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ORIGINAL RESEARCH

Influence of Genetic Counseling Graduate Program Websites on Student Application Decisions

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Abstract This study investigated how genetic counseling educational program websites affect application decisions via an online survey sent to current students and recent graduates. Program leadership: directors, assistant directors, associate directors, were also surveyed to determine where their opinions coincided or differed from those reported by students and recent graduates. Chi square analysis and t-tests were used to determine significance of results. A two-sample t-test was used to compare factors students identified as important on a 5-point Likert scale with those identified by directors. Thematic analysis revealed three major themes students consider important for program websites: easy navigation, website content, and website impression. Directors were interested in how prospective students use their program website and what information they found most useful. Students indicated there were specific programs they chose not to apply to due to the difficulty of using the website for that program. Directors significantly underestimated how important information about application requirements was to students in making application decisions. The information reported herein will help individual genetic counseling graduate programs improve website functionality and retain interested applicants.

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Introduction

Genetic counseling is an expanding health care profession in which individuals trained in both medical genetics and counseling help individuals to "understand and adapt to the medical, psychological and familial implications of genetic contribution to disease" (Resta et al. 2006, pg.77). In 2010, 731 individuals applied for admission to 32 accredited genetic counseling graduate programs, and 230 students matriculated (Association of Genetic Counseling Program Directors 2010). Even with the accreditation of new programs, the number of genetic counseling students admitted each year remains approximately 300 students or less as estimated by the small number of students accepted to each program per year.

Genetic Counseling Program Application Process

Each genetic counseling Master's degree program in the United States and Canada has its own website, and individual links are available on the website of the Accreditation Council for Genetic Counseling) (http://gceducation.org/Pages/Accredited-Programs.aspx). Applications are typically available in September or October for admission in the fall semester of the following academic year, and closing dates are specific to each program. Applications are received and reviewed, and select applicants are offered interviews by the programs. On the national acceptance notification date, a predetermined date agreed upon by the Association of Genetic Counseling Program Directors that occurs in April or May, applicants are notified of their application status by the programs where they interviewed (Association of Genetic Counseling Program Directors 2013). In 2005, students applied to an average of 4.78 programs, applied 1.22 times, and were accepted to an average of 1.77 programs (Lega et al. 2005). While there is information on the application rate of genetic

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counseling program applicants, there is limited research regarding influences on decision making for those applicants.

Student Application Research

Research on genetic counseling program application is limited; however there have been studies of both the undergraduate and graduate student application process. Previous research regarding undergraduate applications has found that applicants to undergraduate institutions frequently use university websites prior to making application decisions (Schimmel et al. 2010). Increased distance from an institution has been shown to correlate with decreased probability of enrolling (Goenner and Pauls 2006). Expressing interest in a specific major available at a university also has a significant positive influence on enrollment, and it is particularly important for majors or programs that are available at only a select number of colleges or universities, such as genetic counseling.

Previous investigations of application decisions have primarily focused on undergraduate studies. Studies comparing undergraduate and graduate students' application decisions determined that the two groups do not consider the same criteria when choosing an educational institution (Schimmel et al. 2009). Graduate students typically consider factors such as availability of major, flexibility of scheduling, speed of degree completion, and ability to schedule evening classes (Schimmel et al. 2009) when making application decisions. Due to the similarity among genetic counseling programs, those factors are less applicable, thus making the admissions process unique.

Genetic Counseling Program Application Factors

As there are currently only 39 accredited genetic counseling graduate programs in the United States and Canada, many prospective students live in a state that does not have a genetic counseling program, and a pre-application onsite visit to programs may not be possible for all applicants. Therefore, individual program websites may be the only source of information an applicant has when deciding whether, or not, to apply to a particular program. Program websites, as a marketing and recruitment tool, are essential to obtain the largest pool of qualified applicants, and website optimization has the potential to improve student recruitment. Website optimization is in the best interest of programs and students alike, and targeted improvements may provide the most benefit from less investment.

There are limited data on factors influencing genetic counseling student application decisions. In investigating the potential benefit and viability of changing the current genetic counseling graduate program match process in North America to a system similar to the system used for medical residency programs in the United States, Newton (2006) investigated factors that influenced genetic counseling students' choice to apply to, interview at, and attend their genetic counseling programs. Students were asked to describe and rank all factors that influenced their decision to apply to specific programs. Common factors previously identified by the 137 student respondents were:1) location (93% of respondents), 2) size of the program (31%), 3) cost (26%), 4) availability of obtaining financial aid (25%), 5) quality of rotations (25%), 6) reputation of the program (24%), and 7) admission requirements (13%). Location was also listed as the most common influencing factor in deciding to interview at (52% of respondents) and attend (70%) a specific program, although the distinction was not made between relative to where a student lived, or the appeal of living in a particular program location. The study also showed that in the 2004–2005 genetic counseling application process, each successful student applied to an average of 5.2 programs, which at the time was approximately one-fifth of the available programs (26 programs in the United States and Canada).

In a study surveying 408 individuals who had graduated from genetic counseling programs between 2008 and 2012, Kuhl et al. (2014) demonstrated that undergraduate debt can influence which training program a student chose to attend (over 40%, $n = 63$ of respondents). Sixty-one respondents (15%) rated the cost of a program as their most influential factor in deciding which program to attend, second only to location ($n = 155$, 38%). To date, no previous studies have specifically addressed how program factors or program websites affect genetic counseling student application decisions.

Purpose of the Study

Analysis of information prospective students find most useful on genetic counseling program websites during the application process may help programs organize their websites more effectively to promote application. The purpose of this descriptive study was to determine prospective genetic counseling applicants' attitudes toward program websites and factors that influence their application decisions. Program leadership: directors, assistant directors, associate directors, were also surveyed to assess their opinions and to determine where their opinions coincided or differed from those reported by students and recent graduates.

Methods

This study was approved by the University of Oklahoma Institutional Review Board (#4277).

Participants

Genetic counseling program directors, assistant/associate directors (referred to collectively as directors), and current first and second year genetic counseling students and the most recently graduated genetic counseling class of 2014 (referred to as students), were invited to participate in this study. Thirty-four Master's in genetic counseling programs were contacted through the Association of Genetic Counseling Program Directors listserv in October of 2014 and emailed an invitation to participate in a study aimed to understand how genetic counseling students use individual program websites in their application decisions. The email included a link to an online Qualtrics survey and a request to forward the link for the student survey to all of their current students, and their most recently graduated class. Both surveys were anonymous, and closed for recruitment in November 2014.

Instrumentation

Director Survey The directors' survey included a total of seven multiple choice questions. They were asked to identify their leadership position and their length of time in that position. They were asked how often the genetic counseling program website is evaluated for possible changes and when the last time a major update occurred; a major update was defined as "analysis/restructuring of a large part or entirety of the website." Directors were asked what prompted the update and what, if any, limitations are involved in making changes to their program website.

To determine what program information from their websites directors believed students used in making application decisions they were provided with a list of 12 items and asked to categorize each as "Important," "Not as Important," or "Unimportant." They were also asked in an open-ended question what would be helpful for them to know about how students use their website.

Student Survey The student survey included a total of eight questions about how information from individual programs was used during the application process. Students were first asked to choose their matriculating class and how they identified programs of interest. Using an answer grid, students were asked which program websites were visited, what programs were applied to, interviewed at, received offers from, and where they matriculated.

To determine the importance of twelve specific program factors (based on the survey performed by Newton (2006)) when deciding where to apply participants were asked to rate each item on a 5 point Likert scale where 1 = least important, or, "I did not find this information helpful in deciding to apply to programs," 2="I found this information helpful, but was not specifically looking for it," 3="I looked for this information,

but not finding it on a website did not change my decision to apply to that program," 4="Not knowing this information made it difficult to apply to a program," and 5 = most important or, "I absolutely needed to know this information about a program to decide whether to apply or not." "Other" was listed as a thirteenth option for program factors. Students were asked if there were any programs they decided not to apply to based solely on the use or accessibility of its website. They were not asked to identify specific programs. Finally, they were asked for a free-text response to express what they would like the managers of the program websites to know.

Data Analysis

Quantitative Analysis Analysis of survey data compared current website management practices and limitations to student and graduate reports of the most helpful features. The directors responses were numerically converted as follows: "important" = 5, "not as important" = 3, and "unimportant" = 1. This conversion was done in order to compute correlations between director and student responses. Results for the student survey were analyzed both as a whole, and divided by academic class for group analysis and comparison. Group descriptive statistics were expressed as mean ± standard deviation and grouped frequencies. Differences in average scores between groups were analyzed using Student's t-test; differences in frequency distributions were analyzed using chi-square tests of categorical tables. To provide an overall 5% level of significance for the study in the presence of multiple tests (62 tests), a Bonferroni correction was applied such that an individual test result was significant if p-value ≤ 0.0008.

Qualitative Analysis Content of student responses were analyzed using thematic analysis (Kuhl et al. 2014). Two investigators (the first and last author) independently identified key words from each open-ended response to describe the main points of each response. After discussion and agreement, similar key words were grouped together to form larger categories. These categories were combined into larger groups based on content to identify larger themes. Discussion provided consensus about classification and identification of themes.

Results

Director Survey

There were 34 accredited genetic counseling programs in the United States and Canada at the time of the study. There were an estimated 64 assistant/associate/co-directors based on review of each program's website. A total of 22 surveys were completed for a response rate of 34%. Fourteen respondents (63.6%) were Program Directors, and nine respondents

(40.9%) reported holding their current position for over 10 years.

Program websites were most commonly reported to be updated annually ($n = 7$ respondents, 31.8%), followed by once a semester ($n = 5$, 22.7%), or "Other" ($n = 5$ respondents, 22.7%). "Other" included three responses of "as needed," and one director indicating that different sections of the website were reviewed at different rates. Nearly half ($n = 10$, 45.5%) of respondents indicated their program websites had been updated during the 2014 fall semester. Two directors indicated that their website was currently being updated. Websites were reported to be updated during university-wide updates ($n = 6$ directors, 27.3%) or a scheduled major update ($n = 5$ respondents, 22.7%). However, many directors ($n = 10$, 45.5%) also indicated there were other reasons for the update. Four updates were done for the new academic year, for reasons such as updating the student profiles and photographs and a new admission process. The most frequently indicated limitation for changes to the program website were university standards or formatting ($n = 17$ respondents, 77.3%) and having to work through another department ($n = 5$ respondents, 22.7%).

The directors reported they wanted to know what information the most students used, how much information students want on program websites, and what information applicants use in their application decision making. Directors also wanted to know how easy the website was to navigate and how accurately the website reflected the program. Directors were asked their opinions as to what students believed were important, or unimportant, factors in making application decisions. The factor most frequently identified as important by the directors were academic requirements ($n = 20$, 90.9%), followed by tuition cost ($n = 19$. 86.3%), accreditation status ($n = 15$, 68.2%), location relative to where the applicant lives ($n = 13$, 59.1%), then equally application requirements ($n = 12$, 54.5%), number of students accepted ($n = 12$, 54.5%), and availability of tuition information on the website ($n = 12$, 54.5%) (Fig. 1). Application requirements were considered to be the application itself, as well as any supplemental materials such as letters of reference and how to submit the application.

Factors listed as unimportant were application fee ($n = 8$, 36.3%), then application requirements (3 responses), number of students accepted (3), summer rotation information (3), location relevant to where applicants live (2), location environment (1), thesis information (1), and availability of tuition information (1).

Student Survey

In 2014, the 34 accredited genetic counseling graduate programs accepted less than 300 students (Association of Genetic Counseling Program Directors 2010). With the addition of five new programs between 2014 and 2016, the authors estimated that approximately 245 individuals were accepted to genetic counseling graduate programs each year. Therefore for 2014–2016 the estimated number of potential respondents was 735 individuals. A total of 255 surveys were completed for a response rate of 34.7%. Of these, 47.8% ($n = 122$) were current 1st year genetic counseling students, 31.0% ($n = 79$) were 2nd year students, and 20% ($n = 51$) were recent (2014) graduates.

Most students ($n = 214$, 83.9%) indicated that they used the Accreditation Council for Genetic Counseling (ACGC) list of accredited programs to identify prospective programs. There was no significant difference in the proportion of students who used the ACGC list of accredited programs across the three years ($p = 0.87$). Students also identified programs online through other websites ($n = 48$, 18.8%), attended a school as an undergraduate that had a genetic counseling program ($n = 38$, 14.9%), or were told about a specific program in a class ($n = 28$, 11.0%). When asked if there were any programs that they decided not to apply to, based solely on ease of use or accessibility of their website, 25.1% responded "yes" ($n = 64$).

Students ratings of each of 12 factors on the 5-point Likert scale revealed that five factors received a mean score between 4 ("Not knowing this information made it difficult to decide to apply to a program) and 5 ("I absolutely needed to know this information about a program to decide whether to apply or not") (Fig. 2). These factors, in descending order, were: application requirements (mean ± SD, 4.53 ± 0.90), academic requirements (4.45 ± 0.87), accreditation status (4.35 ± 1.05),

Fig. 1 Genetic counseling program/assistant/associate director identification of impotant factors used by prospective students in determining which programs to apply to
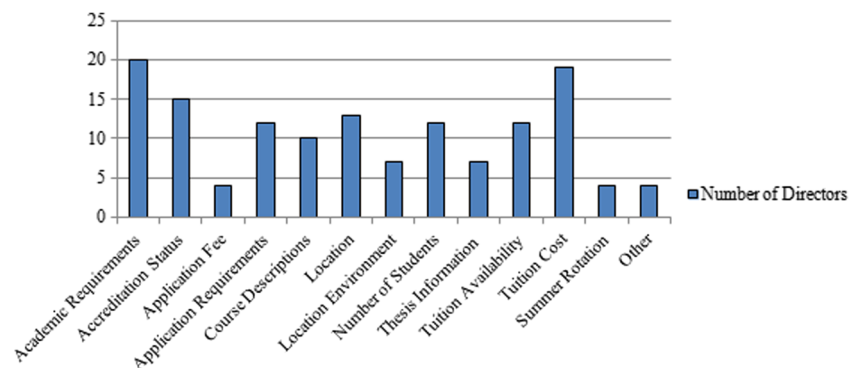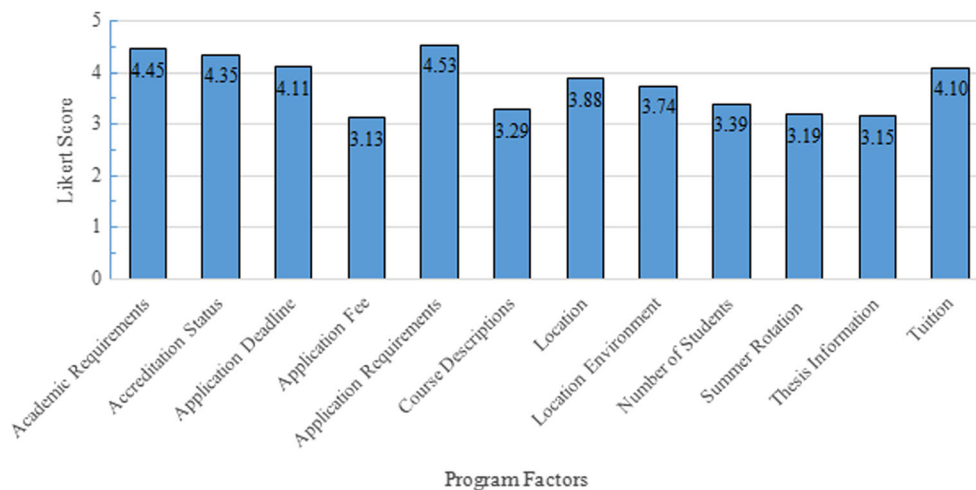
Fig. 2 Genetic counseling students' importance of individual program information on a 5 point Likert scale. The Likert scale: 1) 'I did not find this information helpful in diciding to apply to programs,' 2) I found this information to be helpful, but was no specifically looking for it,' 3) 'I looked for this information, but not finding it on a website ded not change my decision to apply to that program,' 4) 'Not knowing this information made it difficult to apply to a program,' and 5) 'I absolutely need to know this information about a program to decide whether to apply or not.' None of the factors listed has mean score of less than 3

application deadline (4.11 ± 1.19), and tuition (4.10 ± 1.00). None of the 12 factors listed had a mean equal to or below 3 ("I looked for this information, but not finding it on a website did not change my decision to apply to that program"), and all except "application fee," "summer rotation information," and "thesis information" were significantly higher than a score of 3 ($p < 0.0008$). Four students did select the "other" option as important; none of these respondents wrote in what the other factors were.

Thematic Analysis

Genetic counseling students were asked what they would "like the managers of individual genetic counseling websites to know." Thematic analysis revealed three major themes: content of the websites, website impression, and easy navigation.

Theme #1: Website Content

Students reported wanting specific information about the application process. One respondent suggested, "A common app would have been SO helpful"; another respondent pointed out, "One school in mind had an 'admission checklist' system that made it very easy to insure (sic) that I wasn't missing anything." Information about tuition and financial aid were the two pieces of information most commonly requested. Many mentioned that it was difficult to find specific information about tuition, which "you had to dig to find this info and it was not well laid out once found." The difficulty of figuring out the tuition for a program was highlighted by another respondent, "If we have to look it up for the whole university, we don't know if it falls under the graduate school or medical school tuition!"

Students wanted to learn as much information about the program, the application process, and financial issues as possible; they wanted specific information for each program, such as the curriculum and a sample schedule, the program's philosophy, and expectations. As one respondent stated, "I liked when the websites included bios about current students to get a better idea of what type of applicants were being accepted."

Theme #2: Website Impression

Students identified several factors that had an impact on the website, which, in turn, influenced their impression of the genetic counseling program. One individual stated, "For many of the schools I looked at, the website was the first impression I had of the program and had a great impact on whether I felt the school had pride in their GC program." The factors included the appeal of the website, the clarity of the information presented, presence of grammatical errors, and the professional appearance of the website. The importance of having accurate and up to date information on the website, including working links was emphasized, as was using websites to highlight program strengths. As one student said, "I was most drawn to the websites that highlighted what made the individual programs unique."

Theme #3: Ease of Navigation

Multiple students commented on the importance of the navigability of the website. As one person said, "Make your websites easy to use. I don't want to have to spend forever trying to find what I'm looking for. Make sure that it is easy to navigate." This is particularly important, as potential students may be discouraged from applying if the necessary

information is too difficult to find. Another respondent pointed toward the consequence of a website that is difficult to use: "If I can't figure out where to submit an application, I won't." Ease of navigation includes keeping the websites updated, which students also mentioned: "One of the schools I applied to did not have the most updated form of the website linked to the ACGC (ABGC at the time of my application) website."

Comparisons of Student and Director Responses about Factors that Influence Application Decisions

Comparing students' responses to directors' responses, the importance of application requirements information was the only category where opinions differed significantly ($p < 0.0008$) (Table 1). Students rated the importance of application requirements significantly higher than did directors. Two other factors that reached the $p < 0.05$ threshold of significance but did not reach the Bonferroni corrected threshold of $p < 0.0008$ were the importance of academic requirements and course descriptions, both rated higher by directors than by students. Students' responses did not differ significantly by year (data not shown).

Discussion

This study identified significant influences that program websites can have on genetic counseling student application decisions. A significant number of respondents indicated that they decided not to apply to some programs based solely on

ease of use of their website and that all factors on the survey were important in making application decisions. Thematic analysis of open-ended responses revealed impressions obtained from program websites, specific content, and ease of website navigation can affect decision making and overall impressions of a program. Program directors significantly underestimated the importance of listing application requirements on program websites, the most important factor identified by the students.

The study also found that tuition cost and admission requirements are important to prospective genetic counseling students, supporting the results of Newton (2006). Those two factors were among the five most important identified in this study, along with application requirements, accreditation status, and application deadline, none of which were identified by Newton.

As with undergraduate students (Schimmel et al. 2010), the current results support that graduate students also use university websites prior to making application decisions for certain types of programs. Each of the 12 factors the students rated as important received an overall score above 3, or "I looked for this information, but not finding it on a website did not change my decision to apply to that program," indicating that successful applicants want to know a wide variety of comprehensive information about programs before deciding where to apply. One might hypothesize that if any specific factor was found to be considered unimportant by the students, it may have been the recommendation to remove this information from the program websites, or to be less prominent. This was not the case; students demonstrated and specifically stated that they were

Table 1 Means, standard deviations, and p = values for a two sample t-test comparing the importance of genetic counseling graduate program factors as reported by program/assistant/associate directors and genetic counseling students[d]

Factor	Student survey ($N = 225$)	p-value[a]	Program survey ($N = 22$)
Application requirements	4.53 ± 0.90 *	0.00044	3.82 ± 1.47 †
Academic requirements	4.45 ± 0.87 *	0.024	4.82 ± 0.59 *
Accreditation status	4.35 ± 1.05 *	0.94	4.36 ± 0.95 *
Application deadline	4.11 ± 1.19 *		n.a.[c]
Tuition	4.10 ± 1.00 *	0.99	4.73 ± 0.70 *
Location environment (what the city is like)	3.88 ± 1.09 *	0.20	3.55 ± 1.10 †
Location relative to where you live	3.74 ± 1.41 *	0.55	4.00 ± 1.35 †
Number of students accepted	3.39 ± 1.11 *	0.14	3.82 ± 1.47 †
Course descriptions	3.29 ± 1.02 *	0.0079	3.91 ± 1.02 *
Summer rotation information	3.19 ± 1.09 †	0.74	3.10 ± 1.18
Thesis information	3.15 ± 1.08 †	0.13	3.55 ± 1.10 †
Application fee	3.13 ± 1.29 †	0.47	2.64 ± 1.47

[a] Student's t-test for comparison of response on Student survey to response on Program survey

[b] Student's t-test for comparison to midpoint =3 has p-value † $p < 0.05$, * $p < 0.0008$ (Bonferroni corrected threshold for significance)

[c] n.a.: not asked

[d] Listed in in order of decreasing importance as identified by the students

interested in having as much information about a program as possible available on the website.

Five factors: application requirements, academic requirements, accreditation status, application deadline, and tuition, were rated above a score of 4, "Not knowing this information made it difficult to decide to apply to a program." Thus, not being able to find this information about a program could lead a potential applicant to decide not apply to a particular program. The results of this study revealed that the most important factor when making an application decision is application requirements. Clear and easy to locate information relating to application requirements is essential component of the application process.

Qualitative Analysis

Website Content

Students expressed the desire to discover as much information about a program as possible from its website and provided specific items that are especially helpful in making application decisions. Knowledge of preferences may allow programs to evaluate their websites with regard to how well that information fills the needs of applicants. Information located on a program's website may be particularly important for those applicants who are unable make an onsite visit to programs they are considering.

When asked what they wanted the website managers for genetic counseling graduate programs to know, the students wanted them to know that applicants need specific information, including class size, clinical rotations, cost of living of the area, course information including the structure of classes, thesis information, current student biographies, and tuition. Information providing the essence of what a student would experience in a specific genetic counseling program enables applicants to distinguish one program from another.

Easily accessible tuition information was mentioned frequently. The comments stated that clear, easy to find information about the tuition, specific to the genetic counseling graduate program, be located on the genetic counseling program website; being routed to other web pages or having to calculate their own best estimate tended to reduce the chance they would complete an application.

Website Impression

The program website may be the first, and possibly only, impression a potential applicant has prior to application; therefore, a positive impression is essential. Information that is confusing, inaccurate, or difficult to find impacts both the applicant and the program.

Complications in the application process can occur from outdated websites as was highlighted by the student who discussed the outdated program link on the ACGC website. Because of the outdated information on the old link, the student's application was postmarked past the application deadline. Checking all website links, particularly the link from the ACGC website, before a program's application opens for an academic school year benefits both applicants and the programs.

Ease of Navigation

Respondents indicated that website navigability was important to facilitate the application process. Potential students may be dissuaded from proceeding with an application to a specific program if the information is too difficult to find. Many mentioned the idea of reformatting program websites to have clear, easy to use tabs for finding specific information. According to the directors' survey, the most common limitations for changes to the program website were university standards or formatting (80%) and having to work through another department (25%). These data and further research exploring the extent of limitations faced when there is lack of program control over website content could provide an effective argument for obtaining greater control over program websites, thus allow programs to be more effective in recruiting potential applicants.

Comparison of Student and Director Views

"Application requirements" was the highest-rated factor by genetic counseling students for importance when making application decisions. This may indicate that, while there are many factors that applicants consider when making application decisions, they ultimately want to know how to apply and what the process entails before, and possibly during, application to that program. The importance of application requirements was significantly underestimated by the directors. This may be due to a focus on getting students to attend their program, and the application requirements of a program are not a significant aspect of that goal. However, getting an individual to apply to a particular program could be considered the first step to successfully convincing that student to attend that particular program. No previous studies were found that compare different perceptions of a website between the intended users and the creators.

Study Limitations

Study limitations included a small number of responses from leadership of the genetic counseling graduate programs (34.4%), although it was sufficient for analysis. The email invitation did not explicitly ask for both the director and assistant/associate directors to participate in the survey; as the responses were anonymous it is impossible to determine

to what extent this factor may have contributed. The anonymity of the survey also makes the number of programs represented by the directors' responses indeterminable. In addition, the applicant survey was limited as only successful genetic counseling program applicants were surveyed, as there was no access to the entire pool of applicants. Surveying all applicants prospectively may be a way to broaden generalizability of the data obtained.

Another limitation was the inability to directly compare responses from the applicants and directors. The students were asked to rate each of twelve factors on a 5-point Likert scale, while the directors categorized each of their twelve factors on a 3-point scale. This was an oversight made during the survey construction. Although it was possible to numerically convert directors' responses to compare answers between both surveys, in the future, it would be helpful to use the same rating scale to provide more exact comparisons. As the director survey did not include the intermediate scores available to the students, the director scores may have been over- or underestimated in this study, which could have affected comparisons. As students selected from a pre-determined list, there may be other factors that students either do or do not find important when choosing a genetic counseling program and this area may benefit from an exploratory qualitative research approach.

Conclusion

This study showed that successful applicants do use individual genetic counseling program websites in making their application decisions. Applicants generally reported they choose not to apply to programs based solely on the ease of use of that program's website. Applicants wanted to know as much information as possible through viewing of individual program websites, particularly related to application requirements; that desire was significantly underestimated by program directors. Successful applicants also developed a first impression about a specific program from its website, and indicated they would, ideally, like to get an impression of the personality of a program, particularly its unique aspects and strengths. To facilitate application, it may be helpful if comprehensive information about a program is made available on a program's website, particularly regarding application requirements and process. Having updated, organized information available is essential for students to navigate and utilize the information presented to their advantage. Website optimization appears to be in the best interest of both genetic counseling programs and

students, possibly increasing applications to individual programs and yielding optimal program-student "fit."

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