To Be a Clinical or Non-Clinical Genetic Counselor, That is the Question

Master’s Thesis

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The Faculty of the Graduate School of Arts and Sciences
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Barbara Lerner, MS, PhD, CGC, Advisor

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Master of Science
in
Genetic Counseling

by
Stacey Liberman

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ABSTRACT

To Be a Clinical or Non-Clinical Genetic Counselor, That is the Question

A thesis presented to the Graduate Program in Genetic Counseling

Graduate School of Arts and Sciences
Brandeis University
Waltham, Massachusetts

By Stacey Liberman

Many genetic counselors are leaving or considering leaving their clinical positions for non-clinical positions. This comes at a time when there is an increasing need for clinical genetic counselors. A serious concern facing the genetic counseling profession is ensuring that there will be an adequate workforce both in supply and skills needed for existing and emerging roles. The purpose of this study was to determine what types of positions genetic counselors plan to take and what impacts their decisions. Two-hundred seventy-seven current genetic counseling students and 440 individuals who recently graduated from an accredited US or Canadian genetic counseling master’s degree program between 2010 and 2015 completed our anonymous online survey. Overall, both groups consider working in clinical and non-clinical roles. Specifically, 72.6% of graduates (N=408) currently hold or previously held a clinical position, and 95.4% of students (N=263) indicated they will likely pursue a clinical position during their career. Reasons cited for considering or pursuing clinical positions included wanting to provide direct patient care, desiring the job responsibilities and characteristics and seeing a clinical position as a necessary first step to gain experience before moving to a non-clinical position. About 31% of graduates (N=411) reported that they currently work or previously worked in a non-clinical
setting. In addition, 52.4% of graduates who have not yet held a non-clinical position (N=227) and 66% of students (N=265) believe they will likely work in a non-clinical setting during their career. The higher salary, flexibility, opportunities for new challenges, professional growth and respect associated with non-clinical positions were the primary reasons for considering or pursuing these roles. It is important for the genetic counseling profession to develop strategic plans to lessen the number of genetic counselors vacating clinical positions and to increase the supply of genetic counselors to meet the increasing demand for both clinical and non-clinical counselors.

Keywords: genetic counseling roles, clinical genetic counselors, non-clinical genetic counselors, genetic counseling students, genetic counseling workforce, industry, genetic counselor demand
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INTRODUCTION

In the past ten years, the roles genetic counselors pursue have continued to diversify, mostly into non-clinical positions that do not involve counseling patients in a traditional face-to-face setting. Some of these non-clinical settings include industry, research, testing laboratories, public health education and advocacy (Warren, Callanan, & Leroy, 2005). Every two years, the National Society of Genetic Counselors (NSGC) conducts a Professional Status Survey (PSS) that tracks trends in the profession. As evidenced by Professional Status Surveys from the past decade, the availability of jobs in non-clinical areas has increased, and there is concern that there will be an insufficient number of genetic counselors to fill clinical positions. For example, in 2014 17% of genetic counselors reported working in a diagnostic laboratory, which is up from 7% in 2004 (NSGC, 2004, 2014a).

As more genetic counselors move into non-clinical roles patients are likely to have reduced access to licensed and certified genetic counselors in the traditional clinical settings. Between the 2008 PSS, when the NSGC began reporting how many of its respondents worked in clinical or non-clinical positions, and the 2012 PSS the percent of respondents who identified as clinical genetic counselors remained steady at 82% in 2008, 83% in 2010 and 84% in 2012 (NSGC, 2008, 2010, 2012). In the most recent PSS, the percentage of clinical genetic counselors considerably decreased to 74% (NSGC, 2014a). Eighteen percent of respondents identified as non-clinical counselors and 9% did not indicate either way (NSGC, 2014a).

Within the past year Cohen, Tucker and Delk (2015) noticed that many clinical genetic counselors in the state of Indiana were leaving their positions. They surveyed genetic counselors
who had ever been licensed in Indiana to determine how many individuals were leaving their positions and why they were leaving. Eighteen of the 46 respondents who participated in their survey changed jobs within the past two years. Ninety-four percent of these 18 people reported that they provided direct patient care in their previous job and only 44% reported still providing direct patient care in their new positions, suggesting that several clinical genetic counselors have left their positions for non-clinical ones (Cohen, Tucker, & Delk, 2015).

One of the biggest concerns facing the genetic counseling profession is ensuring that we will have an adequate genetic counseling workforce, both in supply and skills needed for existing and emerging clinical and non-clinical roles (Cohen et al., 2015; Wicklund & Trepanier, 2014). There is currently a gap in knowledge regarding why genetic counselors and genetic counseling students become interested in pursuing either clinical or non-clinical genetic counseling positions. As more genetic counselors are choosing non-clinical positions over clinical ones and as the need for clinical genetic counselors is currently increasing, it is essential to determine what types of positions genetic counselors plan to take and what influences their decision (Cohen et al., 2015; Wicklund & Trepanier, 2014). If half of all current genetic counseling students prefer to pursue non-clinical positions, the profession will need to develop a strategic plan to deal with this anticipated change. To make an informed plan, the profession will need to know why individuals are choosing to pursue non-clinical positions.

Most of the prior research regarding the future genetic counseling workforce has focused on motivations and concerns related to the overall pursuit of the genetic counseling profession, but does not assess reasons for selecting specific roles within the field (Lega, Veach, Ward, & LeRoy, 2005; Schoonveld, Veach, & LeRoy, 2007). Two studies, one by Clark et al. (2006) and another by Bedard et al. (2007) did investigate genetic counselors’ involvement in and opinions
on performing research. Clark et al. (2006) surveyed NSGC members to determine their involvement in research. The majority, 84%, of the 531 genetic counselors who participated in this survey had already participated in research whereas 69% of all the respondents reported future plans to conduct research. The top three reasons respondents gave for why they wanted to conduct research were an interest in a specific subject, to contribute to the field and for their own professional development or satisfaction (Clark et al., 2006).

In 2007 204 genetic counseling students participated in a survey conducted by Bedard et al. (2007) to assess their interest in conducting research during their genetic counseling careers. When asked to rate on a 5-point Likert scale their interest in conducting research during their careers, 46% of students reported they were somewhat to very interested in initiating research. Those with prior research experience or prior coursework in research methodology were significantly more interested in pursuing research in their career (Bedard, Huether, Shooner, Buncher, & Warren, 2007).

Learning more about what attracts genetic counseling students and genetic counselors to non-clinical as well as clinical roles will help inform an assessment of the future supply of genetic counselors. This study aims to fill the gap in knowledge about the reasons genetic counseling students and recent graduates select specific roles within the field by exploring why genetic counseling students and newly practicing genetic counselors become interested in filling clinical and non-clinical positions. We investigated what factors influence genetic counseling students’ and recent graduates’ preferences to pursue clinical or non-clinical roles as their first job as well as during their career. We also explored current students’ and recent graduates’ attitudes regarding several current clinical and non-clinical workforce issues. The results of this study provide insight into future genetic counselor workforce issues and can inform strategies for
ensuring the profession will have an adequate workforce that will be interested in filling both clinical and non-clinical positions.
METHODS

Study Design:

This is an exploratory quantitative study supported by qualitative input by study participants. The Brandeis University Institutional Review Board deemed that this study was exempt from full review.

Participants:

Research participant criteria included being a current genetic counseling student in the U.S. and Canada or a genetic counselor who graduated from a genetic counseling training program within the past 5 years (2010-2015). We recruited participants through three separate avenues. We emailed all genetic counseling program directors in the U.S. and Canada to recruit current students. The National Society of Genetic Counselors sent our research recruitment notice as an e-blast through their listserv, and the American Board of Genetic Counseling sent our research recruitment notice to all certified genetic counselors through their listserv. Approximately two weeks after the initial recruitment emails were sent, we sent email reminders to all program directors, and the NSGC sent a reminder through their listserv. Participants were able to enter a random drawing for one of three $50 Amazon gift cards. The recruitment notices are included in Appendix A.

Data Collection:

We used an anonymous online survey created through Qualtrics for data collection. The survey was open from January 11, 2016 through February 12, 2016. The survey consisted of 35 questions. The first question asked participants if they were currently a student in a genetic
counseling program. Next they were asked to provide their graduation year. The survey ended for anyone who graduated from a genetic counseling program prior to 2010. After the second question, the survey was divided into six sections:

1. Background information
2. Experience prior to graduate school including awareness of clinical and non-clinical roles, ideal first job, and motivating factors for as well as concerns about becoming a genetic counselor
3. Ideal job setting for current students and actual first job setting for recent graduates as well as factors that contributed to their job setting preference if their preference changed since applying to graduate school
4. Beliefs about current workforce issues in regard to clinical and non-clinical genetic counseling
5. Likelihood to pursue clinical, non-clinical industry, non-clinical public health, non-clinical research, and other non-clinical positions throughout their career
6. Demographics

Questions included a combination of multiple choice, Likert-scale and open-ended responses.

In section 5 we asked every participant who indicated that they were likely, very likely or currently/previously employed in any setting to complete an open ended question asking why they were/are interested in working in that setting. The survey is included in Appendix D.

**Data Analysis:**

We analyzed quantitative data using SPSS software version 22. We used unilateral statistical analyses to characterize the participants and their responses. We performed chi square tests to determine any relationships between dichotomous variables. To compare means between a scale and a dichotomous variable, we performed independent sample t-tests. To determine any
relationships between multiple scale variables, we performed bivariate analysis and used Pearson correlation.

To identify themes from open-ended responses we used inductive coding. First we manually read every response and then identified key words. We coded every response based on these key words. After counting how many times each code was used we determined what percentage of participants’ responses fell within each code. If more than five percent of participants’ responses had the same code, we identified this code as a theme.

To determine response rate for current students we asked program directors to report how many students are currently enrolled in their programs. To determine response rate for the graduated genetic counselors we used a database which stores the number of genetic counseling graduates within the past five years (2010-2015). This database is personally maintained by the director of the genetic counseling program at Brandeis University.

One of our questions asked students and graduates to indicate how strongly they agreed or disagreed with several statements regarding current workforce issues on a 5-point Likert scale where one indicated strong disagreement and five indicated strong agreement. For the purposes of this paper, we combined the percentage of participants who strongly disagreed or disagreed with each statement into one category, and we combined the percentage of participants who strongly agreed or agreed with each statement into a second category. We left the percentage of participants who neither disagreed nor agreed as a third distinct category. These results are presented in Table 12.

When appropriate participants had the option to select “other” as a response and fill in a text box with their response. For several questions we recoded participants’ “other” responses into new or existing categories. For example, participants were asked to select all professional
opportunities for genetic counselors of which they were aware prior to entering graduate school. Participants could select any combination of the following options: “Clinical genetic counseling”, “Non-clinical genetic counseling”, “Other”, and “None.” Some individuals selected “Other” and indicated that these roles were research and industry. Both of these responses were recoded to “Non-clinical genetic counseling.”
RESULTS

Demographics and Background Information:

We received a total of 791 responses. Seventy-four responses were not used as they either did not meet study requirements (they graduated prior to 2010) or they did not complete enough questions to be useful, leaving a total of 717 responses used for data analysis. For their responses to be used, participants had to have answered whether they were aware of clinical and non-clinical genetic counseling roles prior to graduate school. There was approximately a 31% response rate from recent graduates and approximately a 50% response rate from current students.

Of the analyzed responses 440 (61%) were from recent graduates and 277 (39%) were from current students. Table 1 shows the graduation or projected graduation year of participants.

Six hundred eighty-one participants (students N=269; graduates N=412) answered demographic questions regarding their gender, race, ethnicity and whether they had an advanced degree. The majority of respondents were female (students: 94.8%; graduates: 95.9%). Participants’ race is shown in Table 2. The majority of both students (87.4%) and graduates (88.6%) identified as

<table>
<thead>
<tr>
<th>Table 1: Graduation year (N=717)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduation year</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>2010</td>
</tr>
<tr>
<td>2011</td>
</tr>
<tr>
<td>2012</td>
</tr>
<tr>
<td>2013</td>
</tr>
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<td>2014</td>
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<tr>
<td>2015</td>
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<tr>
<td>2016</td>
</tr>
<tr>
<td>2017</td>
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</table>

<table>
<thead>
<tr>
<th>Table 2: Participants’ race</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Asian</td>
</tr>
<tr>
<td>Multiracial</td>
</tr>
<tr>
<td>White or Caucasian</td>
</tr>
<tr>
<td>Other*</td>
</tr>
<tr>
<td>I prefer not to answer</td>
</tr>
</tbody>
</table>

*Other includes anyone who identified as “Other” as well as any race where n was < 5 including American Indian or Alaskan Native, Black or African American and Native Hawaiian or other Pacific Islander
White, and 1.9% of both students and graduates identified as Hispanic. Of the responding students 8.9% indicated that they had an additional advanced degree as did 13.1% of graduates.

All 717 participants reported the location of their graduate program (Figure 1). The distribution of responses from each region mirrors the distribution of genetic counseling graduate programs in those regions which suggests that students and graduates from all programs are likely represented.

![Participants' Graduate School Location](image)

**Figure 1:** Location of graduate school characterized by NSGC region. Graduates N=440; Students N=277.

**Awareness of Clinical and Non-Clinical Roles Prior to Graduate School:**

Students’ and graduates’ awareness of genetic counseling roles are summarized in Table 3. Virtually all students (99.6%, N=277) and graduates (99.5%, N=440) were aware of clinical genetic counseling roles prior to entering graduate schooling.

<table>
<thead>
<tr>
<th>Region</th>
<th>Students (N=277)</th>
<th>Graduates (N=440)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region I (CT, MA, ME, NH, RI, VT, Canadian Maritime Provinces)</td>
<td>9.1% 8.7%</td>
<td>25.9% 31.4%</td>
</tr>
<tr>
<td>Region II (DC, DE, MD, NJ, NY, PA, VA, WV, Quebec, Puerto Rico, Virgin Islands)</td>
<td>13% 10%</td>
<td>30.2% 29.6%</td>
</tr>
<tr>
<td>Region III (AL, FL, GA, KY, MS, NC, SC, TN)</td>
<td>8.3% 13.9%</td>
<td>10.9% 9.1%</td>
</tr>
<tr>
<td>Region IV (AR, IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, OK, SD, WI, Ontario)</td>
<td>178 68.2%</td>
<td>438 99.5%</td>
</tr>
<tr>
<td>Region V (AZ, CO, MT, NM, TX, UT, WY, Alberta, Manitoba, Saskatchewan)</td>
<td>13.9% 8.3%</td>
<td>166 39.4%</td>
</tr>
</tbody>
</table>
| Region VI (AK, CA, HI, NV, OR, WA, British Columbia) | **Table 3:** Pre-grad school awareness of clinical and non-clinical genetic counseling roles

<table>
<thead>
<tr>
<th></th>
<th>Students (N=277)*</th>
<th>Graduates (N=440)**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Clinical</td>
<td>276</td>
<td>99.6</td>
</tr>
<tr>
<td>Non-Clinical</td>
<td>178</td>
<td>68.2</td>
</tr>
</tbody>
</table>

*N for clinical; **N for non-clinical
school. Students were significantly more aware of non-clinical roles prior to entering graduate school compared to graduates (students: 68.2%, N=261; graduates: 39.4%, N=461; χ²=53.35, p=0.00). The most common avenues through which the 178 students and 166 graduates became aware of non-clinical genetic counseling roles prior to graduate school were similar: word of mouth (students: 42.7%; graduates: 39.2%), professional website (students: 24.7%; graduates: 21.1%) or previous work or internship experience (students: 13.5%; graduates: 13.3%).

**Ideal Jobs Prior to Graduate School and Currently/When Graduating:**

Students were asked to indicate what their ideal job was prior to entering graduate school and what it is currently. Results are shown in Table 4. There is a statistically significant relationship between students’ clinical and non-clinical job preferences prior to graduate school and students’ current clinical and non-clinical job preferences (χ²=72.39, p=0.000). Specifically, the percentage of students interested in clinical positions decreased from 89.2% prior to graduate school (N=277) to 79.3% currently (N=271). In addition, the percentage of students interested in pursuing non-clinical positions increased from 1.8% prior to graduate school (N=277) to 10.3% currently (N=271).

<table>
<thead>
<tr>
<th></th>
<th>Prior to Grad School (N=277)</th>
<th>Currently (N=271)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>(%)</td>
</tr>
<tr>
<td>Clinical</td>
<td>247</td>
<td>89.2</td>
</tr>
<tr>
<td>Non-Clinical -Industry</td>
<td>3</td>
<td>1.1</td>
</tr>
<tr>
<td>Non-Clinical -Public Health</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Non-Clinical -Research</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td>Non-Clinical -Other*</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>No Ideal Job in Mind</td>
<td>25</td>
<td>9.0</td>
</tr>
</tbody>
</table>

*Other: Education

Recent graduates were asked to indicate what their ideal job was prior to entering graduate school and what their actual first job was. Results are shown in Table 5. Prior to entering graduate school, the majority of graduates (87.3%; N=440) were interested in pursuing a clinical position. When graduates were looking for their first genetic counseling position 86%
preferred to work in a clinical setting (N=415), but only 75.8% of graduates’ first jobs were in a clinical setting (N=418).

There is a statistically significant relationship between graduates’ clinical and non-clinical job preferences prior to graduate school and when they were looking for their first job ($\chi^2=58.44, p=0.000$). The percentage of graduates interested in pursuing non-clinical positions increased from 2.3% prior to graduate school (N=440) to 14.0% when looking for their first job (N=415).

Change in Job Preference Setting Throughout Graduate School:

We asked students (N=266) and graduates (N=402) to indicate whether their current job preference (for students) or their job preference when looking for their first job (graduates) changed from the preferences they had prior to entering graduate school. Of the participants, 80.3% of graduates and 82.0% of students (113 who will graduate in 2016 and 105 who will graduate in 2017) reported that their ideal first job preference did not/has not changed throughout their time in graduate school. Eighteen percent of students’ (N=266) and 19.7% of graduates’ (N=402) job setting preferences changed throughout graduate school. Table 6 summarizes these results.

Figure 2 shows which factors contributed to students’ and graduates’ job preferences shifting from no preference or a clinical preference to a non-clinical preference. Three graduates

<table>
<thead>
<tr>
<th>Prior to Grad School</th>
<th>First Job</th>
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<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>Clinical</td>
<td>384</td>
</tr>
<tr>
<td>Non-Clinical -Industry</td>
<td>2</td>
</tr>
<tr>
<td>Non-Clinical -Public Health</td>
<td>1</td>
</tr>
<tr>
<td>Non-Clinical -Research</td>
<td>6</td>
</tr>
<tr>
<td>Non-Clinical -Other</td>
<td>0</td>
</tr>
<tr>
<td>No Ideal Job in Mind</td>
<td>46</td>
</tr>
<tr>
<td>Never took a GC Job</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 5: Graduates’ ideal job preferences prior to entering graduate school and actual first job setting

*Sales side of genetic counseling; **Education (n=2); post-doctoral research; health services/system specialist (n=2); product manager; 50% lab, 50% clinical; gamete donor program

<table>
<thead>
<tr>
<th>Prior to Grad School</th>
<th>First Job</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>Clinical</td>
<td>384</td>
</tr>
<tr>
<td>Non-Clinical -Industry</td>
<td>2</td>
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<tr>
<td>Non-Clinical -Public Health</td>
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<tr>
<td>Non-Clinical -Research</td>
<td>6</td>
</tr>
<tr>
<td>Non-Clinical -Other</td>
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<tr>
<td>No Ideal Job in Mind</td>
<td>46</td>
</tr>
<tr>
<td>Never took a GC Job</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 5: Graduates’ ideal job preferences prior to entering graduate school and actual first job setting

*Sales side of genetic counseling; **Education (n=2); post-doctoral research; health services/system specialist (n=2); product manager; 50% lab, 50% clinical; gamete donor program
did not indicate which factors contributed to their change of preference and therefore were not included in this analysis.

Although not statistically significant, many more students (75%, N=24) compared to graduates (52%, N=25) reported that obtaining a higher salary influenced their preference to pursue a non-clinical role.

Figure 2: Factors that influenced students’ and graduates’ changes in job preference from either no preference or a clinical preference to a non-clinical preference. Graduates N=25; Students N=24

Likelihood of Pursuing Clinical or Non-Clinical Positions:

We asked participants to indicate how likely they are to work in clinical, industry, public health, research and other non-clinical job settings. They rated their likelihood to work in these
settings on a 5-point Likert scale where one was very unlikely and five was very likely. A sixth option given was “currently or previously have worked here.” The results are shown in Figure 3.

![Likelihood of Pursuing Clinical or Non-Clinical Positions throughout Career](image)

**Figure 3:** Likelihood of pursuing clinical and various non-clinical roles throughout career. Population sizes: clinical (graduates N=408, students N=263); industry (graduates N=405, students N=263); public health (graduates N=410, students N=265); research (graduates N=411, students N=263); *There is a smaller N for other non-clinical positions (graduates N=94, students N=52).

The “other non-clinical” roles that graduates were pursuing or were interested in pursuing included becoming involved in a GC program, teaching, becoming involved in sales and marketing, working as a non-profit program manager, taking on managerial positions, becoming a consultant/medical writer, or becoming involved with hospital administration or business management. The “other non-clinical” roles students were interested in pursuing included
becoming involved in genetic counseling training programs, teaching, starting a private GC practice, becoming an advisor to Congress and becoming involved in sales.

**Graduates:**

The majority of graduates currently or have previously worked in a clinical setting (72.6%, N=408) or an industry setting (22.5%, N=405). Of the graduates, 31.4% (N=411) currently or have previously worked in a non-clinical setting and 52.4% who have not yet worked in a non-clinical setting (N=227) believe it is likely or very likely that they will work in a non-clinical setting during their career. There were no significant differences between the likelihood of pursuing clinical or non-clinical jobs and being aware of non-clinical roles prior to graduate school. The likelihood that graduates would pursue a clinical position was moderately negatively correlated with the likelihood that they would pursue a non-clinical position in industry (r = -0.304, p=0.000) and negatively, but weakly correlated with the likelihood that they would pursue a non-clinical role in research (p=0.002, r =-0.155).

**Students:**

Of the responding students, 95.4% reported that they are likely or very likely to pursue a clinical position during their career (N=263) while 66% indicated that they are likely or very likely to pursue a non-clinical role during their career (N=265). There were no significant differences between the likelihood of pursuing clinical or non-clinical jobs and being aware of non-clinical roles prior to graduate school. The likelihood that students would pursue a non-clinical position in industry was weakly negatively correlated with the likelihood they would pursue a clinical position (r = -0.25, p=0.000) and weakly positively correlated with the likelihood that they would pursue a non-clinical position in research (r= 0.28, p=0.000) or public health (r = 0.15, p=0.012).
All respondents who indicated that they were likely, very likely or currently/previouly employed in any of the five settings (clinical, industry, public health, research and other non-clinical) were invited to explain why they pursued or are considering pursuing a position in each of these settings. Themes are shown in Tables 7-11.

**Table 7: Reasons to work in a clinical setting (N=548)**

<table>
<thead>
<tr>
<th>Theme</th>
<th>n</th>
<th>%</th>
<th>Sub-Themes</th>
<th>Example Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Interaction</td>
<td>458</td>
<td>83.6</td>
<td>N/A</td>
<td>“I like working directly with patients. I find the face to face, personalized interaction very rewarding…”</td>
</tr>
<tr>
<td>Job Description</td>
<td>96</td>
<td>17.5</td>
<td>Job characteristics</td>
<td>“…Variability of the day to day”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Job roles</td>
<td>“I want to work with … part of a medical team.”</td>
</tr>
<tr>
<td>“Necessary” first step</td>
<td>67</td>
<td>12.2</td>
<td>Gain experience in clinical setting before transitioning to non-clinical role</td>
<td>“Clinical experience gives good perspective for other positions in industry/research, etc”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Use skills and gain broader knowledge base</td>
<td>“My training focused on clinical skills and I wanted to make use of my training”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Only aware of clinical role</td>
<td>“I didn't realize that GC's worked in other settings, I thought clinical was the only opportunity.[sic…]”</td>
</tr>
</tbody>
</table>
Table 8: Reasons to work in an industry setting (N=323)

<table>
<thead>
<tr>
<th>Theme</th>
<th>n</th>
<th>%</th>
<th>Sub-Themes</th>
<th>Example Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salary and Benefits</td>
<td>142</td>
<td>44</td>
<td>N/A</td>
<td>“50% increase in salary to switch to industry”</td>
</tr>
<tr>
<td>More Flexibility (Schedule and Remote Work</td>
<td>137</td>
<td>42.4</td>
<td>N/A</td>
<td>“Many industry positions afford the opportunity to work from home. In some cases the schedule is more flexible as well.”</td>
</tr>
<tr>
<td>Opportunities)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Challenge</td>
<td>121</td>
<td>37.5</td>
<td>Change for when</td>
<td>“relief of some empathy &quot;burnout&quot; with patients”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>experiencing clinical</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>burn-out</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Apply skills in new</td>
<td>“…I think industry offers … the opportunity to learn new skills.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>areas and learn new</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>skills</td>
<td></td>
</tr>
<tr>
<td>Professional Growth and Respect</td>
<td>67</td>
<td>20.7</td>
<td>Advancement</td>
<td>“…industry provides me more opportunities for career advancement and will open more doors for a variety of work I can do”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>opportunities</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respect and</td>
<td>respect as a professional (feel much more respected by industry colleagues [sic] than from hospital personnel)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>support</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Autonomy</td>
<td>“I like the idea of having increased autonomy working in an industry setting…”</td>
</tr>
<tr>
<td>Job Description</td>
<td>61</td>
<td>18.9</td>
<td>Job responsibilities</td>
<td>“…I also enjoy thinking about vous'e [sic] as well as writing patient reports.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Job characteristics</td>
<td>“…I liked the new intellectual stimulation of laboratory”</td>
</tr>
<tr>
<td>Specific Interest in Industry</td>
<td>55</td>
<td>17</td>
<td>N/A</td>
<td>“…I have become interested in test appropriateness and cost effectiveness and other aspects of genetic testing…”</td>
</tr>
<tr>
<td>Industry is Important to the Future of</td>
<td>40</td>
<td>12.4</td>
<td>GCs have unique</td>
<td>“…Having genetic counselors in industry is important to ensure the testing is being done correctly and also to treat each sample as a patient and not just a [sic] tube.”</td>
</tr>
<tr>
<td>Genetic Counseling</td>
<td></td>
<td></td>
<td>perspective to offer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Broad and important</td>
<td>“…I also feel like [sic] I am able to impact more patients in the industry setting versus seeing a select number of patients a day in the clinic.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>patient impact</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Advances the field</td>
<td>“Industry jobs have the potential to change the practice of genetic medicine.”</td>
</tr>
</tbody>
</table>
### Table 9: Reasons to work in a public health setting (N=148)

<table>
<thead>
<tr>
<th>Theme</th>
<th>n</th>
<th>%</th>
<th>Sub-Themes</th>
<th>Example Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest in Field</td>
<td>67</td>
<td>45.3</td>
<td>N/A</td>
<td>“I have always been interested in public health and would be interested in combining my interest in genetics with my interest in public health.”</td>
</tr>
<tr>
<td>Having a Broad Impact</td>
<td>63</td>
<td>42.5</td>
<td>N/A</td>
<td>“…I think being in a PH setting allows for the ability to have a greater reach to the community that you can’t achieve just one on one in a GC setting…”</td>
</tr>
<tr>
<td>Public Health is Important to the Future of Genetics</td>
<td>24</td>
<td>16.2</td>
<td>GCs have unique perspective to offer public health</td>
<td>“There are broad implications for genetics in health. As our understanding of genetics grows, it’s important to have people working [sic] to educate the public about genetic health factors, and I feel GCs are well qualified to do that work…”</td>
</tr>
<tr>
<td>New Challenges</td>
<td>18</td>
<td>12.2</td>
<td>Change for when experiencing burn-out from patients</td>
<td>“relief of some empathy &quot;burnout&quot; with patients.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Apply skills in new areas and learn new skills</td>
<td>“Similar to my transition into industry, going into public health would allow me to gain new skills…”</td>
</tr>
</tbody>
</table>

### Table 10: Reasons to work in a research setting (N=120)

<table>
<thead>
<tr>
<th>Theme</th>
<th>n</th>
<th>%</th>
<th>Sub-Themes</th>
<th>Example Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research is Important to Future of Genetics</td>
<td>85</td>
<td>70.8</td>
<td>Advancing field of science and/or genetic counseling</td>
<td>“I also love the idea of advancing the scientific discoveries about genetics and contributing to the field in that way that will eventually benefit patients.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GCs have valuable perspective</td>
<td>“Working in a dedicated research setting interests me because I can use my genetic counseling skills to help guide projects in a patient-centered way.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Helping patients</td>
<td>“I am passionate about improving patient care through research.”</td>
</tr>
<tr>
<td>Interested in Research</td>
<td>48</td>
<td>40</td>
<td>N/A</td>
<td>“Research is fascinating to me…”</td>
</tr>
<tr>
<td>Job Characteristics</td>
<td>41</td>
<td>34.2</td>
<td>N/A</td>
<td>I think [research] provides a lot more flexibility and professional growth opportunities than most clinic GC positions.</td>
</tr>
<tr>
<td>New Challenge</td>
<td>13</td>
<td>10.8</td>
<td>Change for when experiencing clinical burn-out</td>
<td>“If I experienced burnout after years in the clinic I would love to move to a public health or research role”</td>
</tr>
</tbody>
</table>
**Table 11: Reasons to work in another non-clinical setting (N=32)**

<table>
<thead>
<tr>
<th>Theme</th>
<th>n</th>
<th>%</th>
<th>Sub-Themes</th>
<th>Example Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlimited Possibilities for GCs</td>
<td>15</td>
<td>46.9</td>
<td>Valuable GC perspective</td>
<td>Genetic counselors have a very flexible and desirable set of skills that, I feel, make us valuable in a number of fields.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Specific Specialty Position</td>
<td>“I have a passion for policy and could bring a unique perspective to a senator's or representative's advisement staff. I want to be an agent of change at the national level.”</td>
</tr>
<tr>
<td>Becoming Involved in Education</td>
<td>12</td>
<td>37.5</td>
<td>Genetic Counseling Education</td>
<td>“I've always wanted to be involved in a genetic counseling training program. I like teaching and being involved with students. I was a TA in undergrad.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Genetics Education</td>
<td>“I am very interested in undergraduate and graduate-level genetics education, and hope to have the opportunity to become involved in both.”</td>
</tr>
<tr>
<td>Job Characteristics</td>
<td>5</td>
<td>15.6</td>
<td>N/A</td>
<td>“for part time/ work-from home flexibility”</td>
</tr>
<tr>
<td>Remedy for Burn-out</td>
<td>3</td>
<td>9.4</td>
<td>N/A</td>
<td>“It would be a nice change if I get burned out”</td>
</tr>
</tbody>
</table>

*Opinions Regarding Workforce Issues:*

Participants were asked to use a 5-point Likert scale (1=strongly disagree, 5=strongly agree) to rate how strongly they disagreed or agreed with several statements regarding the genetic counseling profession. The results are shown in Table 12.

When students’ and graduates’ responses were compared two statements revealed statistical significance. Graduates agreed more than students that they were aware of most of the employment opportunities available to genetic counselors (students $\bar{x}$: 3.8, graduates $\bar{x}$: 4.1; p=0.000). Students disagreed more than graduates that the number of genetic counselors choosing non-clinical positions concerns them (students $\bar{x}$: 2.1, graduates $\bar{x}$: 2.6; p=0.000).
<table>
<thead>
<tr>
<th>Table 12: Opinions on relevant workforce statements</th>
<th>Strongly Disagree or Disagree (%)</th>
<th>Neither Agree nor Disagree (%)</th>
<th>Agree or Strongly Agree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>More genetic counseling opportunities are available than I realized when I applied to my training program.</td>
<td>Students (N= 271) 4</td>
<td>5.5</td>
<td>90.4</td>
</tr>
<tr>
<td></td>
<td>Graduates (N=416) 6.2</td>
<td>6.3</td>
<td>87.5</td>
</tr>
<tr>
<td>More types of employment opportunities are available now than when I graduated.</td>
<td>Graduates (N=416) 7.7</td>
<td>17.8</td>
<td>74.5</td>
</tr>
<tr>
<td>I am aware of most of the employment opportunities available to genetic counselors.</td>
<td>Students (N=271) 10.7</td>
<td>14.8</td>
<td>74.6</td>
</tr>
<tr>
<td></td>
<td>Graduates (N=416) 4.3</td>
<td>7.5</td>
<td>88.2</td>
</tr>
<tr>
<td>Genetic counselors should only work in clinical positions.</td>
<td>Students (N=271) 98.2</td>
<td>1.8</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Graduates (N=415) 97.8</td>
<td>1.9</td>
<td>0.2</td>
</tr>
<tr>
<td>It strengthens the profession for genetic counselors to work in non-clinical positions.</td>
<td>Students (N=271) 1.4</td>
<td>8.5</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Graduates (N=415) 1.9</td>
<td>3.9</td>
<td>94.2</td>
</tr>
<tr>
<td>Genetic counseling trainees should be able to obtain logbook credit for rotations with counselors in non-clinical positions.</td>
<td>Students (N=271) 5.1</td>
<td>17.7</td>
<td>77.1</td>
</tr>
<tr>
<td></td>
<td>Graduates (N=416) 6.3</td>
<td>15.4</td>
<td>78.3</td>
</tr>
<tr>
<td>Genetic counselors work in industry mostly for the high salary.</td>
<td>Students (N=271) 47.6</td>
<td>33.9</td>
<td>18.5</td>
</tr>
<tr>
<td></td>
<td>Graduates (N=416) 44.5</td>
<td>32.5</td>
<td>23.1</td>
</tr>
<tr>
<td>Every genetic counselor would choose to work clinically if the pay were comparable to industry.</td>
<td>Students (N=271) 70.9</td>
<td>20.3</td>
<td>8.9</td>
</tr>
<tr>
<td></td>
<td>Graduates (N=416) 69.5</td>
<td>21.9</td>
<td>8.6</td>
</tr>
<tr>
<td>The number of genetic counselors choosing non-clinical positions concerns me.</td>
<td>Students (N=271) 72.3</td>
<td>16.6</td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td>Graduates (N=415) 54.5</td>
<td>16.4</td>
<td>29.2</td>
</tr>
<tr>
<td>Genetic counseling students should be open to both clinical and industry employment opportunities.</td>
<td>Students (N=271) 1.5</td>
<td>17.3</td>
<td>81.2</td>
</tr>
<tr>
<td></td>
<td>Graduates (N=415) 1.9</td>
<td>10.1</td>
<td>87.9</td>
</tr>
</tbody>
</table>

Bolding indicates statistical significance, see text for details including p values and means
DISCUSSION

This is the first study to our knowledge that explored genetic counselors’ and genetic counseling students’ preferences to pursue positions in clinical and non-clinical settings directly upon graduating from a genetic counseling program as well as throughout their careers. This study also explored graduates’ and students’ attitudes regarding several current workforce issues. Based on the large number of responses we received, it appears that this topic is currently very relevant and important to genetic counselors and genetic counseling students. The demographics gathered in our study (race, ethnicity and gender as well as genetic counseling program location) are comparable to the demographics provided in the 2014 PSS (NSGC, 2014a) suggesting that our results may be generalizable to the larger genetic counseling population.

Awareness of Clinical and Non-Clinical Roles Prior to Graduate School:

Significantly fewer graduates were aware of non-clinical genetic counseling roles prior to entering graduate school compared to current students. It is not surprising that current students were more aware of non-clinical genetic counseling roles prior to graduate schools for several reasons. First, there were fewer genetic counselors pursuing non-clinical roles when the graduates were entering graduate school compared to when current students where entering graduate school most likely because there were fewer non-clinical job openings at the time (NSGC, 2008, 2014a). As a result, it is likely that prior to graduate school fewer graduates had exposure to non-clinical genetic counseling roles because there were fewer non-clinical genetic counselors with whom they could talk or shadow. In addition, as more genetic counselors have been pursuing non-clinical positions, many genetic counseling graduate programs have added
curriculum, internships or other experiences that expose students to these roles. Therefore, when current students were applying to graduate school, it is not only likely that they heard about non-clinical roles from the internet or current genetic counselors, it is also likely that they became aware of additional non-clinical opportunities while researching different genetic counseling programs and attending admission interviews.

**Ideal Jobs Prior to Graduate School and Currently/When Graduating:**

For both students and graduates there was a statistically significant relationship between their clinical and non-clinical job preferences prior to graduate school and their clinical and non-clinical job preference currently for students and when looking for their first jobs for graduates. Prior to entering graduate school over three-fourths of both graduates and students were interested in pursuing a clinical genetic counseling position. The percentage of graduates who were interested in pursuing clinical positions prior to graduate school and when searching for their first job remained relatively stable however the percentage of graduates interested in pursuing non-clinical jobs increased over 10% throughout their time in graduate school. Because fewer graduates were aware of non-clinical jobs prior to graduate school, it seems that learning about these roles in graduate school may cause students to realize that they would prefer to work in a non-clinical position.

Since entering a genetic counseling program, 10% fewer students are interested in pursuing a clinical position and approximately 10% more students are interested in pursuing a non-clinical position. Similar to the graduates, increased exposure to non-clinical roles throughout graduate school likely resulted in more students becoming interested these roles. It is challenging to imagine why fewer students compared to graduates were interested in pursuing a clinical position after their time in graduate school. In a previous study of genetic counseling
students, the majority indicated that they were pursuing a profession in genetic counseling because it was very important to them to help others (Lega et al., 2005). Prior to graduate school current students may have wanted to pursue a clinical role because they knew it would allow them to help others by providing direct patient care. After becoming exposed to the roles and responsibilities of non-clinical genetic counselors they may have realized that even though non-clinical positions often do not involve patient care, these positions still allow counselors to help others, often on a broader scale. Realizing they will still help others in non-clinical roles, students may have become more open to and interested in pursuing these roles.

Factors that Influenced Change in Job Preference:

The most often cited factors that contributed to students’ and graduates’ shift in preference to a non-clinical position included appealing job characteristics, appealing job responsibilities, that a non-clinical job was a better fit for their skills and that they were not aware of this possibility before graduate school. Three-fourths of students whose preferences changed to a non-clinical setting indicated that salary contributed to their desire to pursue a non-clinical role while only half of graduates indicated that salary was a factor for them. A few of the student participants mentioned that they were very concerned about being able to pay off their students loans from graduate school. Being able to pay off loans has been a long time concern for genetic counseling students as previously reported (Schoonveld et al., 2007). Industry and other non-clinical positions are now known to pay more than they originally did in past years, and they are also now known to typically pay much better than clinical positions. When graduates were in a genetic counseling program it is likely that non-clinical positions did not pay as much as they do now and therefore they did not associate non-clinical positions with higher salaries to the same extent that current genetic counseling students do. Because finding a job with a high salary
may be a top priority for students so they can pay off their loans, it seems logical that they may prefer to pursue non-clinical positions for this reason.

Likelihood of Pursuing Clinical or Non-Clinical Positions:

Just under three-fourths of graduates indicated that they currently or previously held a clinical position. About one third of graduates currently or have previously worked in a non-clinical setting and about half of those who have not yet held a non-clinical position believe it is likely or very likely that they will work in a non-clinical setting during their career. Almost all students indicated that they are likely or very like to pursue a clinical position throughout their career, and two thirds of students indicated that they are likely or very likely to pursue a non-clinical position throughout their career. The data from the 2014 PSS identified that 18% of respondents were non-clinical genetic counselors at the time of the survey (NSGC, 2014a). Unfortunately we are unable to compare our data directly with the PSS because we asked how likely participants would be to ever work in a clinical or non-clinical setting, and the PSS was asking whether counselors currently work in clinical or non-clinical settings. However, the finding that one third of graduates either currently work or previously worked in a non-clinical setting can be interpreted in one of two ways. Either some of the graduates switched from clinical to non-clinical roles or vice versa within the past few years since graduating or a much higher percentage of recent graduates as compared to the overall NSGC population are pursuing non-clinical roles. Regardless, it seems that graduates and students are increasingly interested in pursuing non-clinical roles which will likely reduce the clinical genetic counseling workforce and reduce patient access to counselors.
Clinical Positions:

Reasons for pursuing a clinical genetic counseling position varied. Unsurprisingly, participants indicated that they were interested in pursuing or currently have a clinical position because they are interested in providing direct patient care. As stated above, in a previous study many genetic counseling students indicated that they entered the profession because it was important to them to help others (Lega et al., 2005). Providing patient care would give counselors the ability to directly help others. Many participants indicated that they would pursue or did obtain a clinical position because they wanted to gain clinical knowledge and sharpen their skills before transitioning into a non-clinical role. This may help explain why some counselors who have been in the field for a short period of time are leaving their clinical positions. As a result, our profession needs to work to ensure that we have a pipeline of counselors ready and willing to fill these vacated clinical positions.

When participants explained why they were interested in pursuing non-clinical positions, many responses highlighted issues that are driving counselors away from the clinic. These included lack of advancement, respect and compensation; emotional exhaustion; and a high chance of burn-out. Our results appear to be consistent with the 2014 PSS in which many clinical genetic counselors reported dissatisfaction in many of these same areas (NSGC, 2014b). Of the PSS respondents who were clinical counselors, half were dissatisfied with advancement opportunities, a third were dissatisfied with the respect they received from the medical community, about 40% were dissatisfied with their salary and just under a quarter felt that they saw too many patients (NSGC, 2014b).
Non-Clinical Positions:

Among all of the non-clinical positions, students and graduates speculated that they would most likely pursue positions in industry. Public health and then research were the two other non-clinical fields they were most likely to consider entering. Salary, benefits and flexibility were often mentioned together as reasons to pursue or wanting to pursue a position in industry. Participants were also very interested in the professional growth and respect associated with industry and the other non-clinical settings. In the 2014 PSS many non-clinical counselors reported that they were satisfied with these factors in their positions: about 57% were satisfied or very satisfied with their earning potential, about 75% were satisfied or very satisfied with their professional growth opportunities and the respect they received from the medical community and 54% were satisfied or very satisfied with their advancement opportunities (NSGC, 2014b).

Similarly, Cohen et al. reported that genetic counselors working in non-clinical settings were more satisfied with their opportunities for advancement and their salaries compared with individuals who provided direct patient care (Cohen et al., 2015).

Participants stressed they would be or were interested in pursuing non-clinical roles to advance the field, to have a broader impact on the patient population or society as a whole and to explore a specific personal interest. A study that explored genetic counselors’ motivations to perform research found similar results. The top three reasons the participants in this study conduct research is because they are interested in the subject they are studying, to contribute to their field and for their own professional development or personal enjoyment (Clark et al., 2006).

It is concerning and important to note that multiple participants cited actual or anticipated clinical burn-out as a reason they would transition into non-clinical roles. Even students, who
have not yet held a clinical position, still mentioned the expectation that they would experience burn-out.

**Attitudes Regarding Current Workforce Issues:**

Overall, current students and recent graduates seem to respect and be very open to both clinical and non-clinical positions. They believe non-clinical positions are important to the genetic counseling profession’s growth and appreciate that some counselors would not choose to work in a clinical setting. It is not surprising that graduates agreed more than students that they are currently more aware of most of the employment opportunities available to genetic counselors. Once a counselor is employed, interacts with others in the field and regularly attends professional meetings they gain additional exposure to opportunities available to them. Graduates were significantly more concerned than students about the number of genetic counselors choosing non-clinical positions because graduates have likely had colleagues leave their clinic to pursue non-clinical positions. When this happens, it strains the clinical counselors who remain in the clinic, requiring these counselors to take on the additional patients that their colleague would have been responsible for. It is also important to recognize that our study population agrees that genetic counseling students should be receiving logbook hours in non-clinical rotations. As more genetic counselors are pursuing non-clinical roles having experience in non-clinical settings prior to graduating seems necessary, and therefore it seems warranted that students obtain credit for these experiences.

**Study Limitations:**

Within the field of genetic counseling, many individuals seem to have differing definitions of what a non-clinical role is. For example, one participant said her position involved telemedicine at diagnostic lab. It is challenging to determine whether this counselor is in a
clinical role or a non-clinical role as she saw patients but also worked in a non-clinical setting. For the purposes of this study, this counselor’s role was classified as clinical because we defined a clinical role as any position that involves counseling patients. However, the fact that this study required that this counselor categorize her job as being either clinical or non-clinical, not both is a limitation. Since this was a voluntary survey it is possible that selection bias may affect the validity of the findings. Individuals who participated may have had stronger opinions and thoughts about pursuing non-clinical and clinical positions than individuals who chose not to participate. It is also possible that recall bias may have affected our participants, especially the graduates who were already working in the field: we asked them to remember experiences prior to and throughout graduate school, which would have been up to seven years ago for some of our participants.

**Practice Implications:**

The results of this study suggest several implications for the genetic counseling profession. First, recent graduates and students are open to non-clinical as well as clinical roles and see the value that a genetic counselor can bring to a variety of settings.

Both genetic counselors and genetic counseling students appear to be increasingly interested in pursuing non-clinical positions. Most individuals who reported an interest in pursuing a non-clinical position said it was due to a desire for an increased salary, less burn-out and an increase in respect. Because the availability of non-clinical positions continues to increase, it is likely that clinical counselors will continue to leave their positions in pursuit of a better and more balanced working environment in the non-clinical world. To reduce the number of counselors leaving clinical positions, the genetic counseling profession needs to find ways to address several issues that are common among clinical counselors. These issues include that
clinical counselors are often overworked, inadequately compensated, overwhelmed by compassion fatigue and often frustrated by a lack of respect from the medical community.

As the demand for genetic counselors increases genetic counselors will have the luxury of being selective in which positions they apply for, and they will have incredible negotiating power. Although this is beneficial for genetic counselors who are applying for these positions, this can leave lower paying positions or positions with less desired working conditions such as those with a demanding patient load vacant. Ultimately this can and will likely limit the number of genetic counselors choosing to work clinically which will reduce patient access to genetic counselors. To ensure long-term sustainability of the genetic counseling profession, there will need to be an adequate supply of genetic counselors to meet the demands for both clinical and non-clinical positions.

**Research Recommendations:**

It will be extremely valuable to repeat this study or one very similar in three to five years to see how the genetic counseling profession and the roles genetic counselors fulfill are changing. There are several research recommendations based on the results of this study. It would be beneficial to conduct a similar study to this one where researchers survey genetic counselors who have been in the field for more than five years to learn what clinical and non-clinical settings they have worked in and what factors influenced their decision to work there or not work there. Learning about these genetic counselors’ opinions about clinical and non-clinical workforce issues will help determine whether the field as a whole is embracing the expansion of non-clinical roles. This information could provide useful insight into whether this trend of counselors moving into non-clinical roles has been a long time tradition or if it is a new concern.
Interviewing genetic counselors as well as students about their current decisions and anticipated future plans to pursue clinical or non-clinical positions would most likely provide rich data. From the few open-ended response questions that were included in this study, it was clear that many participants were eager to share their experiences as well as their concerns about the profession. Having the chance to engage and explore these views at a greater depth could provide a great deal of insight into the field.
CONCLUSION

Overall, current students and recent graduates seem to respect and be very open to both clinical and non-clinical genetic counseling positions. The majority of graduates currently or previously held a clinical position and almost all students indicated that they are likely or very likely to pursue a clinical position during their career. It seems that students and recent graduates are becoming more interested in pursuing non-clinical positions. About one third of graduates currently or have previously worked in a non-clinical setting and half who have not yet worked in a non-clinical setting believe it is likely or very likely that they will work in a non-clinical setting during their career. Two thirds of students indicated that they are likely or very likely to pursue a non-clinical position throughout their career. To lessen the number of counselors leaving clinical positions, our profession needs to find ways to address several issues that are common among clinical genetic counseling positions. These issues include that clinical counselors are often overworked, inadequately compensated, dealing with compassion fatigue and often frustrated by a lack of respect from the medical community. Having an adequate supply of genetic counselors to fulfill both clinical and non-clinical roles will be necessary to ensure the long-term sustainability of the genetic counseling profession.
REFERENCES


APPENDIX A: Recruitment Notices

ABGC Recruitment Notice:

Dear American Board of Genetic Counseling Diplomate,

My name is Stacey Liberman, and I am a second year graduate student in the Brandeis University Genetic Counseling Program. I am writing to request your participation in a survey as part of my thesis research titled, “To Be a Clinical or Non-Clinical Genetic Counselor, That is the Question”.

The purpose of this study is to assess factors that influence clinical and non-clinical career/job preferences within the genetic counseling profession. The results of this study will inform potential future workforce challenges.

This survey will explore your awareness of non-clinical as well as clinical genetic counseling roles prior to graduate school. It will also ask about your preference to pursue a clinical or non-clinical genetic counseling position when entering graduate school, when you were searching for your first job and as you think about your future career plans.

Here are some important things to know about this study:

- The survey is open to current genetic counseling students and genetic counselors who graduated from a genetic counseling training program between 2010 and 2015.
- The survey will take approximately 15 minutes to complete.
- The survey is anonymous and participation is voluntary.
- You can skip question(s) you are not comfortable answering and may exit the survey any time.
- All participants who complete the survey may enter a drawing for one of three $50 gift cards to Amazon.com. Your survey responses will not be connected to your contact information.
- The survey will be available until mid-February 2016

This study was reviewed and approved by the Brandeis University Institutional Review Board. If you have any questions about this research project, please contact Stacey Liberman at srl591@brandeis.edu, or the Brandeis University faculty sponsor, Barbara Lerner, at lerner@brandeis.edu.

“Click Here to Take the Survey”

Thank you in advance for your time and participation.
Sincerely,

Stacey Liberman
Master’s Degree Candidate, Class of 2016
Genetic Counseling Program
Brandeis University

NSGC Recruitment Notice:

Subject: To Be a Clinical or Non-Clinical Genetic Counselor, That is the Question

Seeking Current Genetic Counseling Students and Recent Graduates (2010-2015) to Participate in a Research Study

Dear NSGC Member,

I am writing to request your participation in a survey to assess factors that influence clinical and non-clinical career/job preferences within the genetic counseling profession. The results of this study will inform potential future workforce challenges.

Here are some important things to know about this study:

- The survey is open to current genetic counseling students and genetic counselors who graduated from a genetic counseling training program between 2010 and 2015.
- The survey will take approximately 15 minutes to complete.
- The survey is anonymous and participation is voluntary.
- You can skip question(s) you are not comfortable answering and may exit the survey any time.
- All participants who complete the survey may enter a drawing for one of three $50 gift cards to Amazon.com. Your survey responses will not be connected to your contact information.

This study was reviewed and approved by the Brandeis University Institutional Review Board. If you have any questions about this research project, please contact Stacey Liberman at srl591@brandeis.edu or the Brandeis University faculty sponsor, Barbara Lerner, at lerner@brandeis.edu.

"Click Here to Take the Survey"

Thank you in advance for your time and participation.

Sincerely,

Stacey Liberman
Initial Recruitment Email to Program Directors:

Subject: Invitation to Forward Student Research Project to Your GC Students

Dear [Name of Program Director],

My name is Stacey Liberman, and I am a second year graduate student in the Brandeis Genetic Counseling Program.

I am conducting a research study to assess factors that influence current students’ and recent graduates’ clinical and non-clinical career/job preferences within the genetic counseling profession. The results of this study will inform potential future workforce challenges.

All participants who complete the survey may enter a drawing for one of three $50 gift cards to Amazon.com. Survey responses will not be connected to the contact information provided.

This study was reviewed and approved by the Brandeis University Institutional Review Board. If you have any questions about this research project, please contact Stacey Liberman at srl591@brandeis.edu or the Brandeis University faculty sponsor, Barbara Lerner, at lerner@brandeis.edu.

Please reply to this email to let me know if you are willing to forward a recruitment email from me to your students. As soon as I receive your reply, I will send the recruitment email.

In your reply please also include the number of students currently enrolled in your training program. I will be using this information to calculate an accurate student response rate for my research project.

Thank you for your help.

Sincerely,

Stacey Liberman  
Master’s Degree Candidate, Class of 2016  
Genetic Counseling Program  
Brandeis University
Second Email to Program Directors (once they agreed to forward the study):

Subject: GC Students’ Clinical or Non-Clinical Job Preferences, A Student Research Project

Dear Fellow Genetic Counseling Student,

I am writing to request your participation in a survey to assess factors that influence clinical and non-clinical career/job preferences within the genetic counseling profession. The results of this study will inform potential future workforce challenges.

Here are some important things to know about this study:

- The survey is open to current genetic counseling students and genetic counselors who graduated from a genetic counseling training program between 2010 and 2015.
- The survey will take approximately 15 minutes to complete.
- The survey is anonymous and participation is voluntary.
- You can skip question(s) you are not comfortable answering and may exit the survey any time.
- All participants who complete the survey may enter a drawing for one of three $50 gift cards to Amazon.com. Your survey responses will not be connected to your contact information.

This study was reviewed and approved by the Brandeis University Institutional Review Board. If you have any questions about this research project, please contact Stacey Liberman at srl591@brandeis.edu or the Brandeis University faculty sponsor, Barbara Lerner, at lerner@brandeis.edu.

"Click Here to Take the Survey"

Thank you in advance for your time and participation.

Sincerely,

Stacey Liberman
Master’s Degree Candidate, Class of 2016
Genetic Counseling Program
Brandeis University
APPENDIX D: Survey Instrument

To Be a Clinical or Non-Clinical Genetic Counselor, That is the Question

You are being asked to participate in this study because you are either currently a genetic counseling student or have graduated from a genetic counseling training program since 2010. The purpose of this study is to assess factors that influence clinical and non-clinical career/job preferences within the genetic counseling profession. The results of this study will inform potential future workforce challenges.

Your responses to this online survey will be anonymous. This survey is estimated to take approximately 15 minutes to complete. Participation in this survey is voluntary. You may skip any question you are not comfortable answering, and you may exit the survey at any time.

This survey is being distributed by the National Society of Genetic Counselors, by the American Board of Genetic Counseling and by genetic counseling training program directors. Please only complete this survey once.

Participants may benefit from feeling like they are contributing useful information to the field of genetic counseling. There are minimal risks to participants. Some participants may feel distress when thinking about finding employment or their long-term career plans.

Participants who complete this survey may enter a drawing for one of three $50 Amazon gift cards. If you enter the drawing, you will be directed to a separate survey to provide your email address. Your contact information will not be linked to your survey responses.

If you have questions about this study please contact me, Stacey Liberman at srl591@brandeis.edu or my thesis committee chairperson, Barbara Lerner at 781-736-3179 or at lerner@brandeis.edu.

This study was reviewed and approved by the Brandeis University Institutional Review Board. If you have questions about your rights as a research subject please contact the Brandeis Institutional Review Board at irb@brandeis.edu or 781-736-8133.

By clicking Next, you acknowledge that you have read the information above and you consent to participate in this survey.

-Next (go to Q1)
-I do not want to participate (go to end of survey)
For the purpose of this study, clinical genetic counselors are defined as those who counsel patients in a clinical setting while non-clinical genetic counselors are defined as those who do not counsel patients.

Q1. Are you currently in a genetic counseling graduate program?
   - Yes
   - No

Q2. In what year did you graduate or are you expected to graduate (yyyy)?___________
   - If 2010 or more recent, go to Q3
   - If earlier than 2010, go to end of survey

Q3. Within which NSGC region is/was your genetic counseling program located?
   - Region I: (CT, MA, ME, NH, RI, VT, Canadian Maritime Provinces)
   - Region II: (DC, DE, MD, NJ, NY, PA, VA, WV, Quebec, Puerto Rico, Virgin Islands)
   - Region III: (AL, FL, GA, KY, MS, NC, SC, TN)
   - Region IV: (AR, IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, OK, SD, WI, Ontario)
   - Region V: (AZ, CO, MT, NM, TX, UT, WY, Alberta, Manitoba, Saskatchewan)
   - Region VI: (AK, CA, HI, NV, OR, WA, British Columbia)

Q4. What was your undergraduate major? (Select one)
   - Biology (including pre-med)
   - Psychology
   - Other (Please specify) _________________

Q5. At the time you applied to a genetic counseling program, which of the following pertained to you? If you applied more than once, please answer for the most recent time. (Select the best option)
   - I was an undergraduate student
   - I was a graduate student
   - I was employed, not a student
   - Other (Please specify) _________________

Q6. What was your age when you entered your genetic counseling training program?
   - under 25
   - 25-29
   - 30-34
   - 35-39
   - 40 or older
The next set of questions focus on your experience prior to graduate school:

Q7. Prior to entering graduate school, which professional opportunities for genetic counselors were you aware of? (Select all that apply)
   - Clinical genetic counseling
   - Non-clinical genetic counseling
   - Other (Please specify) __________
   - None

Q8. How did you learn about the non-clinical role(s) of a genetic counselor prior to entering graduate school? (Select the best option):
   - I was not aware genetic counselors worked in non-clinical roles prior to graduate school
   - High school, undergraduate or graduate (non-GC) coursework
   - Word of mouth (relative, friend, professor, advisor, colleague, lecture)
   - Professional website (e.g. NSGC, ABGC, ACMG or ASHG)
   - The lay media (e.g. articles in popular press, TV stories, etc.)
   - Other (Please specify) __________

Q9. When applying for admission to graduate school for genetic counseling, what did you envision would be the ideal job setting for your first genetic counseling job? If you envisioned a job with a mixture of clinical and non-clinical responsibilities, please select the setting where you would have preferred to spend the majority of your time.
   - I did not have an ideal job in mind (go to Q11)
   - Clinical (go to Q11)
   - Non-clinical (go to Q10)

Q10. What type of non-clinical setting were you most interested in?
    - Industry (including academic diagnostic laboratory)
    - Research
    - Public health
    - Other (Please specify) __________

Q11. Please provide a brief description of the specific position you were interested in. __________

Q12. Why were you interested in pursuing that position? __________________________

______________________________
Q13. Please rate how important the following reasons were to you for becoming a genetic counselor. 
5 (very important); 4 (important); 3 (somewhat important); 2 (not very important); 1 (not at all important).
- To help others
- Continuous intellectual stimulation
- To work in the field of science/genetics
- Job characteristics (e.g. schedule flexibility, ability to work part-time, ability to travel)
- Status of the field (e.g. level of respect for the profession)
- Future potential of the profession
- Level of demand for genetic counseling services
- Variety of employment opportunities
- Ease of finding work
- No doctorate degree in genetic counseling
- Salary
- Job stability
- Other (Please specify) ____________

Q14. Using the scale, please indicate how concerning each of the following factors were to you about pursuing the genetic counseling profession prior to entering graduate school.
5 (very concerning); 4 (concerning); 3 (somewhat concerning); 2 (not very concerning); 1 (not at all concerning)
- Level of professional advancement
- Status of the field (e.g. level of respect for the profession)
- Future potential of the profession.
- Level of demand for genetic counseling services
- Variety of employment opportunities
- Ease of finding work
- Diversity of the field (within the profession and/or within communities served by the profession)
- No doctorate degree in genetic counseling
- Salary
- Job security
- Other (Please specify) ____________

The next set of questions ask you to think about the ideal setting of your first job and the factors that influenced or you imagine will influence your job search:

Q15. **(STUDENTS ONLY)** Right now, what is your ideal job setting? If your ideal job has a mixture of clinical and non-clinical responsibilities, please select the setting where you would prefer to spend the majority of your time.
- I do not have an ideal job in mind (go to Q16)
- Clinical (go to Q17)
- Non-clinical (go to Q16)
Q16. (STUDENTS ONLY) What is your ideal non-clinical job setting?
- Industry (including academic diagnostic laboratory)
- Research
- Public health
- Other (Please specify) __________

Q17. (STUDENTS ONLY) If this job setting preference is different from when you first entered graduate school, what caused this shift? (Select all that apply)
- N/A - My preference did not change
- I wasn’t aware of this possibility before
- Positive internship experience
- Negative internship experience
- Better fit for my skills/abilities
- Appealing job responsibilities
- Appealing job characteristics (level of autonomy, level of prestige, level of respect, ability to work from home, ability to travel)
- Complaints/feedback from those in my original preference
- Higher salary
- Other (Please specify) __________

Q18. (GENETIC COUNSELORS ONLY) What was your first job setting after graduating from your genetic counseling training program? If this setting was/is a mixture of clinical and non-clinical, please select the setting where you spent/spend the majority of your time.
- I never took a GC job
- Clinical
- Non-clinical industry (including academic diagnostic laboratory)
- Non-clinical research
- Non-clinical public health
- Non-clinical other (Please specify) __________

Q19. (GENETIC COUNSELORS ONLY) Was your first job within your preferred job setting when you were applying for positions?
- Yes (go to Q21)
- No (go to Q20)

Q20. (GENETIC COUNSELORS ONLY) What kind of setting would you have preferred to work in when you were looking for your first genetic counseling job? If your preferred setting was a mixture of clinical and non-clinical, please select the setting where you would have liked to have spent the majority of your time.
- I never took a GC job
- Clinical
- Non-clinical industry (including academic diagnostic laboratory)
- Non-clinical research
- Non-clinical public health
- Non-clinical other (Please specify) __________
Q21. (GENETIC COUNSELORS ONLY) If your preferred first job setting differed from the one you had in mind when you were applying to graduate school, what caused this shift? (Select all that apply)

- N/A - my preference did not change
- I wasn’t aware of this possibility before
- Positive clinical or non-clinical internship experience
- Negative clinical or non-clinical internship experience
- Better fit for my skills/abilities
- Appealing job responsibilities
- Appealing job characteristics (level of autonomy, level of prestige, level of respect, ability to work from home, ability to travel)
- Higher salary
- Complaints/feedback from those in the original preference
- Other (Please specify)

Q22. What factors were/will be most important to you when you were/will be looking for your first job? Rate how important the following reasons were/will be by selecting the appropriate number.

5 (very important); 4 (important); 3 (somewhat important); 2 (not very important); 1 (not at all important)

- Geographical location
- Salary
- Position/job responsibilities
- Schedule flexibility (including ability to work part-time)
- Ability to work remotely or travel for work
- Advancement opportunities
- Job benefits
- Level of respect (social respect, approval of my colleagues)
- High level of autonomy
- Other (Please specify)
Q23. How much do you agree/disagree with the following statements?
1-strongly disagree, 2-disagree, 3-neither agree nor disagree, 4- agree, 5-strongly agree:

- More genetic counseling opportunities are available than I realized when I applied to my training program.
- (GENETIC COUNSELORS ONLY) More types of employment opportunities are available now than when I graduated.
- I am aware of most of the employment opportunities available to genetic counselors.
- Genetic counselors should only work in clinical positions.
- It strengthens the profession for genetic counselors to work in non-clinical positions.
- Genetic counseling trainees should be able to obtain logbook credit for rotations with counselors in non-clinical positions.
- Genetic counselors work in industry mostly for the high salary.
- Every genetic counselor would choose to work clinically if the pay were comparable to industry.
- The number of genetic counselors choosing non-clinical positions concerns me.
- Genetic counseling students should be open to both clinical and industry employment opportunities.

Q24. In thinking about your long-term career goals and plans, how likely do you think you will be to work in the following settings during your career? Please select very likely for any setting you currently work in or previously have worked in.

1- not at all likely, 2-not very likely, 3-somewhat likely, 4 likely and 5- very likely
- Clinical
- Non-clinical industry (including academic diagnostic laboratory)
- Non-clinical research
- Non-clinical public health
- Non-clinical other (Please specify) ____________

For all of the reasons that were marked as likely or very likely, ask:

Q25a. (GENETIC COUNSELORS ONLY) Do you currently or have you previously worked in a clinical setting?
- Yes (go to 25b.)
- No (go to 25c.)

25b. (GENETIC COUNSELORS ONLY) Please briefly explain why you were interested in pursuing a job in a clinical setting? ________________________________

25c. (GENETIC COUNSELING STUDENTS AND GENETIC COUNSELORS WHO ANSWER NO TO Q25a) Please briefly explain why you would be interested in working in a clinical setting at some point during your career? ________________________________
Q26a. (GENETIC COUNSELORS ONLY) Do you currently or have you previously worked in an **industry** setting?
   - Yes (go to 26b.)
   - No (go to 26c.)

26b. (GENETIC COUNSELORS ONLY) Please briefly explain why you were interested in working in an **industry** setting?

26c. (GENETIC COUNSELING STUDENTS AND GENETIC COUNSELORS WHO ANSWER NO TO Q26a) Please briefly explain why you would be interested in working in an **industry** setting at some point during your career?

Q27a. (GENETIC COUNSELORS ONLY) Do you currently or have you previously worked in a **research** setting?
   - Yes (go to 27b.)
   - No (go to 27c.)

27b. (GENETIC COUNSELORS ONLY) Please briefly explain why you were interested in working in a **research** setting?

27c. (GENETIC COUNSELING STUDENTS AND GENETIC COUNSELORS WHO ANSWER NO TO Q27a) Please briefly explain why you would be interested in working in a **research** setting at some point during your career?

Q28a. (GENETIC COUNSELORS ONLY) Do you currently or have you previously worked in a **public health** setting?
   - Yes (go to 28b.)
   - No (go to 28c.)

28b. (GENETIC COUNSELORS ONLY) Please briefly explain why you were interested in working in a **public health** setting?

28c. (GENETIC COUNSELING STUDENTS AND GENETIC COUNSELORS WHO ANSWER NO TO Q28a) Please briefly explain why you would be interested in working in a **public health** setting at some point during your career?
Q29a. (GENETIC COUNSELORS ONLY) Do you currently or have you previously worked in another non-clinical setting?
   -Yes (go to 29b.)
   -No (go to 29c.)

29b. (GENETIC COUNSELORS ONLY) Please briefly explain why you were interested in working in this other non-clinical setting.

29c. (GENETIC COUNSELING STUDENTS AND GENETIC COUNSELORS WHO ANSWER NO TO Q29a) Please briefly explain why you would be interested in working in this other non-clinical setting at some point during your career.

Demographic Questions:

Q30. Do you have another advanced degree?
   -Yes (display Q31)
   -No (skip to Q32)

Q31. If yes, what type of degree and in what field?

Q32. What is your gender?
   -Female
   -Male
   -Other

Q33. What race do you most strongly identify with?
   -Asian
   -American Indian or Alaskan Native
   -Black or African American
   -Multiracial (Please specify)
   -Native Hawaiian or other Pacific Islander
   -White
   -Other (Please specify)
   -I prefer not to answer

Q34. Are you Hispanic or Latino?
   -Yes
   -No
Q35. Would you like to enter a drawing to win one of three $50 Amazon gift cards? Your contact information will not be connected to your survey responses if you say yes.

- Yes (go to second survey)
- No (go to end of survey)