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I, Sarah Caldwell B.S., hereby submit this original work as part of the requirements for the degree of Master of Science in Genetic Counseling.

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The relationship between the supervisory working alliance and student self-efficacy in genetic counseling training

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**The relationship between the supervisory working
alliance and student self-efficacy in genetic counseling training**

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Abstract

Clinical supervision is an essential component of genetic counselor training. The purpose of this study was to determine if a genetic counseling student's perception of the supervisory working alliance (SWA) is related to genetic counseling student self-efficacy on select clinical practice-based competencies, evaluating the second tenet of the Reciprocal Engagement Model of Supervision (REM-S) from a student perspective. Establishing if this relationship is critical to supervision in genetic counseling as suggested in the REM-S is an important step in being able to guide supervisors toward best practices in supervision. Because supervision is a necessary component of clinical training, determining factors related to student self-efficacy has the potential to impact future clinical practice. Second year genetic counseling students (N=168) completed an online survey containing demographic and clinical rotation experience questions, the Supervisory Working Alliance Inventory-Trainee Form, and the Genetic Counseling Self-Efficacy Scale (GCSES). The GCSES was created and piloted by the investigators prior to distribution of this survey. The items on the self-efficacy scale were adapted from the ACGC Practice-Based Competencies for all genetic counselors. Overall, the SWA was significantly associated with genetic counseling student self-efficacy after controlling for multiple clinical variables. Additionally, the association between the SWA and self-efficacy differed based on whether a student had one supervisor or more than one supervisor. The relationship between the SWA and self-efficacy was specific to those who had only one supervisor and thus highlights that the supervisory working alliance is most important when the student has only one supervisor. This serves as an important step in being able to guide supervisors toward effective methods in supervision, which may include encouraging supervisors to build a strong

relationship with their supervisee in order to help strengthen the genetic counseling student's confidence in their clinical skills.

Keywords: Supervision, Genetic counseling training, Supervisory working alliance, Self-efficacy, Supervisor, Clinical Supervision

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Introduction

Clinical supervision is instrumental in the successful completion of genetic counselor training (Hendrickson, McCarthy Veach, & LeRoy, 2002). Genetic counseling clinical supervision addresses four primary areas: promoting professional development of supervisees, ensuring that patients receive superior care, socializing students to the profession, and allowing supervisors to serve as “gate-keepers” for the genetic counseling field by ensuring students are meeting ACGC practice-based competencies (PBC) (Finley, Veach, MacFarlane, LeRoy, & Callanan, 2015). The American Board of Genetic Counseling (ABGC) developed practice-based competencies (later updated by ACGC) to serve as academic and clinical training guidelines (Fiddler, Fine, & Baker, 1996). These competencies are utilized in the training of genetic counseling students and the sustainment of practicing genetic counselors’ competency in clinical practice (ACGC, 2013). The PBCs are organized into four domains: (a) Genetics Expertise and Analysis, (b) Interpersonal, Psychosocial and Counseling Skills, (c) Education, and (d) Professional Development and Practice (ACGC, 2013). Not only is clinical supervision vital in the development of a genetic counseling student, but it also serves great importance to the patient by ensuring they are receiving appropriate care from the trainee (Atzinger, He, & Wusik, 2014). It is, therefore, critical to assess what aspects of supervision in genetic counseling help facilitate student skill development in a clinical setting.

Self-Efficacy

Self-efficacy is the perception of one’s own capability of performing a certain action in a given situation (Bandura, 1982). Self-efficacy can provide a basis for evaluation of the supervision experience in clinical training. When trainees have good self-efficacy, it can empower them to successfully complete tasks and show advancement in task performance

(Finley et al., 2015). Bandura's self-efficacy theory indicates that self-efficacy is comprised of two aspects: efficacy expectations and outcome expectations. Efficacy expectations refer to one's beliefs about skills for effectively performing certain tasks, while outcome expectations refer to one's beliefs about the possibility that their own actions will lead to a provided outcome. Even though higher expectations do not necessarily indicate proficiency in a certain task, Bandura asserts that they can affect one's willingness to continue engaging in the task (Bandura, 1982; Bandura, 1997; Finley et al., 2015).

Self-efficacy of trainees has been studied in multiple fields, including counseling. The Counselor Self-Efficacy Scale (CSES) was utilized to measure self-efficacy of counseling psychology master's level students, doctoral students, and professional psychologists. The CSES measured their self-efficacy of knowledge and skill competencies related to both individual and group counseling and therapy. They found that a student's level of training and amount of clinical experience were significantly related to student self-efficacy (Melchert, Hays, Wiljanen, & Kolocek, 1996). Tang et al. (2004) studied counselor education self-efficacy using the Self-Efficacy Inventory (S-EI) and found that length of internship hours and previous counseling-related experiences increased student self-efficacy.

Supervision and Genetic Counseling

Previous research has been conducted on aspects of clinical supervision in genetic counseling, primarily focusing on identifying what methods of supervision are being used and the clinical supervisor's perspective of their own competence in supervision. Several studies have identified that live supervision is the most prevalent supervision method used in genetic counseling training (Hendrickson et al., 2002; Masunga, Wusik, He, Yager, & Atzinger, 2014). Live supervision can be defined as the presence of a supervisor during parts or all of the

counseling session in which the supervisee, or genetic counseling student, is conducting the counseling (Finley et al., 2015; Hendrickson et al. 2002; Lindh, Veach, Cikanek, & LeRoy, 2003; McCarthy Veach & LeRoy, 2009). It involves the genetic counselor serving as the clinical supervisor providing guidance in case preparation to the genetic counseling student, observation of the student and roles they take on during a live genetic counseling session with patients, and providing feedback to the students after the session (Finley et al., 2015; Masunga et al. 2014; McCarthy Veach & LeRoy, 2009). Live supervision is an essential component in the training of genetic counseling students (Hendrickson et al., 2002; Lindh et al., 2003; McIntosh, Dircks, Fitzpatrick, & Shuman, 2006).

Research has also looked at how genetic counselors learn to be clinical supervisors. Several studies have found that genetic counselors are primarily self-taught, meaning little to no formal training of supervisors taking place (Atzinger et al., 2014; Lindh et al., 2003). Although supervisor training is not standardized for genetic counselors currently, formal supervision training has been found to be associated with greater feelings of self-reported “confidence and competence” as supervisors, even in individuals who have more experience as a clinical supervisor (Atzinger et al., 2014). It has also been found that a one-day live supervision conference had the potential to increase feelings of confidence and competence in clinical supervision skills among genetic counselors that attended (Atzinger et al., 2015).

Eubanks Higgins et al. (2012) used a Delphi process to develop genetic counseling supervisor competencies, which could potentially serve as a reference point in the future training of supervisors within the field. They developed six domains of supervisor competencies. Finley et al. (2015) evaluated supervisor self-efficacy for a sub-set of clinical supervision competencies as a function of their supervision or genetic counseling experience. High supervisor self-efficacy

was related to having a greater number of supervisees during their career. In regard to supervisor training methods, supervisors expressed their greatest interest was in the feedback from the trainee (Finley et al., 2015). At this time, all studies of supervisor self-efficacy and competence in the role have focused on clinical supervisors' self-assessment of their own skills. No studies have looked at the impact of supervision on genetic counseling students' skill development. Finley et al. (2015) noted that future studies evaluating self-efficacy from the genetic counseling student point of view would elicit beneficial information regarding how genetic counselors impact the self-efficacy of the student during supervision.

Reciprocal Engagement Model of Supervision

The Reciprocal Engagement Model of Supervision (REM-S) was developed by Wherley Veach, Martyr, and LeRoy, (2015) as an isomorph of the Reciprocal Engagement Model (REM) created for the genetic counseling process. It is a theoretical model of supervision in genetic counseling. REM-S consists of tenets, goals, and outcomes that can provide a basis for the supervision of genetic counseling students. Education, individual student attributes, and the working alliance are components of this framework. Education encompasses both knowledge and the skill set required of genetic counseling students in the clinical setting. Individual student attributes focus on the concept of student-centered supervision, including student autonomy, student capabilities in becoming genetic counselors, and the impact of student emotions on supervision. The working alliance refers to the working relationship between student and supervisor, including communication and bond. The REM-S is beneficial because it can provide a basis for the supervision process, outlining specific goals and outcomes (Wherley et al., 2015).

The development of a working alliance serves the second tenet of the REM-S: "Relationship is integral to genetic counseling student supervision." The authors suggest that, as

in other fields, the working alliance is essential to a genetic counseling student's development in a clinical rotation. The REM-S outlines three goals within the working alliance: "1) Supervisor and student establish a bond, 2) Good supervisor-student communication, and 3) Supervisor characteristics positively influence the process" (Wherley et al., 2015, p.708). At this time, there has been no empirical assessment of the REM-S.

Supervision, Working Alliance, and Student Self-Efficacy in Related Fields

The supervisory working alliance is a critical component of counseling supervision. Efstation, Patton, & Kardash, (1990) characterized the supervisory working alliance as the relationship between supervisor and supervisee that fosters the training of the supervisee, utilizing the developed skills and knowledge of the supervisor. The Supervisory Working Alliance Inventory (SWAI) was developed by Efstation et al. (1990) in order to measure perceptions of the supervisory relationship between supervisor and supervisee from each perspective respectively in the counseling field. The "Trainee's Version" and the "Supervisor's Version" were developed in order to assess the working alliance from different perspectives.

Ladany, Ellis, and Friedlander, (1999) studied counselor trainees to examine the relationship between the supervisory working alliance, satisfaction with the supervision process, and trainee self-efficacy. These counselor trainees were individuals from counselor education and clinical psychology training programs. Counselor trainee satisfaction with supervision was associated with the emotional bond, a critical aspect of the working alliance. When the emotional bond between supervisor and trainee is strengthened, trainees' perceptions of their supervisors and themselves became more positive, resulting in trainees being more comfortable in supervision. Vice versa, if the trainee perceived the emotional bond to become weaker over time, there was an increase in negative feelings and perceptions, resulting in less comfort of the trainee

in the supervisory relationship (Ladany et al., 1999). Another study of 24 graduate-level counseling trainees revealed that the supervisory working alliance, measured by the SWAI, were prognostic of the trainee's development of skills and personal growth, measured by the Counseling Skills and Personal Development- Rating Form (CSPD-RF) (Horrocks & Smaby, 2006).

The purpose of the present study was to determine if a genetic counseling student's perception of the supervisory working alliance is related to genetic counseling student self-efficacy on select clinical practice-based competencies, evaluating the second tenet of the Reciprocal Engagement Model of Supervision (REM-S) from a student perspective. Literature in other fields suggests that building a good alliance with the student is critical to helping a student progress in their skills and in their belief in their ability to perform counseling. Establishing whether this relationship is also critical to supervision in genetic counseling as suggested in the REM-S is an important step in being able to guide supervisors toward best practices in supervision. Because supervision is an essential component of clinical training, determining factors related to student self-efficacy has the potential for impacting future clinical practice and the services patients receive from practicing genetic counselors.

Methods

This study was approved by the Cincinnati Children's Hospital Medical Center Institutional Review Board (Study #2016-3218).

Participants and Procedures

The target population for this study was students currently in their second year of training in an accredited genetic counseling program. An invitation to participate in the survey was emailed to the Association of Genetic Counseling Program Directors (AGCPD) listserv.

Directors of accredited genetic counseling programs were invited to forward the invitation to their program's second year genetic counseling students. Students who completed the survey were given a \$5 gift card. Data collection took place October through November 2016.

Instrumentation

The online survey was administered through SurveyMonkey. The survey consisted of 3 sections: (a) demographics and students' clinical rotation experience, (b) the Supervisory Working Alliance Inventory- Trainee Form, and (c) a newly-developed Genetic Counseling Self-Efficacy Scale.

Demographics/Rotation Experience. This section included close-ended questions to assess students' demographics including age and sex. In addition, students were asked about their clinical rotation experience during their training. Questions included average length of clinical rotations, how many previous rotations they have had, number of cases they had observed, number of cases in which they had taken on at least one face-to-face role in the genetic counseling session, number of core (countable) cases, how many supervisors they report to in their clinical rotation, the types of cases they were seeing (cancer, pediatric, prenatal, specialty, adult, other), and if they had experience with these types of cases in previous clinical rotations. If participants had more than one supervisor for their current clinical rotation, they were asked to choose the supervisor with whom they had the most experience to focus on when completing the Supervisory Working Alliance Inventory-Trainee Form

Supervisory Working Alliance Inventory – Trainee Form. The Supervisory Working Alliance Inventory-Trainee Form (SWAI-T) is a validated tool developed by Efstation et al. (1990). It is designed to assess a trainee's perceptions of the supervisory relationship, or working alliance, between supervisor and trainee in counselor supervision. It contains 19

statements in which participants respond to based on a 7-point Likert scale. The SWAI-T was developed through survey research where trainees in counseling and other related programs completed a survey of 30 items, consisting of tasks and behaviors that occur within the working alliance. Two factors emerged through factor analysis that accounted for approximately 38% of the known variance. The 30 items were pared down to 19 by eliminating items based on factor loading; three items were eliminated that had loadings less than 0.40 and eight items were eliminated because they were nearly identical in magnitude and had loadings greater than 0.25 on both factors. Because factor analysis yielded two factors, the SWAI-T is comprised of two subscales, Rapport and Client Focus. Rapport reflects the effort of the supervisor to build a relationship with the trainee through support and encouragement: for example “My supervisor encourages me to talk about my work with clients in ways that are comfortable for me.” Client Focus refers to the emphasis supervisors place on the understanding of the client by the trainee: for example “My supervisor encourages me to take time to understand what the client is saying and doing” (Efstation et al. 1990).

Genetic Counseling Self-Efficacy Scale (GCSES). The Genetic Counseling Self-Efficacy Scale (GCSES) was created and piloted by the investigators prior to distribution of this survey. The items on the self-efficacy scale were adapted from the ACGC Practice-Based Competencies (PBC) for all genetic counselors. Items were developed from PBC’s in all four domains: (a) Genetics Expertise and Analysis, (b) Interpersonal, Psychosocial and Counseling Skills, (c) Education, and (d) Professional Development and Practice. Competencies were modified to minimize the frequency of statements that essentially addressed two separate competencies in the self-efficacy tool. For example, the PBC “Describe the continuum of non-directiveness to directiveness [i.e., a competency involving the ability to “describe”], and

effectively utilize an appropriate degree of guidance for specific genetic counseling encounters [i.e., a competency involving demonstration of a skill]” (ACGC, 2013) was adapted into the scale item “Utilize an appropriate degree of directive or non-directive guidance for specific genetic counseling encounters.”

The GCSSES was constructed using a 100-point scale in increments of 10, starting at 0 (“Not at all certain I can do”), ranging to 50 (“Moderately certain I can do”), and to 100 (“Highly certain I can do”). A 0 to 100 response format self-efficacy scale has been reported to be a good indicator of performance because it allows for greater differentiation of perceived self-efficacy with the inclusion of more intermediate steps compared to a smaller scale (Bandura, 2006). Participants were asked to rate how certain they are that they can independently perform each competency as of that day in a genetic counseling session. As suggested by Bandura (2006), the term “can” was used in the scale rather than “will” because “can” refers to a perceived assessment of capability, while “will” refers to intention (Bandura, 2006).

The original 49-item self-efficacy scale was then piloted with 20 genetic counseling students who were between their first and second year of training and 18 practicing genetic counselors that had experience ranging from one to 27 years. The students were contacted through the program directors at each of the three accredited genetic counseling programs in Ohio: Ohio State University, Case Western Reserve University, and University of Cincinnati. Genetic counselors were contacted through the Cincinnati Genetic Counseling Program clinic supervisor list. For each item, the Wilcoxon Rank Sum test was used to compare the median self-efficacy between students and genetic counselors. Items that did not reach a nominal significance level ($p < 0.05$) between these two groups were removed. In addition, pilot participants were asked for feedback on the items. Several items were noted to be very similar.

For those items that contained similar wording and were highly correlated with each other, the item perceived by the research team to be “simpler” to perform was removed. For example, “Develop a case management plan that includes case preparation and follow up” was removed from the scale while the following item was retained: “Modify the case management plan as needed in order to incorporate changes in management and surveillance recommendations.” In total, nine items were removed from the scale after the pilot. Therefore, the final GCSSES contained 40 items. This included 18 items from the “Genetics Expertise and Analysis” domain, 17 items from the “Interpersonal, Psychosocial and Counseling Skills” domain, 4 items from the “Education” domain and 1 item from the “Professional Development and Practice” domain. Given the small target population, the students who participated in the GCSSES pilot were not excluded from the main survey.

Data Analysis

Descriptive statistics were used to characterize the study population. Frequency (percentage) was reported for categorical variables while mean and standard deviation were reported for continuous variables. The predictors of interest were two subscales of working alliance between supervisor and genetic counseling student on a seven-point scale: rapport and client focus. The primary outcome was self-efficacy with 40 items. For each participant, the average score was calculated for each domain of the self-efficacy tool; for each participant, the average score was also calculated for Supervisory Working Alliance and for each subscale.

Factor analysis was first used to investigate whether the set of self-efficacy items are linearly related to a smaller number of unobservable factors. Initially, the factorability of the 40 self-efficacy items was examined. The Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett’s test of sphericity were used to determine the factorability of correlation matrix as a

whole. The scree test was used to determine the number of factors to be extracted, in combination with 50 to 75% of the total variance explained using the least number of factors. Maximum likelihood method was used to obtain the first set of loadings and the oblimin rotation was used for the final solution. Items which had a primary/target factor loading < 0.3 were removed. The “Thurstone” regression scores were calculated for each underlying factor. Linear regression was performed to test the association between demographic/clinical variables and the underlying factors. To test the association of the underlying factors of self-efficacy with supervisory working alliance, simple linear regression was performed, as well as multiple linear regression in which all the significant demographic/clinical variables were included as covariates to adjust for potential confounding. The interaction between supervisors (one supervisor vs. more than one supervisor) and supervisory working alliance was also tested in linear regression model of self-efficacy factors. Stratified analysis was performed after interaction was detected. A p value adjustment is usually needed to control for family-wise error rate in a study with multiple hypotheses. However, given the exploratory nature of this study, a nominal p value threshold ($p < 0.05$) was applied for significance for all comparisons. All the analyses were performed in R software, version 3.22 (<https://www.r-project.org>).

Results

The entire population of 291 second year genetic counseling students had the potential to be invited to participate in the survey though it is unknown if all program directors forwarded the survey to their students. One hundred and sixty-eight surveys were completed for an overall response rate of 57.7%.

Sample Demographics and Clinical Characteristics

Demographics of the sample are outlined in Table 1. The vast majority of participants were female and ranged in age from 22 to 37. Participants reported a mean of 7.8 weeks as the average length of a clinical rotation and a mean of 4.3 as the number of clinical rotations completed up to this point in their training. The total number of cases observed, cases participated in, and core (countable) cases acquired thus far in training varied greatly among participants. Most participants (77%) reported to 3 or fewer supervisors in their current clinical rotation. Participants reported on the types of cases they were seeing in their current clinical rotation: 48 were in a prenatal clinic setting, 40 in cancer, 37 in adult, 17 in pediatric, 10 in specialty, and 14 reported to be in a non-specified “other” rotation. Comments from the participants indicated the “other” rotation included cardiovascular, laboratory, industry, and metabolic areas. Slightly more than half of participants reported having a previous clinical rotation in the same specialty area as the current clinical rotation.

Factor Analysis of Self-Efficacy Competencies

Initially, the factorability of the 40 self-efficacy items was examined. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.9, above the recommended value of 0.6, and Bartlett’s test of sphericity was significant [$\chi^2(780) = 4666, p < .001$]. These two measures together suggested reasonable factorability for this scale. The scree plot suggested 5 factors, which only accounts 49% of the total variance. However the six factors solution was chosen because it explained a larger portion of the variance (58%) and allowed for easier interpretation of the factors. By examining the factor loading, a total of two items were eliminated because they did not contribute to a simple factor structure and failed to meet a minimum criterion of having a primary factor loading of 0.3 or above. These items (item 4 “Extract pertinent information from available medical records” and item 18 “Integrate information from a literature review into a

genetic counseling session appropriately”) happened to refer to skills performed outside of the actual clinical visit.

Factor analysis was then re-performed on the remaining 38 items, assuming six factors and using maximum likelihood method and oblimin rotation. The Tucker Lewis Index of factoring reliability is 0.852 and the Root Mean Square Error of Approximation (RMSEA) index is 0.076, indicating reasonable errors of approximation in the population. All six factors together explain 58% of the total variance of the observed variables. Specifically, factor 1, factor 2 and factor 3 account for 11% separately, factor 4 accounts for 10%, factor 5 accounts for 9%, and factor 6 accounts for 7%. Factor loadings are presented in Table 2. All items had primary loadings over 0.3. Factors were labeled as follows based on the items that were loaded to each: Factor 1 – Complex Skills, Factor 2 – Communication, Factor 3 – Genetic Testing, Factor 4 – Basic Psychosocial Skills, Factor 5 – Genetic Counseling Process, and Factor 6 – Information Gathering.

Student Self-Efficacy with GC Skills

Student self-efficacy means and standard deviations for each factor are reported in Table 2. The highest mean self-efficacy was for Information Gathering and the lowest mean self-efficacy was for Complex Skills. Responses on the GCSES for Complex Skills, Communication, and Genetic Testing ranged from 0-100. The overall range of responses for Basic Psychosocial Skills was 10-100, for Genetic Counseling Process was 20-100, and for Information Gathering was 40-100.

Effect of other Clinical Experience variables on Student Self-Efficacy

Multiple clinical experience variables were examined to test the associations with the GCSES factors (Table 3). The number of countable cases a student had was significantly related

to the factors Communication, Genetic Testing, Genetic Counseling Process, and Information Gathering ($p < 0.05$). The number of clinical rotations a student had completed in their training was significantly related to Genetic Testing, Genetic Counseling Process, and Information Gathering ($p < 0.05$). The number of cases the student had participated in face-to-face roles was significantly related to Communication, Genetic Testing, and Genetic Counseling Process ($p < 0.05$).

Effects of Supervisory Working Alliance on Student Self-Efficacy

The overall Supervisory Working Alliance and its subscales were significantly positively associated with each GCSSES factor by simple linear regression (Table 4); the higher the SWAI-T score, the greater the student's self-efficacy. A multiple linear regression model was performed, in which all the significant demographic/clinical variables were included as covariates to adjust for potential confounding, including average length of clinical rotation, number of countable cases, previous experience in a clinical area, student's age, number of cases the student had participated in a face-to-face role, number of supervisors in current clinical rotation, sex, and number of observed cases. After controlling for all the potential confounders, the overall supervisory working alliance was still significantly associated to all GCSSES factors.

The interaction between supervisors (one supervisor vs. more than one supervisor) and supervisory working alliance was also tested in linear regression model of self-efficacy factors. The interactions were significant for all self-efficacy factors except Information Gathering. Stratified analysis was performed for the other five factors (Complex Skills, Communication, Genetic Testing, Basic Psychosocial Skills, Genetic Counseling Process) after interactions were detected. Data was stratified based on whether a student had one supervisor or more than one supervisor. The supervisory working alliance was significantly associated with student self-

efficacy for all of these five factors for students with only one supervisor. This relationship was not significant when the student had more than one supervisor for any of these five factors.

Discussion

Overall, this study found that the student's perception of the supervisory working alliance between genetic counselor and genetic counseling student is related to a student's self-efficacy to perform certain genetic counseling tasks. Although this has not been studied specifically in genetic counseling literature, this is consistent with findings in other fields including counselor training where they have illustrated that trainee perceptions of the working alliance are predictive of trainee's acquirement of skills and their personal growth (Horrocks et al., 2006). In previous studies, scores on the rapport and client focus sub-scales of the SWAI-T were predictive of counselor trainee self-efficacy scores on the Self-Efficacy Inventory (Efstation et al., 1990).

Factors of the GCSES

The GCSES was piloted with genetic counseling students and practicing genetic counselors. Results of the pilot illustrated that the GCSES can differentiate between the self-efficacy of two clearly defined populations of differing experience level, suggesting it an effective tool to use to measure genetic counseling self-efficacy. In the main study population, a wide range of self-efficacy scores and lower average scores on more complex skills also lend support for the effectiveness of this tool in measuring self-efficacy.

Six factors emerged from factor analysis of the GCSES. These factors explained over half of the variance, thus allowing confidence in this tool and the factors that comprise it. Complex Skills includes eight competencies that involve advanced skills in counseling, communication, and follow-up with clients. Communication includes eight competencies that involve professional and interpersonal skills related to communication with a client. Genetic Testing

includes eight competencies that involve facilitating, interpreting, and incorporating genetic testing information in to a genetic counseling session. Basic Psychosocial Skills includes five competencies that relate to basic psychosocial assessment and counseling skills within a genetic counseling session; for example, the use of empathy and normalization. Genetic Counseling Process includes six competencies that involve implementing and explaining the process of genetic counseling during a session. Information Gathering includes three competencies that involve collecting information in a genetic counseling session; for example a medical history and family history.

Through use of the GCSES, we were able to assess the self-efficacy of genetic counseling students during the first few months of their second year in a genetic counseling graduate program. Overall, the highest means of self-efficacy were in more basic skills, including Information Gathering and Genetic Counseling Process. The highest scoring competency within Information Gathering was “Accurately record a family history by drawing a pedigree using appropriate pedigree symbols” with a mean score of 95.4. This makes sense because this is typically one of the foundational skills that students learn at the beginning of their training. Second year genetic counseling students reported the lowest self-efficacy in Complex Skills. These results make sense in light of when this survey was administered. Complex Skills involves skills that students are still working on at the end of their training and even during their genetic counseling career, therefore one would expect students to have lower self-efficacy in these skills toward the beginning of their second year of training. The overall mean for Complex Skills was low at 71.1. The lowest scoring competency within this factor was “Implement evidence-based models of counseling to a genetic counseling session as appropriate (e.g. short-term client-centered counseling, grief counseling, crisis counseling)”. This competency’s mean was

significantly lower than the other competencies in this factor and thus contributed to the overall lower mean for Complex Skills.

Predictors of Self-Efficacy

This study evaluated aspects of clinical training that may be related to a student's self-efficacy. Genetic counseling training programs vary in how clinical rotations are implemented into programs. As data suggests from this study, there is great variability between programs; for example, clinical rotation length and the number of clinical rotations students complete during their training differs among training programs.

In order to graduate from an accredited genetic counseling program and sit for the board certification exam, a student must have fifty total countable cases between four specialty areas (pediatric, adult, prenatal, and cancer). ACGC Accreditation Standards state that a core case is one in which the student, at a minimum, completes one role from each category (management, education, and counseling) (ACGC, 2013); however, programs may have additional requirements which can vary between programs. Interestingly, the number of countable cases a student had was significantly related to the factors Communication, Genetic Testing, Genetic Counseling Process, and Information Gathering; it was not significantly related to Complex Skills and Basic Psychosocial Skills. This may be because students completed the survey toward the beginning of their second year of training and weren't incorporating these more advanced skills into sessions as much as they had with other skills and were therefore not as comfortable with them. It is possible that a relationship between experience and these other two factors might be seen at a later point in training.

Supervisory Working Alliance and Self-Efficacy

The supervisory working alliance is significantly related to student self-efficacy. All six factors of the GCSES were significantly related to the overall SWA score and each subscale (rapport and client focus) independently. The association between self-efficacy and the supervisory working alliance differed based on whether a student had one supervisor or more than one supervisor. The relationship between supervisory working alliance and self-efficacy was specific to those who had only one supervisor for all but one of the factors, and thus highlights that the supervisory working alliance is most important when the student has only one supervisor. This could be because the alliance between supervisor and supervisee does not have as much impact when the student works with multiple people. It could also be because we do not know enough about the multiple relationships a student has with their supervisors since students were only asked to answer questions in the survey based on one supervisor in their current clinical rotation with which they had the most experience.

The relationship between supervisory working alliance and self-efficacy could be due to a number of possibilities. It is possible that this is because a better working alliance between supervisor and student allows a student to make more progress on their clinical development and thus, feel more confident in their skills. It could also be that a good working alliance is not impacting skill development, but instead impacting only a student's confidence which is reflected in the self-efficacy scores. Alternatively, the relationship between supervisory working alliance and self-efficacy could be the opposite, students with strong clinical skills may begin a clinical rotation by feeling more confident, which allows them to have better rapport with their supervisor because they expect to get or are getting more positive feedback from that supervisor. Lastly, it could be that a third factor such as increased experience is related both to feelings of

self-efficacy and to the ability of students to build a strong relationship with their supervisor. However, the relationship between the working alliance and self-efficacy was still present when controlling for number of clinical cases suggesting it is independent of experience.

Supervisory Working Alliance and the Reciprocal Engagement Model of Supervision (REM-S)

By studying the supervisory working alliance from the genetic counseling student's perspective, we were able to evaluate one of three tenets of the REM-S outlined by Wherley et al. (2015). REM-S Tenet 2 states, "Relationship is Integral to Genetic Counseling Student Supervision." One of the corresponding goals within this tenet is establishment of bond between supervisor and student. Although this study only evaluates this bond from the perspective of the trainee, it demonstrates that the relationship between trainee and supervisor affects the way the trainee perceives their ability to perform certain skills during a clinical rotation, lending support to this aspect of the REM-S at least in cases where students have only one supervisor.

The provided outcomes of clinical supervision and the REM-S include the student being able to "provide effective services, develop professionally, and engage in self-reflective practice" (Wherley et al. 2015, p.704). These outcomes are encompassed in the ACGC Practice-Based Competencies which served as the basis for the framework of the GCSES. Therefore, an indication of these outcomes can be measured by a student's self-efficacy, providing a basis for evaluation of the supervision experience in clinical training.

Limitations and Future Studies

One limitation of this study was the size of the study. The population for this study was all second year genetic counseling students in accredited genetic counseling programs in the United States and Canada. Even though there was a high response rate, a larger sample size

might have allowed for a better fitting model during factor analysis of the GCSES. Repeating this study with future cohorts of GC students might strengthen this study's conclusions.

Another limitation of this study is that data was collected at only one point during the clinical training of genetic counseling students. Measuring student self-efficacy at different time points in a student's clinical training would allow a student's progression in clinical skills, measured by self-efficacy, to be evaluated over time and during different clinical rotations. Additionally, this study relied on self-report of genetic counseling students in reporting their self-efficacy as well as the working alliance. Social desirability bias may be present as students may feel they need to respond in a certain way because of their status as a student. They may report higher feelings of self-efficacy to indicate where they feel they should be in skill development and attainment rather than where they actually are. They may also rate their relationship with their supervisor as stronger based on expectations that they are supposed to work well with supervisors. Responses on self-efficacy items and SWAI-T did show a wide range which indicates at least some portion of respondents were comfortable rating particular skills at the very low end of the range.

As discussed briefly before, self-efficacy is not the same as skill level. Although self-efficacy expectations may influence an individual's persistence in a task, greater self-efficacy does not indicate competence of that task (Bandura, 1997; Finley et al., 2015). Therefore, a study evaluating the working alliance and its impact on actual performance may lend support to the current conclusions. Finally, future studies could study a cohort of genetic counseling students over time throughout their clinical training, which would allow us to see how student self-efficacy changes over the course of genetic counseling training.

Conclusion

This was an exploratory study assessing the supervisory working alliance and how it relates to a genetic counseling student's self-efficacy in performing clinical tasks. Overall, the relationship between the student and supervisor is related to the way a student perceives their ability to perform clinical competencies during their clinical training particularly when they have only one supervisor. This highlights the role that the supervisory working alliance plays in supervision, as suggested by the REM-S. This serves an important step in being able to guide supervisors toward effective methods in supervision, which may include encouraging supervisors to build a strong professional relationship with their supervisee to help strengthen the genetic counseling student's confidence in their clinical skills.

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Table 1: Participant demographics and clinical characteristics (N=168)

Variable	Range	Mean $\pm$ SD
Age (years)	22 - 37	25.1 $\pm$ 2.8
Avg. length of clinical rotation (weeks)	4 - 16	7.8 $\pm$ 2.5
Number of clinical rotations completed	1 - 11	4.3 $\pm$ 2.1
Number of observed cases	2 - 157	40.1 $\pm$ 27.0
Number of participated cases	15 - 200	76.4 $\pm$ 34.5
Number of core (countable) cases	15 - 173	58.1 $\pm$ 30.1
Number of supervisors in current rotation	1 - 15	2.8 $\pm$ 2.2
Variable	Percentage	
Female	96%	
Previous experience with current rotation specialty area	57%	

Table 2: Factor Analysis of Self-Efficacy Competencies

Competency	Loading ¹	Factor label	Mean ²	Mean $\pm$ SD ³
Evaluate the need for intervention and referral for a client based on their psychosocial needs.	0.75	Factor 1: Complex Skills	65.7	71.1 $\pm$ 20.7
Implement evidence-based models of counseling to a genetic counseling session as appropriate	0.72		60.1	
Utilize in-depth exploration of client responses to risks and options.	0.51		70.4	
Respond to client-counselor relationship dynamics, such as transference and countertransference.	0.48		72.6	
Utilize anticipatory guidance in a genetic counseling session.	0.44		73.5	
Present balanced descriptions of lived experiences of people with various conditions to a client.	0.41		76.1	
Identify appropriate resources, services and support for a client.	0.38		80.1	
Discuss potential costs of genetic/genomic testing with a client.	0.31		70.1	
Communicate relevant genetic information to a client to help them better understand certain conditions.	0.84	Factor 2: Communication	88.9	80.5 $\pm$ 16.8
Communicate with clients in a way that is clear and unambiguous based on the client's needs and circumstances of the encounter.	0.78		83.5	
Maintain professional boundaries by ensuring directive statements, self-disclosure, and self-involving responses are in the best interest of the client.	0.55		88.2	
Respond to ethical and moral dilemmas that may arise in genetic counseling practice.	0.45		71.6	
Utilize risk communication principles and theory to maximize client understanding.	0.43		77.8	
Utilize an appropriate degree of directive or non-directive guidance for specific genetic counseling encounters.	0.42		77.1	
Respond to client cultural beliefs relevant to the genetic counseling session.	0.42		73.3	
Facilitate client decision-making that is consistent with the values of the client.	0.39		83.5	
Assess the value of a diagnostic genetic/genomic test for determining treatment and management (clinical utility).	0.73	Factor 3: Genetic Testing	80.3	77.9 $\pm$ 16.7
Assess the accuracy with which a diagnostic genetic/genomic test identifies a client's clinical status (clinical validity).	0.67		77.1	
Interpret the clinical implications of genetic/genomic test reports.	0.57		82.3	
Incorporate the results of screening, testing, family history, environmental and lifestyle factors, and other relevant information to provide accurate risk assessment for clients (e.g. probability of carrier status, cancer risk assessment)	0.55		79.0	
Evaluate familial implications from genetic/genomic test results.	0.55		86.4	
Facilitate the ordering of appropriate genetic/genomic testing for the client.	0.49		72.5	
Select the most appropriate laboratory and genetic/genomic test for the given clinical situation.	0.48		70.2	
Modify the case management plan as needed in order to incorporate changes in management and surveillance recommendations.	0.48		75.7	
Respond with empathy to client's emotions and concerns.	0.92	Factor 4: Basic Psychosocial Skills	83.7	78.3 $\pm$ 17.9
Respond to a client's emotional and behavioral cues, expressed both verbally and non-verbally.	0.81		78.2	
Utilize advanced empathy in a genetic counseling session.	0.63		69.8	
Respond to a client using normalization in a genetic counseling session.	0.48		83.0	
Assess pertinent information relating to psychosocial history such as client emotions, individual and family experiences, beliefs, behaviors, values, coping mechanisms, and adaptive capabilities.	0.34		76.7	
Establish a mutually agreed upon genetic counseling agenda with the client.	0.84	Factor 5: Genetic Counseling Process	91.4	87.3 $\pm$ 14.0
Explain the genetic counseling process to a client.	0.73		93.6	
Contract with the client throughout the encounter to address emerging concerns.	0.64		86.5	
Present the genetic counseling encounter information orally to other health care providers in a clear and concise manner	0.36		81.4	
Discuss potential benefits, risks, and limitations of genetic/genomic testing with a client.	0.34		90	
Document the genetic counseling encounter information in accordance with professional guidelines and standards	0.32		80.8	

Formulate targeted, structured questions pertinent to an individual case in order to elicit a family history.	0.96	Factor 6: Information Gathering	86.8	88.9 ± 12.2
Ask targeted questions in order to elicit pertinent information from a client's medical history.	0.74		84.5	
Accurately record a family history by drawing a pedigree using appropriate pedigree symbols.	0.52		95.4	

¹Loading is the primary loading to each corresponding factor; ² mean for each item; ³ mean and standard deviation for all the items in each factor

Table 3: Clinical Rotation Experience Variables and Self-Efficacy
(*p*-values reported)

	Factor 1: Complex Skills	Factor 2: Communication	Factor 3: Genetic Testing	Factor 4: Basic Psychosocial Skills	Factor 5: Genetic Counseling Process	Factor 6: Information Gathering
Number of clinical rotations	0.09	0.18	0.004*	0.07	0.006*	0.02*
Estimated time in clinic (avg. length of clinical rotations x number of clinical rotations)	0.23	0.81	0.004*	0.10	0.03*	0.003*
Number of core (countable) cases	0.74	0.006*	0.006*	0.15	0.0001*	0.03*
Previous Experience with Current Rotation Specialty Area	0.048*	0.19	0.002*	0.41	0.06	0.07
Number of participated cases	0.24	0.01*	0.01*	0.67	0.002*	0.16
Number of observed cases	0.48	0.34	0.03*	0.03*	0.24	0.72

P values were obtained by linear regression

*=Significance

Table 4: Association Between Supervisory Working Alliance and Self-Efficacy Factors

Self-Efficacy	Supervisory Working Alliance		
	Rapport	Client Focus	Overall SWA
Factor 1: Complex Skills	0.03*	0.002*	0.006*
Factor 2: Communication	0.022*	0.04*	0.02*
Factor 3: Genetic Testing	0.0007*	0.01*	0.001*
Factor 4: Basic Psychosocial Skills	0.004*	0.004*	0.002*
Factor 5: Genetic Counseling Process	0.047*	0.04*	0.03*
Factor 6: Information Gathering	0.00006*	0.000003*	0.000006*

P values were obtained by linear regression

*=Significance

Appendix

Genetic Counseling Student Self-Efficacy Scale (GCSES)

*A number of competencies are described below that may be part of a genetic counseling session. Please rate how certain you are you can independently perform this competency **today** in a genetic counseling session.*

0 10 20 30 40 50 60 70 80 90 100

Not at all certain I can do

Moderately certain I can do

Highly certain I can do

1. Accurately record a family history by drawing a pedigree using appropriate pedigree symbols.
2. Formulate targeted, structured questions pertinent to an individual case in order to elicit a family history.
3. Ask targeted questions in order to elicit pertinent information from a client's medical history.
4. Extract pertinent information from available medical records.
5. Assess the accuracy with which a diagnostic genetic/genomic test identifies a client's clinical status (clinical validity).
6. Assess the value of a diagnostic genetic/genomic test for determining treatment and management (clinical utility).
7. Select the most appropriate laboratory and genetic/genomic test for the given clinical situation.
8. Discuss potential benefits, risks, and limitations of genetic/genomic testing with a client.
9. Discuss potential costs of genetic/genomic testing with a client.
10. Facilitate the ordering of appropriate genetic/genomic testing for the client.
11. Interpret the clinical implications of genetic/genomic test reports.
12. Evaluate familial implications from genetic/genomic test results.

13. Incorporate the results of screening, testing, family history, environmental and lifestyle factors, and other relevant information to provide accurate risk assessment for clients (e.g. probability of carrier status, cancer risk assessment)
14. Modify the case management plan as needed in order to incorporate changes in management and surveillance recommendations.
15. Present the genetic counseling encounter information orally to other health care providers in a clear and concise manner (e.g. case presentation to physician).
16. Document the genetic counseling encounter information in accordance with professional guidelines and standards (e.g. medical record documentation; letters to other providers).
17. Identify appropriate resources, services and support for a client.
18. Integrate information from a literature review into a genetic counseling session appropriately.
19. Establish a mutually agreed upon genetic counseling agenda with the client.
20. Explain the genetic counseling process to a client.
21. Contract with the client throughout the encounter to address emerging concerns.
22. Assess pertinent information relating to psychosocial history such as client emotions, individual and family experiences, beliefs, behaviors, values, coping mechanisms, and adaptive capabilities.
23. Respond with empathy to client's emotions and concerns.
24. Respond to a client's emotional and behavioral cues, expressed both verbally and non-verbally.
25. Respond to a client using normalization in a genetic counseling session.
26. Utilize anticipatory guidance in a genetic counseling session.
27. Utilize advanced empathy in a genetic counseling session.
28. Utilize in-depth exploration of client responses to risks and options.

29. Evaluate the need for intervention and referral for a client based on their psychosocial needs.
30. Implement evidence-based models of counseling to a genetic counseling session as appropriate (e.g. short-term client-centered counseling, grief counseling, crisis counseling).
31. Facilitate client decision-making that is consistent with the values of the client.
32. Maintain professional boundaries by ensuring directive statements, self-disclosure, and self-involving responses are in the best interest of the client.
33. Respond to client-counselor relationship dynamics, such as transference and countertransference.
34. Utilize an appropriate degree of directive or non-directive guidance for specific genetic counseling encounters.
35. Respond to client cultural beliefs relevant to the genetic counseling session.
36. Utilize risk communication principles and theory to maximize client understanding.
37. Communicate relevant genetic information to a client to help them better understand certain conditions.
38. Communicate with clients in a way that is clear and unambiguous based on the client's needs and circumstances of the encounter.
39. Present balanced descriptions of lived experiences of people with various conditions to a client.
40. Respond to ethical and moral dilemmas that may arise in genetic counseling practice.