   □ Online materials not produced by the institution (e.g. websites, blogs, etc. about being an international student in the United States)
□ Online chatrooms, listservs, or groups for graduate students or international students
□ Friends or family in Canada
□ Friends or family in the United States
□ Other (please specify)
□ I did not seek any additional information beyond what was provided by the program directly

21. Please describe any challenges you faced, related to being an international student, from the time you matched with the program until the start of the program.
   a. Free response

22. Please describe what kind of resources would have improved your experience from the time you matched with the program until the start of the program.
   a. Free response

23. Please describe any challenges you faced, related to being an international student, from the time you started the program until the end of your first semester of the program.
   a. Free response

24. Please describe what kind of resources would have improved your experience from the time you started the program until the end of the first semester of the program.
   a. Free response

25. Please comment on your general experience as a Canadian attending a genetic counseling training program in the United States. Please only consider from the time you matched with the program until the end of the first semester of the program. You are welcome to share any feelings, encounters, insights, or challenges that you think would be
helpful in understanding your experience. In particular, you are invited to share any observations you made about the experience of Canadians studying in the United States versus Canadians studying in Canada.

a. Free response

26. Which of the following is the largest source of financial support for your graduate school education?

a. Personal savings

b. Financial assistance from family members

c. Student loans

d. University-funded scholarship or bursary

e. Other scholarship, grant, or bursary (please describe)

f. Other (please specify)

27. If you have already graduated, in which country did you accept a job after graduation? If you are still in school, in which country are you planning on working after graduation?

a. Canada

b. United States

c. I do not know

d. Other (please specify)

28. In which country would you consider applying for and accepting a genetic counseling position in the next 10 years? (Select all that apply)

a. Canada

b. United States

c. I do not know
29. In order to help us better study the experiences of Canadian genetic counseling students in the future, please let us know how this survey could be improved. What questions did we not ask? What additional information would you like to provide that was not requested?
   a. Free response

30. What is your gender identity?
   a. Female
   b. Male
   c. Transgender female
   d. Transgender male
   e. Genderqueer/Gender nonconforming
   f. Not listed (please specify)

31. What is your ancestry? If you are of mixed descent, please select all that apply.
   - Indigenous from within North America (ex. First Nations, Inuit, Metis)
   - White
   - South Asian (ex. East Indian, Pakistani, Sri Lankan)
   - Chinese
   - Black
   - Filipino
   - Arab
   - Latin American
   - Southeast Asian (ex. Vietnamese, Cambodian, Laotian, Thai)
   - West Asian (ex. Iranian, Afghan)
☐ Korean

☐ Japanese

☐ Other group (please specify)

32. What is your ethnicity?
   a. Hispanic or Latino
   b. Not Hispanic or Latino

33. What is your age in years?
   a. Free text

34. What was the highest level of education you completed prior to starting your genetic counseling training program?
   a. Bachelor’s Degree (e.g. BA, BS, BSN)
   b. Master’s Degree (e.g. MA, MS, MEng, MEd, MSW, MBA, MSN)
   c. Professional Degree (e.g. MD, DDS, DVM, LLB, JD)
   d. Doctorate (e.g. PhD, EdD)
**Figure E.1** Rankings of motivating factors. Results of participants ranking each of the factors that influenced their decision to apply to American training programs from most to least important.
Figure E.2 Rankings of deterring factors. Results of participants ranking each of the factors that influenced their decision not to apply to American programs from most to least important.